2010 Annual Revision Cycle

National Electrical Code® Committee Report on Proposals

This Report contains the proposed amendments for the 2011 National Electrical Code® for public review and comment prior to October 23, 2009, and for consideration at the NFPA June 2010 Association Technical Meeting

NOTE: The proposals contained in this NEC Report on Proposals (ROP) and the comments addressed in a follow-up NEC Report on Comments (ROC) will be presented for action when proper Amending Motions have been submitted to the NFPA by the deadline of May 7, 2010. The June 2010 NFPA Conference and Expo will be held June 7-10, 2010 at the Mandalay Bay Convention Center, Las Vegas, NV. During the Conference and Expo, the Association Technical Meeting (Tech Session) will be held on June 9-10, 2010. For more information on the new rules and for up-to-date information on schedules and deadlines for processing NFPA Documents, check the NFPA website (www.nfpa.org) or contact NFPA Standards Administration.

NFPA
National Fire Protection Association
1 BATTERYMARCH PARK, QUINCY, MA 02169-7471

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Information on NFPA Codes and Standards Development

I. Applicable Regulations. The primary rules governing the processing of NFPA documents (codes, standards, recommended practices, and guides) are the NFPA *Regulations Governing Committee Projects (Regs)*. Other applicable rules include NFPA *Bylaws*, NFPA *Technical Meeting Convention Rules*, NFPA *Guide for the Conduct of Participants in the NFPA Standards Development Process*, and the NFPA *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council*. Most of these rules and regulations are contained in the *NFPA Directory*. For copies of the *Directory*, contact Codes and Standards Administration at NFPA Headquarters; all these documents are also available on the NFPA website at "www.nfpa.org."

The following is general information on the NFPA process. All participants, however, should refer to the actual rules and regulations for a full understanding of this process and for the criteria that govern participation.

II. Technical Committee Report. The Technical Committee Report is defined as "the Report of the Technical Committee and Technical Correlating Committee (if any) on a document. A Technical Committee Report consists of the Report on Proposals (ROP), as modified by the Report on Comments (ROC), published by the Association."

III. Step 1: Report on Proposals (ROP). The ROP is defined as "a report to the Association on the actions taken by Technical Committees and/or Technical Correlating Committees, accompanied by a ballot statement and one or more proposals on text for a new document or to amend an existing document." Any objection to an action in the ROP must be raised through the filing of an appropriate Comment for consideration in the ROC or the objection will be considered resolved.

IV. Step 2: Report on Comments (ROC). The ROC is defined as "a report to the Association on the actions taken by Technical Committees and/or Technical Correlating Committees accompanied by a ballot statement and one or more comments resulting from public review of the Report on Proposals (ROP)." The ROP and the ROC together constitute the Technical Committee Report. Any outstanding objection following the ROC must be raised through an appropriate Amending Motion at the Association Technical Meeting or the objection will be considered resolved.

V. Step 3a: Action at Association Technical Meeting. Following the publication of the ROC, there is a period during which those wishing to make proper Amending Motions on the Technical Committee Reports must signal their intention by submitting a Notice of Intent to Make a Motion. Documents that receive notice of proper Amending Motions (Certified Amending Motions) will be presented for action at the annual June Association Technical Meeting. At the meeting, the NFPA membership can consider and act on these Certified Amending Motions as well as Follow-up Amending Motions, that is, motions that become necessary as a result of a previous successful Amending Motion. (See 4.6.2 through 4.6.9 of *Regs* for a summary of the available Amending Motions and who may make them.) Any outstanding objection following action at an Association Technical Meeting (and any further Technical Committee consideration following successful Amending Motions, see *Regs* at 4.7) must be raised through an appeal to the Standards Council or it will be considered to be resolved.

VI. Step 3b: Documents Forwarded Directly to the Council. Where no Notice of Intent to Make a Motion (NITMAM) is received and certified in accordance with the Technical Meeting Convention Rules, the document is forwarded directly to the Standards Council for action on issuance. Objections are deemed to be resolved for these documents.

VII. Step 4a: Council Appeals. Anyone can appeal to the Standards Council concerning procedural or substantive matters related to the development, content, or issuance of any document of the Association or on matters within the purview of the authority of the Council, as established by the *Bylaws* and as determined by the Board of Directors. Such appeals must be in written form and filed with the Secretary of the Standards Council (see 1.6 of *Regs*). Time constraints for filing an appeal must be in accordance with 1.6.2 of the *Regs*. Objections are deemed to be resolved if not pursued at this level.

VIII. Step 4b: Document Issuance. The Standards Council is the issuer of all documents (see Article 8 of *Bylaws*). The Council acts on the issuance of a document presented for action at an Association Technical Meeting within 75 days from the date of the recommendation from the Association Technical Meeting, unless this period is extended by the Council (see 4.8 of *Regs*). For documents forwarded directly to the Standards Council, the Council acts on the issuance of the document at its next scheduled meeting, or at such other meeting as the Council may determine (see 4.5.6 and 4.8 of *Regs*).

IX. Petitions to the Board of Directors. The Standards Council has been delegated the responsibility for the administration of the codes and standards development process and the issuance of documents. However, where extraordinary circumstances requiring the intervention of the Board of Directors exist, the Board of Directors may take any action necessary to fulfill its obligations to preserve the integrity of the codes and standards development process and to protect the interests of the Association. The rules for petitioning the Board of Directors can be found in the *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council* and in 1.7 of the *Regs*.

X. For More Information. The program for the Association Technical Meeting (as well as the NFPA website as information becomes available) should be consulted for the date on which each report scheduled for consideration at the meeting will be presented. For copies of the ROP and ROC as well as more information on NFPA rules and for up-to-date information on schedules and deadlines for processing NFPA documents, check the NFPA website (www.nfpa.org) or contact NFPA Codes & Standards Administration at (617-984-7246).

National Electrical Code® Committee Report on Proposals

This *Report on Proposals* is published for public review and comment prior to consideration at the NFPA June 2010 Association Technical Meeting in Las Vegas, NV, June 7–10.

All members and others interested are urged to read this Report and submit their comments on the forms provided in the Report prior to the end of the comment period, which closes October 23, 2009.

Each comment received on or before the closing date of the comment period will be considered and acted upon by the National Electrical Code Committee. The results of the committee action will be published in the *National Electrical Code® Committee Report on Comments,* which will be available to all who request it. Announcement of its availability will be made in *NFPA News.* Commentors will receive notification of the availability of the Report.

Following the publication of the ROC, there is a period during which those wishing to make proper Amending Motions on the Technical Committee Reports must signal their intention by submitting a Notice of Intent to Make a Motion. Documents that receive notice of proper Amending Motions (Certified Amending Motions) will be presented for action at the annual June Association Technical Meeting. At the meeting, the NFPA membership can consider and act on these Certified Amending Motions as well as Follow-up Amending Motions, that is, motions that become necessary as a result of a previous successful Amending Motion. (See 4.6.2 through 4.6.9 of *Regs* for a summary of the available Amending Motions and who may make them.) Any outstanding objection following action at an Association Technical Meeting and any further Technical Committee consideration following successful Amending Motions, (see *Regs* at 4.7) must be raised through an appeal to the Standards Council or it will be considered to be resolved.

Providing at least one NITMAM has been certified, the *National Electrical Code® Committee Report on Proposals* and the *National Electrical Code® Committee Report on Comments* will be presented at the June 2010 Association Technical Meeting for action. An amendment to the National Electrical Code Technical Committee Report will not be considered at the meeting unless it is one that is a certified NITMAM.

Chapter 5. Special Occupancies

Chapter 6. Special Equipment

Chapter 7. Special Conditions

Chapter 8. Communications Systems

Chapter 9. Tables

FORM FOR COMMENT FOR 2011 NATIONAL ELECTRICAL CODE®

INSTRUCTIONS — PLEASE READ CAREFULLY

Type or print **legibly** in **black** ink. Use a separate copy for each comment. Limit each comment to a **SINGLE** section. All comments **must be received by NFPA by 5 p.m., EDST, Friday, October 23, 2009**, to be considered for the 2011 National Electrical Code. Comments received after 5:00 p.m., EDST, Friday, October 23, 2009, will be returned to the submitter. If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

For technical assistance, please call NFPA at 1-800-344-3555.

FOR OFFICE USE ONLY

Log #: ______

Date Rec'd: ______

Please indicate in which format you wish to receive your ROP/ROC ☐ **electronic** ☐ **paper** ☐ **download**

(Note: If choosing the download option, you must view the ROP/ROC from our website; no copy will be sent to you.)

Date 2/1/200X **Name** John B. Smith **Tel. No.** 253-555-1234

Company ABC Electric Company **Email**

Street Address 9 Seattle St. **City** Tacoma **State** WA **Zip** 98402

If you wish to receive a hard copy, a street address MUST be provided. Deliveries cannot be made to PO boxes.

Please indicate organization represented (if any) National Electrical Contractors Association

1. **Section/Paragraph** 210-60(A)

2. **Comment on Proposal No. (from ROP):** 70-8

3. **Comment recommends (check one):** ☐ new text ☒ revised text ☐ deleted text

4. **Comment (include proposed new or revised wording, or identification of wording to be deleted):** [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (<u>inserted wording</u>) and strike-through to denote wording to be deleted (~~deleted wording~~).]

Guest rooms <u>or guest suites</u> ~~meeting the definition of a dwelling unit~~ <u>provided with permanent provisions for cooking</u> shall have receptacle outlets installed in accordance with all of the applicable rules in 210.52.

5. **Statement of Problem and Substantiation for Comment:** (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Comment, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

The existing language is modified to eliminate confusion between the electrical and building codes as to the precise definition of these types of accommodations.

6. **Copyright Assignment**

(a) ☒ **I am the author of the text or other material (such as illustrations, graphs) proposed in the Comment.**

(b) ☐ **Some or all of the text or other material proposed in this Comment was not authored by me. Its source is as follows:** (please identify which material and provide complete information on its source)

I hereby grant and assign to the NFPA all and full rights in copyright in this Comment and understand that I acquire no rights in any publication of NFPA in which this Comment in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Comment and that I have full power and authority to enter into this assignment.

Signature (Required) ______

PLEASE USE SEPARATE FORM FOR EACH COMMENT

Mail to: Secretary, Standards Council · National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

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For technical assistance, please call NFPA at 1-800-344-3555.

FOR OFFICE USE ONLY

Log #: ________

Date Rec'd: ________

Please indicate in which format you wish to receive your ROP/ROC ☐ **electronic** ☐ **paper** ☐ **download**
(Note: If choosing the download option, you must view the ROP/ROC from our website; no copy will be sent to you.)

Date ________ **Name** ________ **Tel. No.** ________

Company ________ **Email** ________

Street Address ________ **City** ________ **State** ________ **Zip** ________

******If you wish to receive a hard copy, a street address MUST be provided. Deliveries cannot be made to PO boxes.***

Please indicate organization represented (if any) ________

1. **Section/Paragraph** ________
2. **Comment on Proposal No. (from ROP):** ________
3. **Comment recommends (check one):** ☐ new text ☐ revised text ☐ deleted text
4. **Comment (include proposed new or revised wording, or identification of wording to be deleted):** [Note: Proposed text should be in legislative format; i.e., use underscore to denote wording to be inserted (inserted wording) and strike-through to denote wording to be deleted (~~deleted wording~~).]

5. **Statement of Problem and Substantiation for Comment:** (Note: State the problem that would be resolved by your recommendation; give the specific reason for your Comment, including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

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I hereby grant and assign to the NFPA all and full rights in copyright in this Comment and understand that I acquire no rights in any publication of NFPA in which this Comment in this or another similar or analogous form is used. Except to the extent that I do not have authority to make an assignment in materials that I have identified in (b) above, I hereby warrant that I am the author of this Comment and that I have full power and authority to enter into this assignment.

Signature (Required) ________

PLEASE USE SEPARATE FORM FOR EACH COMMENT

Mail to: Secretary, Standards Council · National Fire Protection Association
1 Batterymarch Park · Quincy, MA 02169-7471 OR
Fax to: (617) 770-3500 OR Email to: proposals_comments@nfpa.org

6/17/2009

Note: An NEC preprint incorporating the proposed changes published in the ROP may be downloaded from NFPA's (and NEC's) website, www.nfpa.org.

COMMITTEE MEMBER CLASSIFICATIONS[1,2,3,4]

The following classifications apply to Committee members and represent their principal interest in the activity of the Committee.

1. M Manufacturer: A representative of a maker or marketer of a product, assembly, or system, or portion thereof, that is affected by the standard.

2. U User: A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.

3. IM Installer/Maintainer: A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the standard.

4. L Labor: A labor representative or employee concerned with safety in the workplace.

5. RT Applied Research/Testing Laboratory: A representative of an independent testing laboratory or independent applied research organization that promulgates and/or enforces standards.

6. E Enforcing Authority: A representative of an agency or an organization that promulgates and/or enforces standards.

7. I Insurance: A representative of an insurance company, broker, agent, bureau, or inspection agency.

8. C Consumer: A person who is or represents the ultimate purchaser of a product, system, or service affected by the standard, but who is not included in (2).

9. SE Special Expert: A person not representing (1) through (8) and who has special expertise in the scope of the standard or portion thereof.

NOTE 1: "Standard" connotes code, standard, recommended practice, or guide.

NOTE 2: A representative includes an employee.

NOTE 3: While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of member or unique interests need representation in order to foster the best possible Committee deliberations on any project. In this connection, the Standards Council may make such appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.

NOTE 4: Representatives of subsidiaries of any group are generally considered to have the same classification as the parent organization.

Report of the Committee on

National Electrical Code®

Technical Correlating Committee

James W. Carpenter,
International Association of Electrical Inspectors, TX [E]
Rep. International Association of Electrical Inspectors

Mark W. Earley, *Secretary (NV)*
National Fire Protection Association, MA

Jean A. O'Connor, Recording *Secretary (NV)*
National Fire Protection Association, MA

James E. Brunssen, Telcordia, NJ [UT]
Rep. Alliance for Telecommunications Industry Solutions
Merton W. Bunker, Jr., US Department of State, VA [U]
VL to Document: 110, Document: 111, Document: 70, Document: 70B, Document: 70E, Document: 79
James M. Daly, General Cable, NJ [M]
Rep. National Electrical Manufacturers Association
William R. Drake, Marinco, CA [M]
Stanley J. Folz, Morse Electric Company, NV [IM]
Rep. National Electrical Contractors Association
Palmer L. Hickman, National Joint Apprentice & Training Committee, MD [L]
Rep. International Brotherhood of Electrical Workers
John R. Kovacik, Underwriters Laboratories Inc., IL [RT]
Neil F. LaBrake, Jr., National Grid, NY [UT]
Rep. Electric Light & Power Group/EEI
Danny Liggett, DuPont Company, TX [U] Rep. American Chemistry Council
Robert G. Wilkinson, IEC Texas Gulf Coast, TX [IM]
Rep. Independent Electrical Contractors, Inc.

Alternates

Thomas L. Adams, Engineering Consultant, IL [UT]
(Alt. to Neil F. LaBrake, Jr.)
Rep. Electric Light & Power Group/EEI
Larry D. Cogburn, Cogburn Bros, Inc., FL [IM]
(Alt. to Stanley J. Folz)
Rep. National Electrical Contractors Association
James T. Dollard, Jr., IBEW Local Union 98, PA [L]
(Alt. to Palmer L. Hickman)
Rep. International Brotherhood of Electrical Workers
Ernest J. Gallo, Telcordia Technologies, Inc., NJ [UT]
(Alt. to James E. Brunssen)
Rep. Alliance for Telecommunications Industry Solutions
David L. Hittinger, IEC of Greater Cincinnati, OH [IM]
(Alt. to Robert G. Wilkinson)
Rep. Independent Electrical Contractors, Inc.
Daniel J. Kissane, Pass & Seymour/Legrand, NY [M]
(Alt. to James M. Daly)
Rep. National Electrical Manufacturers Association
Michael E. McNeil, FMC Bio Polymer, ME [U]
(Alt. to Danny Liggett)
Rep. American Chemistry Council
Mark C. Ode, Underwriters Laboratories Inc., NC [RT]
(Alt. to John R. Kovacik)
Richard P. Owen, City of St. Paul, MN [E]
(Alt. to James W. Carpenter)
Rep. International Association of Electrical Inspectors

Nonvoting

David Mascarenhas, Canadian Standards Association, Canada [RT]
Richard G. Biermann, Biermann Electric Company, Inc., IA [IM]
(Member Emeritus)
D. Harold Ware, Libra Electric Company, OK [IM]
(Member Emeritus)

Staff Liaison: **Mark W. Earley**

Committee Scope: This Committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.

CODE-MAKING PANEL NO. 1

Articles 90, 100, 110, Annex A, Annex H

Gil Moniz, *Chair*
National Electrical Manufacturers Association, MA [M]
Rep. National Electrical Manufacturers Association

Michael A. Anthony, University of Michigan, MI [U]
Rep. Association of Higher Education Facilities Officers
Louis A. Barrios, Shell Global Solutions, TX [U]
Rep. American Chemistry Council
Kenneth P. Boyce, Underwriters Laboratories Inc., IL [RT]
William T. Fiske, Intertek Testing Services NA, Inc., NY [RT]
H. Landis Floyd, The DuPont Company, DE [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Palmer L. Hickman, National Joint Apprentice & Training Committee, MD [L]
Rep. International Brotherhood of Electrical Workers
David L. Hittinger, IEC of Greater Cincinnati, OH [IM]
Rep. Independent Electrical Contractors, Inc.
Neil F. LaBrake, Jr., National Grid, NY [UT]
Rep. Electric Light & Power Group/EEI
Randall R. McCarver, Telcordia Technologies, Inc., NJ [U]
Rep. Alliance for Telecommunications Industry Solutions
Lanny G. McMahill, City of Phoenix, AZ [E]
Rep. International Association of Electrical Inspectors
Harry J. Sassaman, Forest Electric Corporation, NJ [IM]
Rep. National Electrical Contractors Association

Alternates

Thomas L. Adams, Engineering Consultant, IL [UT]
(Alt. to Neil F. LaBrake, Jr.)
Rep. Electric Light & Power Group/EEI
Joseph F. Andre, National Electrical Manufacturers Association, WA [M]
(Alt. to Gil Moniz)
Rep. National Electrical Manufacturers Association
Mark Christian, National Joint Apprentice & Training Committee, MD [L]
(Alt. to Palmer L. Hickman)
Rep. International Brotherhood of Electrical Workers
Benjamin F. Dunford, Ben Dunford Electric Company Inc., TN [IM]
(Alt. to David L. Hittinger)
Rep. Independent Electrical Contractors, Inc.
Ernest J. Gallo, Telcordia Technologies, Inc., NJ [U]
(Alt. to Randall R. McCarver)
Rep. Alliance for Telecommunications Industry Solutions
Thomas R. Lichtenstein, Underwriters Laboratories Inc., IL [RT]
(Alt. to Kenneth P. Boyce)
Donald H. McCullough, II, Washington Savannah River Company, SC [U]
(Alt. to H. Landis Floyd)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Susan Newman Scearce, State of Tennessee, TN [E]
(Alt. to Lanny G. McMahill)
Rep. International Association of Electrical Inspectors
James F. Pierce, Intertek, OR [RT]
(Alt. to William T. Fiske)

Nonvoting

Ark Tsisserev, City of Vancouver, Canada
Rep. CSA/Canadian Electrical Code Committee

CODE-MAKING PANEL NO. 2

Articles 210, 215, 220, Annex D
Examples D1 through D6

Raymond W. Weber, *Chair*
State of Wisconsin, WI [E]
Rep. International Association of Electrical Inspectors

Richard W. Becker, Engineered Electrical Systems, Inc., WA [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Charles L. Boynton, The DuPont Company, TX [U]
Rep. American Chemistry Council
Frank Coluccio, New York City Department of Buildings, NY [E]
Thomas L. Harman, University of Houston-Clear Lake, TX [SE]
Donald M. King, IBEW Local Union 313, DE [L]
Rep. International Brotherhood of Electrical Workers
Robert L. LaRocca, Underwriters Laboratories Inc., NY [RT]
Steven Orlowski, National Association of Home Builders, DC [U]
Rep. National Association of Home Builders

Jim Pauley, Square D Company/Schneider Electric, KY [M]
Rep. National Electrical Manufacturers Association
Ronald L. Purvis, Sharpsburg, GA [UT]
Rep. Electric Light & Power Group/EEI
Robert G. Wilkinson, IEC Texas Gulf Coast, TX [IM]
Rep. Independent Electrical Contractors, Inc.
Thomas H. Wood, Cecil B. Wood, Inc., IL [IM]
Rep. National Electrical Contractors Association

Alternates

Jacob G. Benninger, Cornell University, NY [L]
(Alt. to Donald M. King)
Rep. International Brotherhood of Electrical Workers
Lawrence Brown, National Association of Home Builders, DC [U]
(Alt. to Steven Orlowski)
James E. Degnan, Sparling, WA [U]
(Alt. to Richard W. Becker)
Rep. Institute of Electrical & Electronics Engineers, Inc.
David A. Dini, Underwriters Laboratories Inc., IL [RT]
(Alt. to Robert L. LaRocca)
Daniel J. Kissane, Pass & Seymour/Legrand, NY [M]
(Alt. to Jim Pauley)
Rep. National Electrical Manufacturers Association
William Ross McCorcle, American Electric Power, OK [UT]
(Alt. to Ronald L. Purvis)
Rep. Electric Light & Power Group/EEI
William J. McGovern, City of Plano, TX [E]
(Alt. to Raymond W. Weber)
Rep. International Association of Electrical Inspectors

Nonvoting

William Burr, Canadian Standards Association, Canada [RT]
Douglas A. Lee, US Consumer Product Safety Commission, MD [C]
Andrew M. Trotta, US Consumer Product Safety Commission, MD [C]
(Alt. to Douglas A. Lee)

CODE-MAKING PANEL NO. 3

Articles 300, 590, 720, 725, 727, 760, Chapter 9, Tables 11(A) and (B), and Tables 12(A) and (B)

Paul J. Casparro, *Chair*
Scranton Electricians JATC, PA [L]
Rep. International Brotherhood of Electrical Workers

Lawrence S. Ayer, Biz Com Electric, Inc., OH [IM]
Rep. Independent Electrical Contractors, Inc.
Thomas F. Connaughton, Intertek, NJ [RT]
Les Easter, Tyco/Allied Tube and Conduit, IL [M]
Rep. National Electrical Manufacturers Association
Sanford E. Egesdal, Egesdal Associates PLC, MN [M]
Rep. Automatic Fire Alarm Association, Inc.
Stanley D. Kahn, Tri-City Electric Company, Inc., CA [IM]
Rep. National Electrical Contractors Association
Ray R. Keden, ERICO, Inc., CA [M]
Rep. Building Industry Consulting Services International
Juan C. Menendez, Southern California Edison Company, CA [UT]
Rep. Electric Light & Power Group/EEI
Richard P. Owen, City of St. Paul, MN [E]
Rep. International Association of Electrical Inspectors
Steven J. Owen, Steven J. Owen, Inc., AL [IM]
Rep. Associated Builders & Contractors
David A. Pace, Olin Corporation, AL [U]
Rep. American Chemistry Council
Melvin K. Sanders, Things Electrical Co., Inc. (TECo., Inc.), IA [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Mark A. Sepulveda, USA Alarm Systems, Inc., CA [IM]
Rep. National Burglar & Fire Alarm Association
(Vote Limited to 720, 725, 727, 760)
John E. Sleights, Travelers Insurance Company, CT [I]
Susan L. Stene, Underwriters Laboratories Inc., CA [RT]

Alternates

Richard S. Anderson, RTKL Associates Inc., DC [M]
(Alt. to Ray R. Keden)
Rep. Building Industry Consulting Services International
Steven D. Burlison, Progress Energy, FL [UT]
(Alt. to Juan C. Menendez)
Rep. Electric Light & Power Group/EEI
Shane M. Clary, Bay Alarm Company, CA [M]
(Alt. to Sanford E. Egesdal)
Rep. Automatic Fire Alarm Association, Inc.
Adam D. Corbin, Corbin Electrical Services, Inc., NJ [IM]
(Alt. to Lawrence S. Ayer)
Rep. Independent Electrical Contractors, Inc.
Danny Liggett, DuPont Company, TX [U]
(Alt. to David A. Pace)
Rep. American Chemistry Council
T. David Mills, Savannah River Nuclear Solutions, LLC, SC [U]
(Alt. to Melvin K. Sanders)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Mark C. Ode, Underwriters Laboratories Inc., NC [RT]
(Alt. to Susan L. Stene)
Roger S. Passmore, IES Industrial, Inc., SC [IM]
(Alt. to Steven J. Owen)
Rep. Associated Builders & Contractors
Marty L. Riesberg, IBEW Local Union 22, MD [L]
(Alt. to Paul J. Casparro)
Rep. International Brotherhood of Electrical Workers
George A. Straniero, Tyco/AFC Cable Systems, Inc., NJ [M]
(Alt. to Les Easter)
Rep. National Electrical Manufacturers Association
Robert J. Walsh, City of Hayward, CA [E]
(Alt. to Richard P. Owen)
Rep. International Association of Electrical Inspectors
Edward C. Lawry, Oregon, WI [E]
(Member Emeritus)

CODE-MAKING PANEL NO. 4

Articles 225, 230, 690, 692, 705

Ronald J. Toomer, *Chair*
Toomer Electrical Company Inc., LA [IM]
Rep. National Electrical Contractors Association

Ward I. Bower, Sandia National Laboratories, NM [U]
Rep. Solar Energy Industries Association
(Vote Limited to 690, 692, 705)
Robert J. Deaton, The Dow Chemical Company, TX [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Tony Dorta, Intertek Testing Services NA, Inc., CA [RT]
Roger D. McDaniel, Georgia Power Company, GA [UT]
Rep. Electric Light & Power Group/EEI
James J. Rogers, Towns of Oak Bluffs, Tisbury, West Tisbury, MA [E]
Rep. International Association of Electrical Inspectors
John A. Sigmund, PPG Industries, Inc., LA [U]
Rep. American Chemistry Council
Todd W. Stafford, National Joint Apprentice & Training Committee, TN [L]
Rep. International Brotherhood of Electrical Workers
Robert H. Wills, Intergrid, LLC, NH [U
Rep. American Wind Energy Association
(Vote Limited to 690, 692, 705)
John W. Young, Siemens Energy & Automation, Inc., GA [M]
Rep. National Electrical Manufacturers Association
Timothy P. Zgonena, Underwriters Laboratories Inc., IL [RT]
Vincent C. Zinnante, Advantage Electric, Inc., TX [IM]
Rep. Independent Electrical Contractors, Inc.

Alternates

Paul D. Barnhart, Underwriters Laboratories Inc., NC [RT]
(Alt. to Timothy P. Zgonena)
William F. Brooks, Brooks Engineering, CA [U]
(Alt. to Ward I. Bower)
Rep. Solar Energy Industries Association
(Vote Limited to 690, 692, 705)
Larry D. Cogburn, Cogburn Bros, Inc., FL [IM]
(Alt. to Ronald J. Toomer)
Rep. National Electrical Contractors Association
Brian L. Crise, NIETC, OR [L]
(Alt. to Todd W. Stafford)
Rep. International Brotherhood of Electrical Workers
Mark D. Gibbs, B&W Y-12, LLC, TN [U]
(Alt. to Robert J. Deaton)
Rep. Institute of Electrical & Electronics Engineers, Inc.

Barry N. Hornberger, PECO Energy Company, PA [UT]
(Alt. to Roger D. McDaniel)
Rep. Electric Light & Power Group/EEI
Tim LaLonde, Haskin Electric, Inc., WA [IM]
(Alt. to Vincent C. Zinnante)
Rep. Independent Electrical Contractors, Inc.
Philip M. Piqueira, General Electric Company, CT [M]
(Alt. to John W. Young)
Rep. National Electrical Manufacturers Association
Robert W. Preus, Abundant Renewable Energy, LLC, OR [U]
(Alt. to Robert H. Wills)
Rep. American Wind Energy Association
(Vote Limited to 690, 692, 705)
Glenn A. Soles, Clark County Department of Development Services, NV [E]
(Alt. to James J. Rogers)
Rep. International Association of Electrical Inspectors

CODE-MAKING PANEL NO. 5

Articles 200, 250, 280, 285

Michael J. Johnston, *Chair*
National Electrical Contractors Association, MD [IM]

Trevor N. Bowmer, Telcordia Technologies, NJ [U]
Rep. Alliance for Telecommunications Industry Solutions
David Brender, Copper Development Association, Inc., NY [M]
Rep. Copper Development Association Inc.
Martin J. Brett, Jr., Wheatland Tube Company, DE [M]
Rep. American Iron and Steel Institute
Paul Dobrowsky, Innovative Technology Services, NY [U]
Rep. American Chemistry Council
Dan Hammel, IBEW Local Union 704, IA [L]
Rep. International Brotherhood of Electrical Workers
G. Scott Harding, F. B. Harding, Inc., MD [IM]
Rep. Independent Electrical Contractors, Inc.
William J. Helfrich, US Department of Labor, PA [E]
Charles F. Mello, Underwriters Laboratories Inc., WA [RT]
Daleep C. Mohla, DCM Electrical Consulting Services, Inc., TX [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Christine T. Porter, Intertek, WA [RT]
Gregory J. Steinman, Thomas & Betts Corporation, TN [M]
Rep. National Electrical Manufacturers Association
Robert G. Stoll, Thomas Associates, Inc., OH [M]
Rep. Power Tool Institute, Inc
Richard Temblador, Southwire Company, GA [M]
Rep. The Aluminum Association, Inc.
C. Douglas White, CenterPoint Energy, Inc., TX [UT]
Rep. Electric Light & Power Group/EEI
David A. Williams, Delta Charter Township, MI [E]
Rep. International Association of Electrical Inspectors

Alternates

Ron D. Alley, Northern New Mexico IEC, NM [IM]
(Alt. to G. Scott Harding)
Rep. Independent Electrical Contractors, Inc.
Joseph P. DeGregoria, Underwriters Laboratories Inc., NY [RT]
(Alt. to Charles F. Mello)
Ronald Lai, FCI USA Inc., NH [M]
(Alt. to Gregory J. Steinman)
Rep. National Electrical Manufacturers Association
Paul J. LeVasseur, Bay City JEATC, MI [L]
(Alt. to Dan Hammel)
Rep. International Brotherhood of Electrical Workers
Richard E. Loyd, R & N Associates, AZ [M]
(Alt. to Martin J. Brett, Jr.)
Rep. American Iron and Steel Institute
Randall R. McCarver, Telcordia Technologies, Inc., NJ [U]
(Alt. to Trevor N. Bowmer)
Rep. Alliance for Telecommunications Industry Solutions
Michael E. McNeil, FMC Bio Polymer, ME [U]
(Alt. to Paul Dobrowsky)
Rep. American Chemistry Council
Mike O'Meara, Arizona Public Service Company, AZ [UT]
(Alt. to C. Douglas White)
Rep. Electric Light & Power Group/EEI
William A. Pancake, III, Universal Engineering Sciences, FL [E]
(Alt. to David A. Williams)
Rep. International Association of Electrical Inspectors
Nathan Philips, Integrated Electronic Systems, OR [IM]
(Alt. to Michael J. Johnston)
Paul R. Picard, Tyco/AFC Cable Systems, Inc., MA [M]
(Alt. to Richard Temblador)
Rep. The Aluminum Association, Inc.
Elliot Rappaport, Electro Technology Consultants, Inc., FL [U]
(Alt. to Daleep C. Mohla)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Phil Simmons, Simmons Electrical Services, WA [M]
(Alt. to David Brender)
Rep. Copper Development Association Inc.
Thomas R. Siwek, Robert Bosch Tool Corporation, IL [M]
(Alt. to Robert G. Stoll)
Rep. Power Tool Institute, Inc

Nonvoting

Robert A. Nelson, Canadian Standards Association, Canada [RT]

CODE-MAKING PANEL NO. 6

Articles 310, 400, 402, Chapter 9 Tables 5 through 9, and Annex B

Scott Cline, *Chair*
McMurtrey Electric, Inc., CA [IM]
Rep. National Electrical Contractors Association

Samuel B. Friedman, General Cable Corporation, RI [M]
Rep. National Electrical Manufacturers Association
Robert L. Huddleston, Jr., Eastman Chemical Company, TN [U]
Rep. American Chemistry Council
Randal Hunter, City of Las Vegas, NV [E]
Rep. International Association of Electrical Inspectors
G. W. Kent, Kent Electric & Plumbing Systems, TX [IM]
Rep. Independent Electrical Contractors, Inc.
William F. Laidler, IBEW Local 223 JATC, MA [L]
Rep. International Brotherhood of Electrical Workers
L. Bruce McClung, Mc Squared Electrical Consulting LLC, WV [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Paul R. Picard, Tyco/AFC Cable Systems, Inc., MA [M]
Rep. The Aluminum Association, Inc.
John M. Thompson, Underwriters Laboratories Inc., NC [RT]
Carl Timothy Wall, Alabama Power Company, AL [UT]
Rep. Electric Light & Power Group/EEI
Joseph S. Zimnoch, The Okonite Company, NJ [M]
Rep. Copper Development Association Inc.

Alternates

Peter E. Bowers, Satellite Electric Company, Inc., MD [IM]
(Alt. to G. W. Kent)
Rep. Independent Electrical Contractors, Inc.
John J. Cangemi, Underwriters Laboratories Inc., NY [RT]
(Alt. to John M. Thompson)
James M. Daly, General Cable, NJ [M]
(Alt. to Joseph S. Zimnoch)
Rep. Copper Development Association Inc.
James E. Dean, Entergy Services Inc., LA [UT]
(Alt. to Carl Timothy Wall)
Rep. Electric Light & Power Group/EEI
Richard A. Holub, DuPont Engineering, DE [U]
(Alt. to Robert L. Huddleston, Jr.)
Rep. American Chemistry Council
Phillip J. Huff, Inglett & Stubbs LLC, GA [IM]
(Alt. to Scott Cline)
Rep. National Electrical Contractors Association
Christel K. Hunter, Alcan Cable, NV [M]
(Alt. to Paul R. Picard)
Rep. The Aluminum Association, Inc.
Lowell Lisker, American Insulated Wire Corporation, MA [M]
(Alt. to Samuel B. Friedman)
Rep. National Electrical Manufacturers Association
John Stacey, City of St. Louis, MO [E]
(Alt. to Randal Hunter)
Rep. International Association of Electrical Inspectors
Donald A. Voltz, BP, TX [U]
(Alt. to L. Bruce McClung)
Rep. Institute of Electrical & Electronics Engineers, Inc.
James R. Weimer, Eastern Idaho Electrical JATC, ID [L]
(Alt. to William F. Laidler)
Rep. International Brotherhood of Electrical Workers

CODE-MAKING PANEL NO. 7

Articles 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 382, 394, 396, 398

Michael W. Smith, *Chair*
Kaiser Electric Company, MO [IM]
Rep. National Electrical Contractors Association

Thomas H. Cybula, Underwriters Laboratories Inc., NY [RT]
James M. Daly, General Cable, NJ [M]
Rep. National Electrical Manufacturers Association
Chris J. Fahrenthold, Facilities Solutions Group, TX [IM]
Rep. Independent Electrical Contractors, Inc.
Herman J. Hall, Austin, TX [M]
Rep. The Vinyl Institute
James K. Hinrichs, State of Washington, WA [E]
Rep. International Association of Electrical Inspectors
Christel K. Hunter, Alcan Cable, NV [M]
Rep. The Aluminum Association, Inc.
Samuel R. La Dart, City of Memphis, TN [L]
Rep. International Brotherhood of Electrical Workers
Ronald G. Nickson, National Multi Housing Council, DC [U]
Dennis A. Nielsen, Lawrence Berkeley National Laboratory, CA [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
John W. Ray, Duke Energy Corporation, NC [UT]
Rep. Electric Light & Power Group/EEI
Gregory L. Runyon, Eli Lilly and Company, IN [U]
Rep. American Chemistry Council
David E. Schumacher, Associated Builders and Contractors, IA [IM]
Rep. Associated Builders & Contractors
George A. Straniero, Tyco/AFC Cable Systems, Inc., NJ [M]
Rep. Copper Development Association Inc.

Alternates

William B. Crist, Houston Stafford Electric Company, TX [IM]
(Alt. to Chris J. Fahrenthold)
Rep. Independent Electrical Contractors, Inc.
Donald G. Dunn, Aramco Services Company, TX [U]
(Alt. to Dennis A. Nielsen)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Charles David (Dave) Mercier, Southwire Company, GA [M]
(Alt. to James M. Daly)
Rep. National Electrical Manufacturers Association
Keith Owensby, Chattanooga Electrical JATC, TN [L]
(Alt. to Samuel R. La Dart)
Rep. International Brotherhood of Electrical Workers
Charles J. Palmieri, Town of Norwell, MA [E]
(Alt. to James K. Hinrichs)
Rep. International Association of Electrical Inspectors
Peter Pollak, The Aluminum Association, Inc., VA [M]
(Alt. to Christel K. Hunter)
Rep. The Aluminum Association, Inc.
Kevin T. Porter, Encore Wire Corporation, TX [M]
(Alt. to George A. Straniero)
Rep. Copper Development Association Inc.
Susan L. Stene, Underwriters Laboratories Inc., CA [RT]
(Alt. to Thomas H. Cybula)
Wesley L. Wheeler, Cogburn Bros., Inc., FL [IM]
(Alt. to Michael W. Smith)
Rep. National Electrical Contractors Association

CODE-MAKING PANEL NO. 8

Articles 342, 344, 348, 350, 352, 353, 354, 355, 356, 358, 360, 362, 366, 368, 370, 372, 374, 376, 378, 380, 384, 386, 388, 390, 392, Chapter 9, Tables 1 through 4, and Annex C

Julian R. Burns, *Chair*
Quality Power Solutions, Inc., NC [IM]
Rep. Independent Electrical Contractors, Inc.

Joyce Evans Blom, The Dow Chemical Company, CA [U]
Rep. American Chemistry Council
David M. Campbell, Tyco/AFC Cable Systems, Inc., MA [M]
Rep. The Aluminum Association, Inc.
Joseph Dabe, City of St. Paul, MN [L]
Rep. International Brotherhood of Electrical Workers
M. Shan Griffith, Elektek, PLLC, TX [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
David G. Humphrey, County of Henrico, Virginia, VA [E]
Rep. International Association of Electrical Inspectors
David H. Kendall, Thomas & Betts Corporation, OH [M]
Rep. The Vinyl Institute
Richard E. Loyd, R & N Associates, AZ [M]
Rep. American Iron and Steel Institute
Dean T. Negrelli, Wiremold/Legrand, CT [M]
Rep. National Electrical Manufacturers Association
Stephen P. Poholski, Newkirk Electric Associates, Inc., MI [IM]
Rep. National Electrical Contractors Association
George F. Walbrecht, Underwriters Laboratories Inc., IL [RT]
Leslie R. Zielke, South Carolina Electric & Gas Company, SC [UT]
Rep. Electric Light & Power Group/EEI

Alternates

Richard J. Berman, Underwriters Laboratories Inc., IL [RT]
(Alt. to George F. Walbrecht)
Duane A. Carlson, PRS Consulting Engineers, WA [U]
(Alt. to M. Shan Griffith)
Rep. Institute of Electrical & Electronics Engineers, Inc.
George R. Dauberger, Thomas & Betts Corporation, TN [M]
(Alt to David H. Kendall)
Rep. The Vinyl Institute
James T. Dwight, Sasol North America, Inc., LA [U]
(Alt. to Joyce Evans Blom)
Rep. American Chemistry Council
Kenneth W. Hengst, EAS Contracting, LP, TX [IM]
(Alt. to Julian R. Burns)
Rep. Independent Electrical Contractors, Inc.
James M. Imlah, City of Hillsboro, OR [E]
(Alt. to David G. Humphrey)
Rep. International Association of Electrical Inspectors
Gregory L. Maurer, Wheatland Tube Company, PA [M]
(Alt. to Richard E. Loyd)
Rep. American Iron and Steel Institute
Gary W. Pemble, Montana Electrical JATC, MT [L]
(Alt. to Joseph Dabe)
Rep. International Brotherhood of Electrical Workers
Richard Temblador, Southwire Company, GA [M]
(Alt. to David M. Campbell)
Rep. The Aluminum Association, Inc.
Rodney J. West, Square D Company/Schneider Electric, OH [M]
(Alt. to Dean T. Negrelli)
Rep. National Electrical Manufacturers Association

CODE-MAKING PANEL NO. 9

Articles 312, 314, 404, 408, 450, 490

Robert A. McCullough, *Chair*
Tuckerton, NJ [E]
Rep. International Association of Electrical Inspectors

Rodney D. Belisle, NECA-IBEW Electrical Training Trust, OR [L]
Rep. International Brotherhood of Electrical Workers
Billy Breitkreutz, Fluor Corporation, TX [U]
Rep. Associated Builders & Contractors
Paul D. Coghill, Intertek, OH [RT]
Richard P. Fogarty, Consolidated Edison Company of New York, Inc., NY [UT]
Rep. Electric Light & Power Group/EEI
Frederic P. Hartwell, Hartwell Electrical Services, Inc., MA [SE]
Thomas J. LeMay, LeMay Electric, Inc., GA [IM]
Rep. Independent Electrical Contractors, Inc.
Robert D. Osborne, Underwriters Laboratories Inc., NC [RT]
Bradford D. Rupp, Allied Moulded Products, Inc., OH [M]
Rep. National Electrical Manufacturers Association
Sukanta Sengupta, FMC Corporation, NJ [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Monte Szendre, Wilson Construction Company, OR [IM]
Rep. National Electrical Contractors Association
Ralph H. Young, Eastman Chemical Company, TN [U]
Rep. American Chemistry Council

Alternates

Kevin J. Breen, Breen Electrical Contractors Inc., NY [IM]
(Alt. to Thomas J. LeMay)
Rep. Independent Electrical Contractors, Inc.

Robert R. Gage, National Grid, NY [UT]
(Alt. to Richard P. Fogarty)
Rep. Electric Light & Power Group/EEI
L. Keith Lofland, International Association of Electrical Inspectors (IAEI), TX [E]
(Alt. to Robert A. McCullough)
Kenneth L. McKinney, Jr., Underwriters Laboratories Inc., NC [RT]
(Alt. to Robert D. Osborne)
Paul W. Myers, Potash Corporation, OH [U]
(Alt. to Sukanta Sengupta)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Ronnie H. Ridgeway, Siemens Energy & Automation Inc., TX [M]
(Alt. to Bradford D. Rupp)
Rep. National Electrical Manufacturers Association
Rhett A. Roe, IBEW Local Union 26 JATC, MD [L]
(Alt. to Rodney D. Belisle)
Rep. International Brotherhood of Electrical Workers

CODE-MAKING PANEL NO. 10

Articles 240

Donald R. Cook, *Chair*
Shelby County Development Services, AL [E]
Rep. International Association of Electrical Inspectors

Madeline Borthick, IEC of Houston, Inc., TX [IM]
Rep. Independent Electrical Contractors, Inc.
Dennis M. Darling, Ayres, Lewis, Norris & May, Inc., MI [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
James T. Dollard, Jr., IBEW Local Union 98, PA [L]
Rep. International Brotherhood of Electrical Workers
Charles Eldridge, Indianapolis Power & Light Company, IN [UT]
Rep. Electric Light & Power Group/EEI
Carl Fredericks, The Dow Chemical Company, TX [U]
Rep. American Chemistry Council
Roderic Hageman, PRIT Service, Inc., IL [IM]
Rep. InterNational Electrical Testing Association
Jeffrey H. Hidaka, Underwriters Laboratories Inc., IL [RT]
Alan Manche, Square D Company/Schneider Electric, KY [M]
Rep. National Electrical Manufacturers Association
Robert W. Mount, Jr., Hussmann Corporation, MO [M]
Rep. Air-Conditioning, Heating, and Refrigeration Institute
George J. Ockuly, O'Fallon, MO [M]
Richard Sobel, Quantum Electric Corporation, NY [IM]
Rep. National Electrical Contractors Association

Alternates

Scott A. Blizard, American Electrical Testing Company, Inc., MA [IM]
(Alt. to Roderic Hageman)
Rep. InterNational Electrical Testing Association
Robert J. Kauer, Building Inspection Underwriters, Inc., PA [E]
(Alt. to Donald R. Cook)
Rep. International Association of Electrical Inspectors
Frank G. Ladonne, Underwriters Laboratories Inc., IL [RT]
(Alt. to Jeffrey H. Hidaka)
Kevin J. Lippert, Eaton Corporation, PA [M]
(Alt. to Alan Manche)
Rep. National Electrical Manufacturers Association
Richard E. Lofton, II, IBEW Local Union 280, OR [L]
(Alt. to James T. Dollard, Jr.)
Rep. International Brotherhood of Electrical Workers
Vincent J. Saporita, Cooper Bussmann, MO [M]
(Alt. to George J. Ockuly)
Roy K. Sparks, III, Eli Lilly and Company, IN [U]
(Alt. to Carl Fredericks)
Rep. American Chemistry Council
Steve A. Struble, Freeman's Electric Service, Inc., SD [IM]
(Alt. to Madeline Borthick)
Rep. Independent Electrical Contractors, Inc.
Steven E. Townsend, General Motors Corporation, MI [U]
(Alt. to Dennis M. Darling)
Rep. Institute of Electrical & Electronics Engineers, Inc.
John F. Vartanian, National Grid, MA [UT]
(Alt. to Charles Eldridge)
Rep. Electric Light & Power Group/EEI

CODE-MAKING PANEL NO. 11

Articles 409, 430, 440, 460, 470, Annex D, Example D8

Wayne Brinkmeyer, *Chair*
Britain Electric Company, TX [IM]
Rep. National Electrical Contractors Association

Rick L. Bunch, Tecumseh Products Company, MI [M]
Rep. Air-Conditioning, Heating, and Refrigeration Institute
Terry D. Cole, Hamer Electric, Inc., WA [IM]
Rep. Independent Electrical Contractors, Inc.
Jeffrey A. DesJarlais, Underwriters Laboratories Inc., IL [RT]
Robert G. Fahey, City of Janesville, WI [E]
Rep. International Association of Electrical Inspectors
William D. Glover, PPG Industries, Inc., WV [U]
Rep. American Chemistry Council
Paul E. Guidry, Fluor Enterprises, Inc., TX [U]
Rep. Associated Builders & Contractors
Leo H. Haas, Jr., CenterPoint Energy, Inc., TX [UT]
Rep. Electric Light & Power Group/EEI
Paul S. Hamer, Chevron Energy Technology Company, CA [U]
Rep. American Petroleum Institute
Vincent J. Saporita, Cooper Bussmann, MO [M]
Lynn F. Saunders, Brighton, MI [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Lawrence E. Todd, Intertek Testing Services NA, Inc., OR [RT]
Ron Widup, Shermco Industries, Inc., TX [IM]
Rep. InterNational Electrical Testing Association
James R. Wright, Siemens Energy & Automation, Inc., IL [M]
Rep. National Electrical Manufacturers Association

Alternates

Larry W. Burns, Burns Electric, Inc., TX [IM]
(Alt. to Terry D. Cole)
Rep. Independent Electrical Contractors, Inc.
James M. Fahey, IBEW Local Union 103, MA [L]
(Voting Alt. to IBEW Rep.)
Rep. International Brotherhood of Electrical Workers
Stanley J. Folz, Morse Electric Company, NV [IM]
(Alt. to Wayne Brinkmeyer)
Rep. National Electrical Contractors Association
Barry G. Karnes, Underwriters Laboratories Inc., CA [RT]
(Alt. to Jeffrey A. DesJarlais)
Robert J. Keough, Emerson Motor Company, MO [M]
(Alt. to James R. Wright)
Rep. National Electrical Manufacturers Association
James C. Missildine, Jr., Southern Company Services, Inc., AL [UT]
(Alt. to Leo H. Haas, Jr.)
Rep. Electric Light & Power Group/EEI
Thomas E. Moore, City of Beachwood, OH [E]
(Alt. to Robert G. Fahey)
Rep. International Association of Electrical Inspectors
George J. Ockuly, O'Fallon, MO [M]
(Alt. to Vincent J. Saporita)
Charles L. Powell, Eastman Chemical Company, TN [U]
(Alt. to William D. Glover)
Rep. American Chemistry Council
Arthur J. Smith, III, Waldemar S. Nelson & Company, Inc., LA [U]
(Alt. to Lynn F. Saunders)
Rep. Institute of Electrical & Electronics Engineers, Inc.

CODE-MAKING PANEL NO. 12

Articles 610, 620, 625, 626, 630, 640, 645, 647, 650, 660, 665, 668, 669, 670, 685, Annex D, Examples D9 and D10

Timothy M. Croushore, *Chair*
Allegheny Power, PA [UT]
Rep. Electric Light & Power Group/EEI

Thomas R. Brown, Intertek, NY [RT]
Karl M. Cunningham,Alcoa, Inc.,PA [M]
Rep. The Aluminum Association, Inc.
(Vote Limited to 610, 625, 630, 645, 660, 665, 668, 669, 685)
Thomas L. Hedges, Hedges Electric & Construction Inc., CA [IM]
Rep. National Electrical Contractors Association
Robert E. Johnson, ITE Safety, MA [U]
Rep. Information Technology Industry Council
(Vote Limited to 640, 645, 647, 685)

Andy Juhasz, Kone, Inc., IL [M]
Rep. National Elevator Industry Inc.
(Vote Limited to 610, 620, 630)
Stanley Kaufman, CableSafe, Inc./OFS, GA [M]
Rep. Society of the Plastics Industry, Inc.
(Vote Limited to 640, 645)
John R. Kovacik, Underwriters Laboratories Inc., IL [RT]
Todd Lottmann, Cooper Bussmann, MO [M]
Rep. National Electrical Manufacturers Association
Sam Marcovici, New York City Department of Buildings, NY [E]
Tim McClintock, Wayne County, Ohio, OH [E]
Rep. International Association of Electrical Inspectors
Ralph C. Prichard, Hercules Incorporated, DE [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
David R. Quave, IBEW Local Union 903, MS [L]
Rep. International Brotherhood of Electrical Workers
Duke W. Schamel, Electrical Service Solutions, Inc., CO [IM]
Rep. Independent Electrical Contractors, Inc.
Arthur E. Schlueter, Jr., A. E. Schlueter Pipe Organ Company, GA [M]
Rep. American Institute of Organ Builders
(Vote Limited to 640, 650)
Robert C. Turner, Inductotherm Corporation, MD [M]
(Vote Limited to 610, 630, 665, 668, 669)
Kenneth White, Olin Corporation, NY [U]
Rep. American Chemistry Council

Alternates

William E. Anderson, The Procter & Gamble Company, OH [U]
(Alt. to Ralph C. Prichard)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Jeffrey W. Blain, Schindler Elevator Corporation, NY [M]
(Alt. to Andy Juhasz)
Rep. National Elevator Industry Inc.
(Vote Limited to 610, 620, 630)
Thomas M. Burke, Underwriters Laboratories Inc., CA [RT]
(Alt. to John R. Kovacik)
Jeffrey L. Holmes, IBEW Local Union 1 JATC, MO [L]
(Alt. to David R. Quave)
Rep. International Brotherhood of Electrical Workers
Todd R. Konieczny, Intertek, MA [RT]
(Alt. to Thomas R. Brown)
Christopher P. O'Neil, NSTAR Electric & Gas Corporation, MA [UT]
(Alt. to Timothy M. Croushore)
Rep. Electric Light & Power Group/EEI
Peter Pollak, The Aluminum Association, Inc., VA [M]
(Alt. to Karl M. Cunningham)
Rep. The Aluminum Association, Inc.
(Vote Limited to 610, 625, 630, 645, 660, 665, 668, 669, 685)
David L. Sher, City of Bellevue, WA [E]
(Alt. to Tim McClintock)
Rep. International Association of Electrical Inspectors
Emad Tabatabaei, Inductotherm Corporation, NJ [M]
(Alt. to Robert C. Turner)
(Vote Limited to 610, 630, 665, 668, 669)
Lori L. Tennant, Square D Company/Schneider Electric, NC [M]
(Alt. to Todd Lottmann)
Rep. National Electrical Manufacturers Association
Stephen J. Thorwegen, Jr., FSG Electric, TX [IM]
(Alt. to Duke W. Schamel)
Rep. Independent Electrical Contractors, Inc.
Charles M. Trout, Maron Electric Company, FL [IM]
(Alt. to Thomas L. Hedges)
Rep. National Electrical Contractors Association
Andre R. Cartal, Yardley, PA [E]
(Member Emeritus)

CODE-MAKING PANEL NO. 13

Articles 445, 455, 480, 695, 700, 701, 702, 708, Annex F and Annex G

Donald P. Bliss, *Chair*
NI2 Center for Infrastructure Expertise, NH [U]

Martin D. Adams, Adams Electric, Inc., CO [IM]
Rep. National Electrical Contractors Association
James L. Brown, Detroit Edison, DTE Energy, MI [UT]
Rep. Electric Light & Power Group/EEI
Daniel J. Caron, Bard, Rao + Athanas Consulting Engineers, LLC, MA [SE]
James S. Conrad, Tyco Thermal Controls, CT [M]
Rep. Copper Development Association Inc.
Neil A. Czarnecki, Reliance Controls Corporation, WI [M]
Rep. National Electrical Manufacturers Association
Herbert H. Daugherty, Electric Generating Systems Association, NJ [M]
James E. Degnan, Sparling, WA [U]
Rep. American Society for Healthcare Engineering
Ronald A. Keenan, M. C. Dean, Inc., VA [IM]
Rep. Independent Electrical Contractors, Inc.
Linda J. Little, IBEW Local 1 Electricians JATC, MO [L]
Rep. International Brotherhood of Electrical Workers
Craig A. Mouton, ExxonMobil Chemical Corporation, TX [U]
Rep. American Chemistry Council
Mark C. Ode, Underwriters Laboratories Inc., NC [RT]
Michael L. Savage, Sr., Middle Department Inspection Agency, Inc., MD [E]

Alternates

Suzanne M. Borek, New Jersey Department of Community Affairs, NJ [E]
(Voting Alt. to IAEI Rep.)
Rep. International Association of Electrical Inspectors
James T. Dollard, Jr., IBEW Local Union 98, PA [L]
(Alt. to Linda J. Little)
Rep. International Brotherhood of Electrical Workers
Chad Kennedy, Square D Company/Schneider Electric, SC [M]
(Alt. to Neil A. Czarnecki)
Rep. National Electrical Manufacturers Association
John R. Kovacik, Underwriters Laboratories Inc., IL [RT]
(Alt. to Mark C. Ode)
Stephen V. St. Croix, 1st Electric, Inc., MD [IM]
(Alt. to Ronald A. Keenan)
Rep. Independent Electrical Contractors, Inc.

CODE-MAKING PANEL NO. 14

Articles 500, 501, 502, 503, 504, 505, 506, 510, 511, 513, 514, 515, and 516

Robert A. Jones, *Chair*
Independent Electrical Contractors, Inc., TX [IM]
Rep. Independent Electrical Contractors, Inc.

Daniel Batta, Jr., Constellation Power Source Generation, Inc., MD [UT]
Rep. Electric Light & Power Group/EEI
Troy Beall, B & D Industries, Inc., NM [IM]
Rep. National Electrical Contractors Association
Edward M. Briesch, Underwriters Laboratories Inc., IL [RT]
James D. Cospolich, Waldemar S. Nelson & Company Inc., LA [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Mark Goodman, Jacobs Engineering Group, CA [U]
Rep. American Petroleum Institute
Joseph H. Kuczka, Killark Electric Manufacturing Company, MO [M]
Rep. National Electrical Manufacturers Association
William G. Lawrence, Jr., FM Global, MA [I]
L. Evans Massey, Reliance Electric Company, SC [M]
Rep. Instrumentation, Systems, & Automation Society
Jeremy Neagle, Intertek, NY [RT]
Donald R. Offerdahl, North Dakota State Electrical Board, ND [E]
Rep. International Association of Electrical Inspectors
John L. Simmons, Florida East Coast JATC, FL [L]
Rep. International Brotherhood of Electrical Workers
David B. Wechsler, The Dow Chemical Company, TX [U]
Rep. American Chemistry Council
Mark C. Wirfs, R & W Engineering, Inc., OR [U]
Rep. Grain Elevator and Processing Society

Alternates

Harold G. Alexander, American Electric Power Company, OH [UT]
(Alt. to Daniel Batta, Jr.)
Rep. Electric Light & Power Group/EEI
Donald W. Ankele, Underwriters Laboratories Inc., IL [RT]
(Alt. to Edward M. Briesch)
A. W. Ballard, Crouse-Hinds, NY [M]
(Alt. to Joseph H. Kuczka)
Rep. National Electrical Manufacturers Association
Mark W. Bonk, Cargill Incorporated, MN [U]
(Alt. to Mark C. Wirfs)
Rep. Grain Elevator and Processing Society
Dave Burns, Shell Exploration & Production Company, TX [U]
(Alt. to Mark Goodman)
Rep. American Petroleum Institute
Jonathan L. Cadd, International Association of Electrical Inspectors, TX [E]
(Alt. to Donald R. Offerdahl)

Thomas E. Dunne, Long Island Joint Apprenticeship & Training Committee, NY [L]
(Alt. to John L. Simmons)
Rep. International Brotherhood of Electrical Workers
Richard A. Holub, DuPont Engineering, DE [U]
(Alt. to David B. Wechsler)
Rep. American Chemistry Council
Ted H. Schnaare, Rosemount Incorporated, MN [M]
(Alt. to L. Evans Massey)
Rep. Instrumentation, Systems, & Automation Society
Michael D. Webster, Weifield Group Contracting, CO [IM]
(Alt. to Robert A. Jones)
Rep. Independent Electrical Contractors, Inc.
Donald W. Zipse, Zipse Electrical Engineering Inc., PA [U]
(Alt. to James D. Cospolich)
Rep. Institute of Electrical & Electronics Engineers, Inc.

Nonvoting

Timothy J. Pope, Canadian Standards Association, Canada [RT]
Eduardo N. Solano, Estudio Ingeniero Solano S.A., Argentina [SE]
Fred K. Walker, US Department of the Air Force, FL [U]
Rep. TC on Airport Facilities

CODE-MAKING PANEL NO. 15

Articles 517, 518, 520, 522, 525, 530, 540

Donald J. Talka, *Chair*
Underwriters Laboratories Inc., NY [RT]

James R. Duncan, Sparling Electrical Engineering & Technology Consulting, WA [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Ronald E. Duren, PacifiCorp, WA [UT]
Rep. Electric Light & Power Group/EEI
Douglas S. Erickson, American Society for Healthcare Engineering, VI [U]
Rep. American Society for Healthcare Engineering
Mitchell K. Hefter, Entertainment Technology/Philips, TX [IM]
Rep. Illuminating Engineering Society of North America
(Vote Limited to 518, 520, 525, 530, 540)
Kim Jones, Funtastic Shows, OR [U]
Rep. Outdoor Amusement Business Association, Inc.
(Vote Limited to 525)
Edwin S. Kramer, Radio City Music Hall, NY [L]
Rep. International Alliance of Theatrical Stage Employees
(Vote Limited to 518, 520, 525, 530, 540)
Larry Lau, US Department of Veterans Affairs, DC [U]
(Vote Limited to 517, 518)
Dennis W. Marshall, D & L Electric Company, TX [IM]
Rep. Independent Electrical Contractors, Inc.
Eugene E. Morgan, County of Clackamas, Oregon, OR [E]
Rep. International Association of Electrical Inspectors
Hugh O. Nash, Jr., Nash Lipsey Burch, LLC, TN [SE]
Rep. TC on Electrical Systems
Bruce D. Shelly, Shelly Electric Company, Inc., PA [IM]
Rep. National Electrical Contractors Association
Michael D. Skinner, CBS Studio Center, CA [U]
Rep. Alliance of Motion Picture and Television Producers
(Vote Limited to 518, 520, 525, 530, 540)
Kenneth E. Vannice, Leviton Manufacturing Company Inc., OR [M]
Rep. US Institute for Theatre Technology
(Vote Limited to 518, 520, 525, 530, 540)
Michael Velvikis, High Voltage Maintenance Corporation, WI [IM]
Rep. InterNational Electrical Testing Association
Andrew White, IBEW Local Union 3, NY [L]
Rep. International Brotherhood of Electrical Workers
James L. Wiseman, Square D Company/Schneider Electric, TN [M]
Rep. National Electrical Manufacturers Association

Alternates

James L. Brown, Detroit Edison, DTE Energy, MI [UT]
(Alt. to Ronald E. Duren)
Rep. Electric Light & Power Group/EEI
Matthew B. Dozier, IDesign Services, TN [U]
(Alt. to James R. Duncan)
Rep. Institute of Electrical & Electronics Engineers, Inc.
Samuel B. Friedman, General Cable Corporation, RI [M]
(Alt. to James L. Wiseman)
Rep. National Electrical Manufacturers Association
Stephen M. Lipster, The Electrical Trades Center, OH [L]
(Alt. to Andrew White)
Rep. International Brotherhood of Electrical Workers
Joseph P. Murnane, Jr., Underwriters Laboratories Inc., NY [RT]
(Alt. to Donald J. Talka)
Marcus R. Sampson, Minnesota Department of Labor & Industry, MN [E]
(Alt. to Eugene E. Morgan)
Rep. International Association of Electrical Inspectors
James C. Seabury, III, Enterprise Electric, LLC, TN [IM]
(Alt. to Dennis W. Marshall)
Rep. Independent Electrical Contractors, Inc.
Steven R. Terry, Electronic Theatre Controls Inc., NY [M]
(Alt. to Kenneth E. Vannice)
Rep. US Institute for Theatre Technology
(Vote Limited to 518, 520, 525, 530, 540)

CODE-MAKING PANEL NO. 16

Articles 770, 800, 810, 820, 830

Ron L. Janikowski, *Chair*
City of Wausau, Wisconsin, WI [E]
Rep. International Association of Electrical Inspectors

Donna Ballast, dbi, TX [M]
Rep. Telecommunications Industry Association
George Bish, MasTec, Inc., dba Advanced Technologies, NC [IM]
Rep. Satellite Broadcasting & Communications Association
J. Robert Boyer, GE Security, NJ [M]
Rep. National Electrical Manufacturers Association
James E. Brunssen, Telcordia, NJ [U]
Rep. Alliance for Telecommunications Industry Solutions
Gerald Lee Dorna, Belden Wire & Cable Co., IN [M]
Rep. Insulated Cable Engineers Association Inc
Ralph M. Esemplare, Consolidated Edison Company of New York, NY [UT]
Rep. Electric Light & Power Group/EEI
Dale R. Funke, Shell Oil Company, TX [U]
Rep. American Chemistry Council
Roland W. Gubisch, Intertek Testing Services NA, Inc., MA [RT]
Randolph J. Ivans, Underwriters Laboratories Inc., NY [RT]
Robert W. Jensen, dbi-Telecommunication Infrastructure Design, TX [M]
Rep. Building Industry Consulting Services International
Steven C. Johnson, Johnson Telecom, LLC, NC [UT]
Rep. National Cable & Telecommunications Association
William J. McCoy, Telco Sales, Inc., TX [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Harold C. Ohde, IBEW-NECA Technical Institute, IL [L]
Rep. International Brotherhood of Electrical Workers
W. Douglas Pirkle, Pirkle Electric Company, Inc., GA [IM]
Rep. National Electrical Contractors Association
Luigi G. Prezioso, M. C. Dean, Inc., VA [IM]
Rep. Independent Electrical Contractors, Inc.

Alternates

Trevor N. Bowmer, Telcordia Technologies, NJ [U]
(Alt. to James E. Brunssen)
Rep. Alliance for Telecommunications Industry Solutions
Terry C. Coleman, National Joint Apprentice & Training Committee, TN [L]
(Alt. to Harold C. Ohde)
Rep. International Brotherhood of Electrical Workers
Timothy D. Cooke, Times Fiber Communications, Inc., VA [UT]
(Alt. to Steven C. Johnson)
Rep. National Cable & Telecommunications Association
Jeff Fitzloff, State of Idaho Division of Building Safety, ID [E]
(Alt. to Ron L. Janikowski)
Rep. International Association of Electrical Inspectors
Roderick S. Kalbfleisch, Northeast Utilities, CT [UT]
(Alt. to Ralph M. Esemplare)
Rep. Electric Light & Power Group/EEI
Stanley Kaufman, CableSafe, Inc./OFS, GA [M]
(Alt. to Gerald Lee Dorna)
Rep. Insulated Cable Engineers Association Inc
David M. Lettkeman, Dish Network Service, LLC, CO [IM]
(Alt. to George Bish)
Rep. Satellite Broadcasting & Communications Association

Jack McNamara, Bosch Security Systems, NY [M]
(Alt. to J. Robert Boyer)
Rep. National Electrical Manufacturers Association
Craig Sato, Underwriters Laboratories Inc., CA [RT]
(Alt. to Randolph J. Ivans)
David B. Schrembeck, DBS Communications, Inc., OH [IM]
(Alt. to Luigi G. Prezioso)
Rep. Independent Electrical Contractors, Inc.
Mario C. Spina, Verizon Wireless, OH [U]
(Alt. to William J. McCoy)
Rep. Institute of Electrical & Electronics Engineers, Inc.

CODE-MAKING PANEL NO. 17

Articles 422, 424, 426, 427, 680, 682

Don W. Jhonson, *Chair*
Interior Electric, Inc., FL [IM]
Rep. National Electrical Contractors Association

Thomas V. Blewitt, Underwriters Laboratories Inc., NY [RT]
Paul Crivell, Camp, Dresser & McKee Inc., WA [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Christopher S. Gill, New York Board of Fire Underwriters, NY [E]
Bruce R. Hirsch, Baltimore Gas & Electric Company, MD [UT]
Rep. Electric Light & Power Group/EEI
James E. Maldonado, City of Tempe, AZ [E]
Rep. International Association of Electrical Inspectors
Jurgen Pannock, Whirlpool Corporation, TN [M]
Rep. Air-Conditioning, Heating, and Refrigeration Institute
(Vote Limited to 422, 424)
Marcos Ramirez, Hatfield-Reynolds Electric Company, AZ [IM]
Rep. Independent Electrical Contractors, Inc.
Brian E. Rock, Hubbell Incorporated, CT [M]
Rep. National Electrical Manufacturers Association
Ronald F. Schapp, Intertek, OH [RT]
Kenneth M. Shell, Tyco Thermal Controls, CA [M]
Rep. Copper Development Association Inc.
(Vote Limited to 426, 427)
Ronald Sweigart, E.I. duPont de Nemours & Company, Inc., DE [U]
Rep. American Chemistry Council
(Vote Limited to 422, 424, 426, 427, 682)
Lee L. West, Newport Controls, LLC, CA [M]
Rep. Association of Pool & Spa Professionals
(Vote Limited to 680)
Randy J. Yasenchak, IBEW Local Union 607, PA [L]
Rep. International Brotherhood of Electrical Workers

Alternates

Dennis L. Baker, Springs & Sons Electrical Contractors Inc., AZ [IM]
(Alt. to Marcos Ramirez)
Rep. Independent Electrical Contractors, Inc.
Allan Chen, Intertek, China [RT]
(Alt. to Ronald F. Schapp)
E. P. Hamilton, III, E. P. Hamilton & Associates, Inc., TX [M]
(Alt. to Lee L. West)
Rep. Association of Pool & Spa Professionals
(Vote Limited to 680)
Robert M. Milatovich, Clark County Building Department, NV [E]
(Alt. to James E. Maldonado)
Rep. International Association of Electrical Inspectors
Wayne E. Morris, Association of Home Appliance Manufacturers, DC [M]
(Voting Alt. to AHAM Rep.)
Rep. Association of Home Appliance Manufacturers
(Vote Limited to 422, 424)
Brian Myers, IBEW Local Union 98, PA [L]
(Alt. to Randy J. Yasenchak)
Rep. International Brotherhood of Electrical Workers
Stephen C. Richbourg, Gulf Power Company, FL [UT]
(Alt. to Bruce R. Hirsch)
Rep. Electric Light & Power Group/EEI
Patrick G. Salas, GE Consumer and Industrial, CT [M]
(Alt. to Brian E. Rock)
Rep. National Electrical Manufacturers Association
Peter J. Sanders, Jr., Snohomish Electric, Inc., WA [IM]
(Alt. to Don W. Jhonson)
Rep. National Electrical Contractors Association
Gary L. Siggins, Underwriters Laboratories Inc., CA [RT]
(Alt. to Thomas V. Blewitt)

Nonvoting

Douglas A. Lee, US Consumer Product Safety Commission, MD [C]
(Alt. to Andrew M. Trotta)
Andrew M. Trotta, US Consumer Product Safety Commission, MD [C]

CODE-MAKING PANEL NO. 18

Articles 406, 410, 411, 600, 605

Michael N. Ber, *Chair*
IEC, Houston, TX [IM]
Rep. Independent Electrical Contractors, Inc.

Frederick L. Carpenter, Lithonia Lighting, GA [M]
Rep. National Electrical Manufacturers Association
Paul Costello, NECA and IBEW Local 90 JATC, CT [L]
Rep. International Brotherhood of Electrical Workers
Lee C. Hewitt, Underwriters Laboratories Inc., IL [RT]
Melvyn J. Kochan, Young Electric Sign Company, NV [M]
Rep. International Sign Association
(VL to 600)
Steven A. Larson, MS Technology, Inc., TN [U]
Rep. Institute of Electrical & Electronics Engineers, Inc.
Amos D. Lowrance, Jr., City of Chattanooga, Tennessee, TN [E]
Rep. International Association of Electrical Inspectors
Michael S. O'Boyle, Lightolier Division of Genlyte/Phillips Lighting, MA [M]
Rep. American Lighting Association
(VL to 410, 411)
James F. Pierce, Intertek, OR [RT]
Sondra K. Todd, Westar Energy, Inc., KS [UT]
Rep. Electric Light & Power Group/EEI
Charles M. Trout, Maron Electric Company, FL [IM]
Rep. National Electrical Contractors Association
Jack Wells, Pass & Seymour/Legrand, NC [M]
Randall K. Wright, RKW Consulting, PA [SE]

Alternates

Steve Campolo, Leviton Manufacturing Company, Inc., NY [M]
(Alt. to Frederick L. Carpenter)
Rep. National Electrical Manufacturers Association
Robert T. Carlock, R. T. Carlock Company, TN [IM]
(Alt. to Michael N. Ber)
Rep. Independent Electrical Contractors, Inc.
Larry Chan, City of New Orleans, LA [E]
(Alt. to Amos D. Lowrance, Jr.)
Rep. International Association of Electrical Inspectors
David D'Hooge, ComEd, IL [UT]
(Alt. to Sondra K. Todd)
Rep. Electric Light & Power Group/EEI
Richard D. Gottwald, International Sign Association, VA [M]
(Alt. to Melvyn J. Kochan)
Rep. International Sign Association
(VL to 600)
Charles S. Kurten, Underwriters Laboratories Inc., NY [RT]
(Alt. to Lee C. Hewitt)
Terry K. McGowan, Lighting Ideas, Inc., OH [M]
(Alt. to Michael S. O'Boyle)
Rep. American Lighting Association
(VL to 410, 411)
Jesse Sprinkle, IBEW Local 461, IL [L]
(Alt. to Paul Costello)
Rep. International Brotherhood of Electrical Workers
Chandresh Thakur, Intertek, CA [RT]
(Alt. to James F. Pierce)

CODE-MAKING PANEL NO. 19

Articles 545, 547, 550, 551, 552, 553, 555, 604, 675, Annex D, Examples D11 and D12

Leslie Sabin-Mercado, *Chair*
San Diego Gas & Electric Company, CA [UT]
Rep. Electric Light & Power Group/EEI

Barry S. Bauman, Alliant Energy, WI [U]
Rep. American Society of Agricultural & Biological Engineers
William Bruce Bowman, Fox Systems, Inc., GA [IM]
Rep. Independent Electrical Contractors, Inc.
Ron B. Chilton, North Carolina Department of Insurance, NC [E]
Rep. International Association of Electrical Inspectors
Garry D. Cole, Shelby/Mansfield KOA, OH [U]
Rep. National Association of RV Parks & Campgrounds
(Vote Limited to 550, 551, 552)
Bruce A. Hopkins, Recreation Vehicle Industry Association, VA [M]
(Vote Limited to 550, 551, 552)
Howard D. Hughes, Hughes Electric Company Inc., AR [IM]
Rep. National Electrical Contractors Association
Thomas R. Lichtenstein, Underwriters Laboratories Inc., IL [RT]
Timothy P. McNeive, Thomas & Betts Corporation, TN [M]
Rep. National Electrical Manufacturers Association
Ronald Michaelis, South Bend & Vicinity Electrical JATC, IN [L]
Rep. International Brotherhood of Electrical Workers
Doug Mulvaney, Kampgrounds of America, Inc., MT [U]
(Vote Limited to 550, 551, 552, 555)
Michael L. Zieman, RADCO, CA [RT]
(Vote Limited to 545, 550, 551, 552)

Alternates

Glenn H. Ankenbrand, Delmarva Power, MD [UT]
(Alt. to Leslie Sabin-Mercado)
Rep. Electric Light & Power Group/EEI
Michael B. F. Atkinson, Kampgrounds of America, Inc., MT [U]
(Alt. to Doug Mulvaney)
(Vote Limited to 550, 551, 552, 555)
William E. Duggins, San Diego Electrical Training Center, CA [L]
(Alt. to Ronald Michaelis)
Rep. International Brotherhood of Electrical Workers
John P. Goodsell, Hubbell Incorporated, CT [M]
(Alt. to Timothy P. McNeive)
Rep. National Electrical Manufacturers Association
David W. Johnson, CenTex IEC, TX [IM]
(Alt. to William Bruce Bowman)
Rep. Independent Electrical Contractors, Inc.
Kent Perkins, Recreation Vehicle Industry Association, VA [M]
(Alt. to Bruce A. Hopkins)
(Vote Limited to 550, 551, 552)
Raymond F. Tucker, Consulting Professional Engineer/RADCO, CA [RT]
(Alt. to Michael L. Zieman)
(Vote Limited to 545, 550, 551, 552)
Cari Williamette, City of St. Paul, MN [E]
(Alt. to Ron B. Chilton)
Rep. International Association of Electrical Inspectors
Eugene W. Wirth, Underwriters Laboratories Inc., WA [RT]
(Alt. to Thomas R. Lichtenstein)

NFPA Electrical Engineering Division Technical Staff

William Burke, Division Manager
Mark W. Earley, Chief Electrical Engineer
Ernest W. Buss, Senior Electrical Engineer
Paul Choiniere, Senior Electrical Specialist
Mark Cloutier, Senior Electrical Engineer
Christopher Coache, Senior Electrical Engineer
Jean O'Connor, Electrical Projects Specialist and Support Supervisor
Lee Richardson, Senior Electrical Engineer
Richard Roux, Senior Electrical Specialist
Jeffrey Sargent, Senior Electrical Specialist

These lists represent the membership at the time each Committee was balloted on the text of this report. Since that time, changes in the membership may have occurred. A key to classifications is found at the front of the document.

Committee Scope: This Committee shall have primary responsibility for documents on minimizing the risk of electricity as a source of electric shock and as a potential ignition source of fires and explosions. It shall also be responsible for text to minimize the propagation of fire and explosions due to electrical installations.

9-1 Log #614g NEC-P09 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms "high voltage" and "medium voltage" are used in many US and international standards, but the definitions of these terms are inconsistent within these standards. Defining these terms in NFPA 70 will merely add another set of definitions to the wide array of definitions already in existence. Currently, 490.2 defines high voltage as more than 600 V, nominal. For the purposes of the requirements in NFPA 70, this definition is adequate, since "over 600-volt" installations, such as "medium voltage" and "high voltage" systems, are treated similarly throughout the NEC with respect to installation requirements.
It is also noted that the submitter did not specify where and in what form the revisions should be made.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-1 Log #4917 NEC-P01 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user ease, make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The proposal does not contain proposed text for the change, including the wording to be added or substantiation of the proposal as required by 4.3.3 of the NFPA Regulations Governing Committee Projects. The panel notes that those articles already provided with diagrams are more complex than most others where the existence of a diagram makes sense and provides guidance; however, most articles do not require diagrams.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-1 Log #4917a NEC-P02 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: Those articles already provided with diagrams are more complex than most others where the existence of a diagram makes sense and provides guidance. However, most articles do not need or require diagrams. This proposal does not recommend specific code text as is required by section 4.4.3(c) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

3-1 Log #4917b NEC-P03 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: Adding a diagram statement to every article in the NEC would not be effective since most articles in the NEC are not complex enough to require these diagrams. 90.1(C) already states that the NEC is not intended as an instruction manual for untrained persons. In addition, there were no actual diagrams provided which is a violation of Section 4.3.3(C) of the NFPA Regulations Governing Committee Projects since the submitter did not provide the recommended text for proposal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

4-1 Log #4917c NEC-P04 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

5-1 Log #4917d NEC-P05 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided proposed text for this proposal, including the wording to be added, revised (and how revised), or deleted in accordance with 4.3.3(c) of the NFPA Regulations Governing Committee Projects. Also, the submitter has not provided a statement of the problem or substantiation for the proposal in accordance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

6-1 Log #4917e NEC-P06 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided the recommended diagram required to address the proposed change in accordance with 4.3.3 of the Regulations Governing Committee Projects. There is currently no table 430.8 in the 2008 edition of the National Electrical Code.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

7-1 Log #4917f NEC-P07 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The panel is not clear on what the submitter is requesting. There is no Table 430.8 in the 2008 code. Article 430 has many different parts for motors so the diagram there is needed to identify which part of the code applies. That is not the case here.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

8-1 Log #4917g NEC-P08 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: Diagrams are not useful or practical for all articles. Submitter does not provide proposed diagrams, just a concept.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-1 Log #4917i NEC-P10 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided text to be added after the scope of each article. This proposal does not meet the requirements of 4.3.3(c) of the Regulations Governing Committee Projects as follows:
4.3.3 Content of Proposals. Each Proposal shall be submitted to the Council Secretary and shall include the following:
(c) Proposed text of the Proposal, including the wording to be added, revised (and how revised), or deleted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

11-1 Log #4917j NEC-P11 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: It is assumed that the submitter is referring to Figure 430.1 on page 70-299. The panel agrees that Figure 430.1 is an excellent format to help guide users through the complexities of Article 430. However, the purview of Panel 11 in addition to Article 430 is Articles 409, 440, 460, and 470. These articles are mostly short in nature and would not benefit from a figure similar to Figure 430.1.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

12-1 Log #4917k NEC-P12 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: Those articles already provided with diagrams are more complex than most others where the existence of a diagram makes sense and provides guidance. However, most articles do not need or require diagrams.
The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

13-1 Log #4917l NEC-P13 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided text or an example to be added after the scope of each article. This proposal does not meet the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-1 Log #4917m NEC-P14 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide a complete proposal and, thus, the proposal does not fulfill the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects. Additionally, CMP-14 does not agree that these articles require tables as this proposal attempts to do.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

15-1 Log #4917n NEC-P15 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3 of the Regulations Governing Committee Projects.
The diagram/table idea works well for motor feeders, circuits and protection. However, the chart concept doesn't fit well with the special occupancies and provisions of Chapter 5. The proposal is incomplete in that it doesn't provide a substantiation as to what function this diagram would serve.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

16-1 Log #4917o NEC-P16 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The submitter has not supplied any figures for the panel to consider and the type of figure suggested is inappropriate for CMP-16 articles.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

17-1 Log #4917p NEC-P17 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The articles covered by CMP-17 include many different types of installations within each article. The NEC already has a systematic methodology of uniform section numbering. This type of table works well with motors, since it only addresses a single type of equipment. The panel does not agree that this proposal will improve the usability of the articles covered by CMP-17.
The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

18-1 Log #4917q NEC-P18 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the NFPA Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted for suggested diagram table.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

19-1 Log #4917r NEC-P19 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: Specific proposals have not been submitted for articles under the responsibility of CMP-19. There does not appear to be a table layout in 430.8 so the submitter's intent is not clear.
Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

1-2 Log #614 NEC-P01 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms low voltage, medium voltage, and high voltage may apply in different contexts as they relate to systems and equipment addressed throughout the scope of the NEC. These different contexts are reflected in different standards and in the nature of the requirements within the NEC. For example, IEEE 100, The Authoritative Dictionary of IEEE Standards Terms, indicates that: “low voltage” can mean either 24 volts or less, supplied from a transformer, converter, or battery, or a class of nominal system voltages 1000 or less; “medium voltage” can mean either 601 to 15,000 V, or a class of nominal system voltages greater than 1000 V and less than 100,000 V, and “high voltage” can mean either a class of nominal system voltages equal to or greater than 100,000 V and equal to or less than 230,000 V or voltage levels that are greater than 1000 V.
The proposal is not consistent with ANSI/NEMA C84.1, Electric Power Systems and Equipment – Voltage Ratings, and with many product standards such as ANSI/UL 347, Safety of High Voltage Industrial Control Equipment, or ANSI/UL 60947-1, Safety of Low-Voltage Switchgear and Controlgear.
The panel concludes that acceptance of the proposal would not provide benefit and would confuse users of the NEC because of the various definitions are in use.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-2 Log #614a NEC-P02 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms “high voltage” and “medium voltage” are used in many US and international standards, but the definitions of these terms are inconsistent within these standards. Defining these terms in NFPA 70 will merely add another set of definitions to the wide array of definitions already in existence. Currently, 490.2 defines High Voltage as more than 600 V, nominal. For the purposes of the requirements in NFPA 70, this definition is adequate, since “over 600 volt” installations, such as “medium voltage” and “high voltage” systems, are treated similarly throughout the NEC with respect to installation requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-2 Log #614b NEC-P04 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The proposal does not contain any actual proposed language and lacks any specific requirement and thus does not comply with the NEC Style Manual. These terms are not used in the Articles under CMP 4.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

5-2 Log #614c NEC-P05 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided proposed text for this proposal, including the wording to be added, revised (and how revised), or deleted in accordance with 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

6-2 Log #614d NEC-P06 **Final Action: Reject**
(Entire Document)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as “Reject” to correlate with the actions of other Code-Making Panels throughout the document on related proposals.
Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Accept in Principle in Part
Add new definitions to Article 100 as follows:
<u>**Voltage, Low.** A class of nominal system voltages not exceeding 2,000 volts.</u>
<u>**Voltage, Medium.** A class of nominal system voltages over 2,000 Volts but not exceeding 69 kV.</u>
Panel Statement: Low voltage should include up to and including 2,000 volts since 328.2 defines Type MV medium voltage cable as rated 2001 volts or higher. The separation at 69 kV is consistent with IEEE Std 100, IEEE Standard Dictionary of Electrical and Electronic Terms. The panel does not accept the proposed definition for high voltage as it does not fit the panel’s work.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:
PICARD, P.: There is not a definition for Low Voltage/High Voltage that encompasses all applications within the Code. If needed, definitions should be included in applicable sections of the Code not in Article 100.
THOMPSON, J.: This proposal should be reviewed by the TCC to determine the impact on other areas of the Code and the actions taken by other CMPs that received this same proposal. The use of Low and Medium Voltage differ throughout the Code. This includes Articles 110, 411, 490, 517, 551, 552 and to some degree, 830, all of which are beyond the scope of CMP6.

7-2 Log #614e NEC-P07 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: Submit this proposal to the TCC awaiting the action of CMP-1. The panel does not have a preference. Medium voltage maximum of 100 kv is too high. See also Article 328.2 for medium voltage cable definition.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

8-2 Log #614f NEC-P08 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms “high voltage” and “medium voltage” to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: Will not add clarity to the NEC. The code has established nominal voltages and terminology that is well recognized in the industry.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-2 Log #614h NEC-P10 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: This proposal suggests action but lacks specific text and is in violation of 4.3.3 of the Regulations Governing Committee Projects. The recommendation is contingent on the acceptance of proposal 1-109 which intends to add new definitions for "Voltage, Low, Voltage, Medium and Voltage, High." The global implications of such a change would require task group action to correlate the use of these terms throughout the document. CMP-10 requests that the TCC direct CMP-1 to comment on this proposal and a task group be formed if necessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
COOK, D.: I agree with the Panel action and statement. I also realize current text and requirements in Article 240 and most of the NEC is not based on "Low", "Medium", or "High" voltage, but primarily based on installations 600 volts, nominal, or less and installations over 600 volts. Acceptance of proposed definitions in Article 100 would not create a correlation problem in Article 240. Acceptance of the proposed definitions in Article 100, assuming they correlate with other ANSI standards related to "Low", "Medium", and "High" voltage installations, has the potential to provide useful guidance for those installations when they are part of premises wiring. In that case, I would be supportive of adding the definitions and allowing NEC Committees the opportunity to develop NEC requirements for premises wiring at voltage levels that are standardized with other ANSI standards.

11-2 Log #614i NEC-P11 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: These terms do not exist in the articles that Panel 11 has control over (409, 430, 440, 460, and 470).
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

12-2 Log #614j NEC-P12 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms "high voltage" and "medium voltage" are used in many US and international standards, but the definitions of these terms are inconsistent within these standards. Defining these terms in NFPA 70 will merely add another set of definitions to the wide array of definitions already in existence. Currently, 490.2 defines high voltage as more than 600 V, nominal. For the purposes of the requirements in NFPA 70, this definition is adequate, since "over 600-volt" installations, such as "medium voltage" and "high voltage" systems, are treated similarly throughout the NEC with respect to installation requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

13-2 Log #614k NEC-P13 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms "high voltage" and "medium voltage" are used in many US and international standards, but the definitions of these terms are inconsistent within these standards. Defining these terms in NFPA 70 will merely add another set of definitions to the wide array of definitions already in existence. Currently, 490.2 defines "high voltage" as more than 600 V, nominal. For the purposes of the requirements in NFPA 70, this definition is adequate, since "medium voltage" and "high voltage" systems are treated similarly throughout the NEC with respect to installation requirements.
The terms low voltage, medium voltage, and high voltage may apply in different contexts as they relate to systems and equipment addressed throughout the scope of the NEC. These different contexts are reflected in different standards and in the nature of the requirements within the NEC.
For example, IEEE 100, The Authoritative Dictionary of IEEE Standards Terms, indicates that:
• Low voltage can mean either 24 volts or less, supplied from a transformer, converter, or battery, or a class of nominal system voltages 1000 or less.
• Medium voltage can mean either 601 to 15,000 V, or a class of nominal system voltages greater than 1000 V and less than 100,000 V.
• High voltage can mean either a class of nominal system voltages equal to or greater than 100,000 V and equal to or less than 230,000 V or voltage levels that are greater than 1000 V.
The proposal is not consistent with ANSI/NEMA C84.1, Electric Power Systems and Equipment – Voltage Ratings, and with many product standards such as ANSI/UL 347, Safety of High Voltage Industrial Control Equipment, or ANSI/UL 60947-1, Safety of Low-Voltage Switchgear and Controlgear. The panel concludes that acceptance of the proposal would not provide benefit and would confuse users of the NEC because of the various definitions that are in use.
This issue is outside the jurisdiction of Panel 13 and, since it affects the entire NEC, it is an NEC TCC issue. CMP-13 requests that the TCC direct CMP-1 to comment on this proposal and a task group be formed if necessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-2 Log #614l NEC-P14 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: CMP-14 cannot assume that the new proposed definitions will be accepted. If the definitions are accepted, the TCC will take appropriate action.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

15-2 Log #614m NEC-P15 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The term "high voltage" in Article 517 is used with reference to internal equipment voltages not system voltages, and the term "medium voltage" is not used in any of CMP-15 articles. Correlation with other accepted code changes is necessary. (Proposal 1-109)
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

16-2 Log #614n NEC-P16 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.

Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms "high voltage" and "medium voltage" are not used in the articles under the purview of CMP-16.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

17-2 Log #614o NEC-P17 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: These terms do not appear to be used within the articles covered by CMP-17.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

18-2 Log #614p NEC-P18 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
The proposal additionally does not comply with 4.3.3(d) because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

19-2 Log #614q NEC-P19 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to support the proposed revision. No definitions for the specified terms exist in Article 100.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

3-2 Log #614r NEC-P03 **Final Action: Reject**
(Entire Document)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Change terms "high voltage" and "medium voltage" to correlate with new proposed definitions in Article 100.
This is a companion proposal to a proposal to add definitions for low voltage, medium voltage, and high voltage to Article 100.
Substantiation: If the proposal for adding the definitions in Article 100 is accepted, this proposal must be accepted as well to correlate between all chapters of the NEC.
Panel Meeting Action: Reject
Panel Statement: The terms "high voltage" and "medium voltage" are used in many US and international standards, but the definitions of these terms are inconsistent within these standards. Defining these terms in NFPA 70 will merely add another set of definitions to the wide array of definitions already in existence. Currently, 490.2 defines High Voltage as more than 600 V, nominal. For the purposes of the requirements in NFPA 70, this definition is adequate, since "medium voltage" and "high voltage" systems are treated similarly throughout the NEC with respect to installation requirements.
The terms low voltage, medium voltage, and high voltage may apply in different contexts as they relate to systems and equipment addressed throughout the scope of the NEC. These different contexts are reflected in different standards and in the nature of the requirements within the NEC.
For example, IEEE 100, The Authoritative Dictionary of IEEE Standards Terms, indicates that:
- low voltage can mean either 24 volts or less, supplied from a transformer, converter, or battery, or a class of nominal system voltages 1000 V or less.
- medium voltage can mean either 601 V to 15,000 V, or a class of nominal system voltages greater than 1000 V and less than 100,000 V.
- high voltage can mean either a class of nominal system voltages equal to or greater than 100,000 V and equal to or less than 230,000 V or voltage levels that are greater than 1000 V.

The proposal is not consistent with ANSI/NEMA C84.1, Electric Power Systems and Equipment – Voltage Ratings and with many product standards such as ANSI/UL 347, Safety of High Voltage Industrial Control Equipment or ANSI/UL 60947-1, Safety of Low-Voltage Switchgear and Controlgear. The panel concludes that acceptance of the proposal would not provide benefit and would confuse users of the NEC because of the various definitions that are in use.
This issue is outside the jurisdiction of Code-Making Panel 3 and, since it affects the entire NEC, it is an NEC Technical Correlating issue.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

1-3 Log #2245 NEC-P01 **Final Action: Reject**
(Entire Document)

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Revise text to read as follows:
For example: Instead of ~~50 mm~~ it should read 5 cm.
Substantiation: The proposed revision is to promulgate the International System and the proper usage of that system in a broad manner. For example, in engineering related areas, drawings are often in millimeters rather than centimeters. Contrarily, groups dealing with consumer issues may give preference to centimeters. Thus, avoiding the large numbers in millimeters such as "600 mm" that would become "60 cm". Practical for the end user and would save a decimal for every millimeter figure in the standard.
Panel Meeting Action: Reject
Panel Statement: The proposal conflicts with 3.2.7.6 of the NEC Style Manual, which requires dimensions less than 1 m to be expressed in mm.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-3 Log #3922 NEC-P08 **Final Action: Reject**
(Entire Document)

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read:
Everywhere "Type RTRC marked with the suffix -XW" is mentioned, add "Type RTRC marked with the suffix –PW".
Substantiation: Champion Fiberglass, Inc. is submitting to Underwriters Laboratories data for fact finding study for a new conduit made from a different wall thickness compared to the RTRC XW conduit. This conduit has the same or higher impact and compression strength as Schedule 80 PVC and should therefore qualify for all instances where Schedule 80 PVC is approved (as well as RTRC XW).
Panel Meeting Action: Reject
Panel Statement: Proposers should identify by section with proposed text where revisions are to be made within the code. Panel review of the fact finding report will be required prior to consideration of a proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

11-160 Log #4917h NEC-P11 **Final Action: Reject**
(Entire Document)

Submitter: Caleb M. Ferris, Chadwick Electric
Recommendation: Add a diagram table after the scope of each article similar to the one in Article 430.
Substantiation: For NEC user cost make the table layout diagram in 430.8 standard throughout the code.
Panel Meeting Action: Reject
Panel Statement: Those articles already provided with diagrams are more complex than most others where the existence of a diagram makes sense and provides guidance. However, most articles do not need or require diagrams. This proposal does not recommend specific code text as is required by 4.4.3(c) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 90 — INTRODUCTION

1-4 Log #2325 NEC-P01 **Final Action: Reject**
(90.1)

Submitter: Thomas J. Conlan, The Electrician Incorporated
Recommendation: Revise text as follows:
The purpose of this code is the practical safeguarding of persons**, life** and property from hazards arising from the use of electricity.
Substantiation: Life is really living matter, that should be added to the purpose of this code because Life is addressed to Animal Life not limited to pets and farm animals; and Plant Life is not limited to Agricultural and Greenhouse vegetation. Let's not segregate animal and plant life, include what is to be safeguarded and that the NFPA does recognize ALL LIFE. The NFPA should not ignore this area especially in this day and age.
Panel Meeting Action: Reject
Panel Statement: The use of the word "life" in the sentence would include all living things (matter). The purpose of the code is not the practical safeguarding of all living matter. The "practical safeguarding" is specific to "persons and property." Including the word "life" in the sentence would be a major divergence from the purpose of the NEC.
In addition, the submitter has not provided substantiation as required by 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-5 Log #592 NEC-P01 **Final Action: Reject**
(90.1(A))

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Add new text as follows:
90.1 Purpose.
(A) Practical Safeguarding. The purpose of this Code is to establish the minimum requirements for the practical safeguarding of persons and property from hazards arising from the use of electricity.
Substantiation: By adding this language, it will make it explicitly clear that the NEC is a minimum standard. It has always been implied that it is a minimum standard, however, I do not believe the current text states that the NEC is in fact a minimum standard. This language would also bring the purpose of the NEC to closely resemble the purpose or intent of other model codes.
Panel Meeting Action: Reject
Panel Statement: The submitter's intent is stated in 90.1(B) that reads: "This *Code* contains provisions that are considered necessary for safety."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-6 Log #1536 NEC-P01 **Final Action: Reject**
(90.1(A))

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
90.1 Purpose.
(A) Practical Safeguarding. The purpose of this Code is to establish the minimum requirements for the practical safeguarding of persons and property from hazards arising from the use of electricity.
Substantiation: By adding this language, it will make it explicitly clear that the NEC is a minimum standard. It has always been implied that it is a minimum standard, however, I do not believe the current text states that the NEC is in fact a minimum standard. This language would also bring the purpose of the NEC to closely resemble the purpose or intent of other model codes.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-7 Log #4886 NEC-P01 **Final Action: Reject**
(90.1(B), FPN)

TCC Action: The Technical Correlating Committee directs that this proposal be referred to the NEC Technical Correlating Committee Usability Task Group for information.
Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Revise text as follows:
FPN: Hazards often occur because of overloading of wiring systems by methods or usage not in conformity with this Code. This occurs because initial wiring did not provide for increases in the use of electricity. An initial adequate installation, ~~and reasonable provisions for system changes provide for future increases in the use of electricity~~ provisions for future increases in the use of electricity, and plans and specifications that provide ample space in raceways, spare raceways, and additional spaces allow for future increases in electric power and communications circuits. Distribution centers located in readily accessible locations provide convenience and safety of operation.
Substantiation: Revise to include the text from 90.8(A). I also submitted a proposal to delete 90.8(A).
Panel Meeting Action: Reject
Panel Statement: The panel concludes that the submitter did not provide adequate technical substantiation.
There are a number of sections in the NEC that do not contain "enforceable" requirements. (See Section 90.6 for an example.) Fine print notes per the requirements of 90.5(C), can contain "references to other Standards, references to related sections of this Code, or information related to a code rule,...". Sections such as 90.8(A) and (B) effect none of these actions and are not required to be in the form of a fine print note.
The panel requests that the NEC Technical Correlating Committee refer this proposal to the Technical Correlating Committee Usability Task Group for information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: When considering as a whole what the submitter is attempting to do with this proposal and other associated proposals, the proposed change makes sense and should have been accepted. As the panel has noted, there are several code section that do not contain "enforceable" requirements. As such, there is no basis for maintaining unenforceable text in the code. If necessary, unenforceable text should be in the form of a "FPN." Although the submitter has not provided sufficient substantiation for the proposed change, moving the text into an existing FPN makes sense, as it cleans up the text in Article 90 and makes it easier to follow and understand the Introduction. As a note, due to panel action on Proposal 1-43, the word "communication" has changed to the plural "communications".

1-8 Log #593 NEC-P01 **Final Action: Reject**
(90.1(C))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text as follows:
(C) Intention. ~~This Code is not intended as a design specification or an instruction manual for untrained persons.~~ The Code is intended for use in the design and/or installation and maintenance of electrical systems and equipment. The rules in the Code are intended for application by users such as inspection authorities exercising legal jurisdiction over electrical installations, property insurance inspectors, designers and engineers, other qualified persons and organizations working to achieve minimum electrical safety requirements in electrical systems design and installation.
FPN: This Code is not intended as a design specification or an instruction manual for untrained persons.
Substantiation: This proposal is an effort to improve usability and clarity by changing negative text to positive text. The existing text has been relocated to a new FPN following the new text that describes how the Code is intended to be applied, rather than how it is not intended. Subdivision (C) is titled "Intention" yet the current text indicates only what is not intended from the NEC. This proposal does not seek any technical revision and is not intended to exclude any entity that uses the NEC on a voluntary or mandatory basis. The proposal simply transforms the explanatory information in the 2008 NECH into positive text in order to describe the intent of the Code. The second sentence list is left open-ended by including the words "such as" in the text in an effort to not exclude any current or potential users.
Panel Meeting Action: Reject
Panel Statement: The proposal does not enhance clarity or usability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:
ANTHONY, M.: This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want. Therefore the explanation of how we hope to help the harmonization process please refer to our comment on Proposal 1-17.
LABRAKE, JR., N.: Proposal 1-8 should have been accepted-in-principle. Refer to my ballot statement on Proposal 1-9.
MCMAHILL, L.: This proposed change should have been accept in principle. The submitter was simply attempting to change the paragraph into positive text. So, minor adjustments to the text should have been made. The first sentence should have been revised to read: "The Code is intended for use in the installation and maintenance of electrical systems and equipment." The last sentence should have been revised by deleting: "in electrical systems design and installation." It should be clear that the code is not intended to be a design specification. In addition, the NEC Style Manual, Annex B, recommends avoiding the use of "and/or." The deleted text is superfluous.

1-9 Log #3127 NEC-P01 **Final Action: Reject**
(90.1(C))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Revise 90.1(C) as follows:
(C) Intention. The Code is intended for use in the design and/or installation and maintenance of electrical systems and equipment. The rules in the Code are intended for application to electrical installations and communications systems on the load side of the service point. The Code is intended to be applied to installations by users such as inspection authorities exercising legal jurisdiction over, property insurance inspectors, designers and engineers, and other qualified persons and organizations working to achieve electrical safety in electrical systems design and installation.
FPN: This Code is not intended as a design specification or an instruction manual ~~for untrained persons~~.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". Several companion proposals regarding this subject are submitted to 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

Specifically, the rationale for this change is to state what the Code intends in positive language and that the document does not depend on this statement for only untrained persons. Also, see the narrative in front of the 2008 NEC Handbook.
Panel Meeting Action: Reject
Panel Statement: The panel concludes that the proposal does not enhance clarity or usability.

In addition, the panel concludes that this is a scope statement. 90.2 already addresses the scope and that should not be repeated in a different form in 90.1(C).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

ANTHONY, M.: This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want. Therefore the explanation of how we hope to help the harmonization process, refer to our comment on Proposal 1-17.

LABRAKE, JR., N.: Proposal 1-9 should have been accepted-in-principle. The text could be revised as follows to meet the intent of the Panel's discussion regarding scope statements.
90.1(C) Intention. This Code applies to the design and installation of electrical and communications systems and equipment on the premises wiring side of the service point. This Code is not intended as a design specification or an instruction manual for untrained persons.

In addition, refer to my ballot statement on Proposal 1-29.

1-10 Log #4520 NEC-P01 **Final Action: Reject**
(90.1(C))

Submitter: Medard Kopczynski, Town of Keene / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:

(C) ~~Intention~~ Limits. This Code is not intended as a design specification or an instruction manual for untrained persons.
Substantiation: Note: This proposal was developed by the proponent as a member of the Building Code Development Committee (BCDC) with the committee's endorsement.

This term is more definitive than the current title because the provision is actually a limit rather than an intention.
Panel Meeting Action: Reject
Panel Statement: "Intention" is the purpose or goal of the NEC or what is to be accomplished or attained. The word "Limits" implies a boundary, something that restrains, or confines.

Changing the word to "Limits" would imply that there are no other limits to the NEC, except those stated in 90.1(C), which certainly is not the case.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-11 Log #4782 NEC-P01 **Final Action: Reject**
(90.1(C))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text as follows:

(C) Intention. ~~This Code is not intended as a design specification or an instruction manual for untrained persons.~~ The Code is intended for use in the design and/or installation and maintenance of electrical systems and equipment. The rules in the Code are intended for application to electrical installations and communications systems on the load side of the service point. The Code is intended to be applied to installations by users such as inspection authorities exercising legal jurisdiction over property insurance inspectors, designers and engineers, and other qualified persons and organizations working to achieve electrical safety in electrical systems design and installation.
FPN: This Code is not intended as a design specification or an instruction manual for untrained persons.
Substantiation: This proposal is an effort to improve usability and clarity by changing negative text to positive text. The existing text has been relocated to a new FPN following the new text that describes how the Code is intended to be applied, rather than how it is not intended. Subdivision (C) is titled "Intention" yet the current text indicates only what is not intended from the NEC. This proposal does not seek any technical revision and is not intended to exclude any entity that uses the NEC on a voluntary or mandatory basis. The proposal simply transforms the explanatory information in the 2008 NECH into positive text in order to describe the intent of the Code. The second sentence list is left open-ended by including the words "such as" in the text in an effort to not exclude any current or potential users.
Panel Meeting Action: Reject
Panel Statement: The panel concludes that the proposal does not enhance clarity or usability.

The panel also concludes that the second sentence is a scope statement. 90.2 already addresses the scope, which should not be repeated in a different form in 90.1(C).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:

LABRAKE, JR., N.: Proposal 1-11 should have been accepted-in-principle. Refer to my ballot statement on Proposal 1-9.
Explanation of Abstention:

ANTHONY, M.: Although the existing language is efficient, it is cast in negative language. This proposal puts the purpose of the NEC in positive language, a shared objective. Our interest group would object to the inclusion of the word "maintenance" however. While there are passages in the NEC would contain references to maintenance practice, we would prefer that maintenance be covered in NFPA 70B.

We encourage the submitter to revise the proposal by removing references to the maintenance aspect of the NEC, add language that emphasizes that the NEC is to be used by trained persons only, clear up the redundancy cited by the panel. Periodic re-consideration of the scope of the NEC is to be welcomed as an indication of dynamic thinking.

1-12 Log #3128 NEC-P01 **Final Action: Reject**
(90.2)

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Add the following text and illustration to 90.2 Scope:
90.2 Scope. The following is a general illustration of where utility electric supply and premises wiring meet for what is covered by this Code and what is not covered.

See page 17 for Figure 90.2.

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.

*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

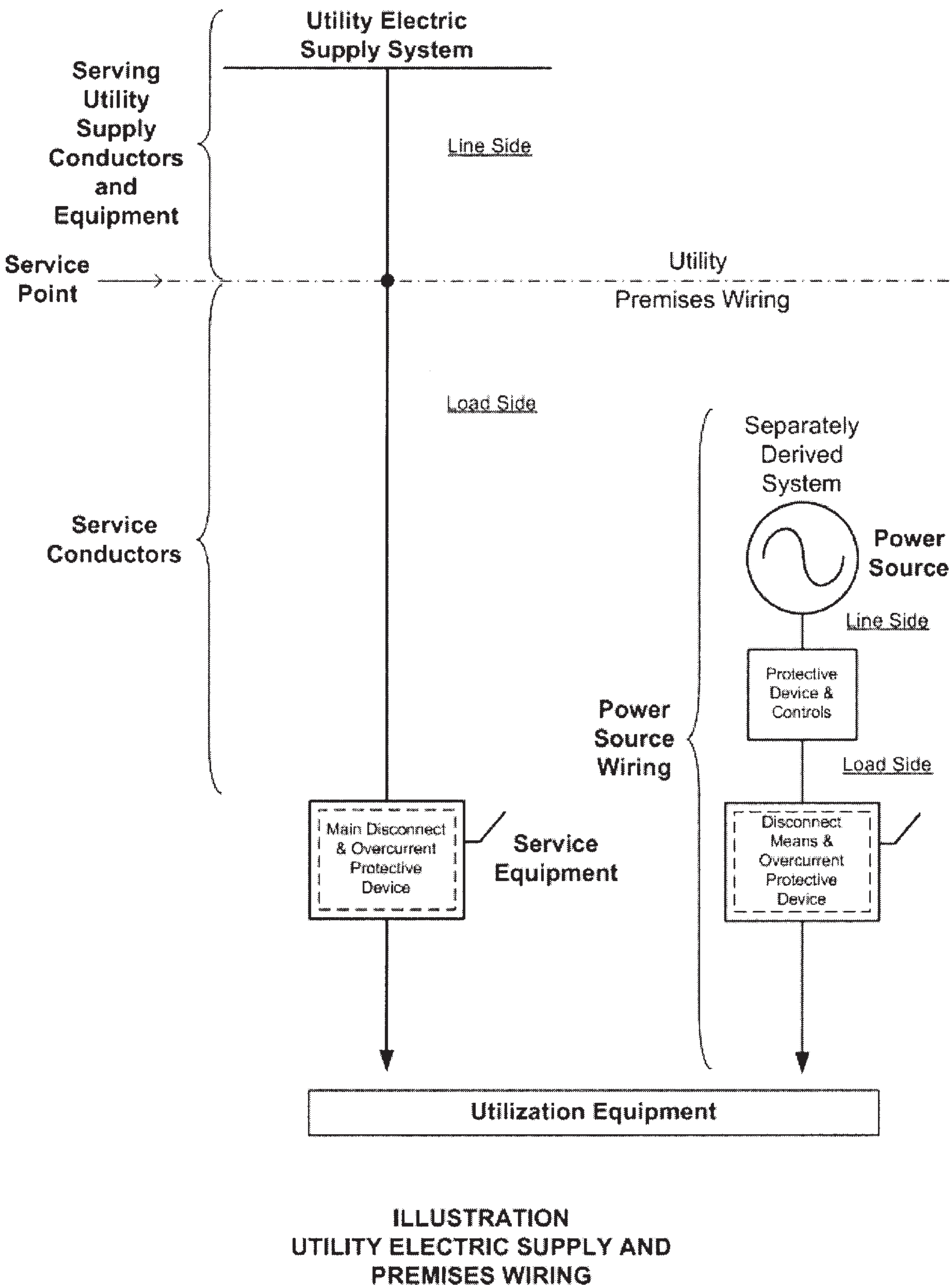

Utility Electric
Supply System
Serving
Utility
Supply
Conductors
and
Equipment
Line Side
Service
Point
Utility
Premises Wiring
Load Side
Separately
Derived
System
Service
Conductors
Power
Source
Line Side
Protective
Device &
Controls
Power
Source
Wiring
Load Side
Main Disconnect
& Overcurrent
Protective
Device
Service
Equipment
Disconnect
Means &
Overcurrent
Protective
Device
Utilization Equipment
ILLUSTRATION
UTILITY ELECTRIC SUPPLY AND
PREMISES WIRING

Figure 90.2

Specifically, the rationale for this change is to add an illustrative figure to 90.2 to provide visual clarity where the NEC applies to premises wiring meeting the supply facilities under exclusive control of utilities at the service point and to separately derived systems that are not connected to a service point. The location of the service point and utility equipment to provide electric service to premises wiring is dependent upon the governmental or regulated serving utility's local requirements or those of a private utility under governmental oversight or conditions of service (e.g. tariffs with service applications).

Panel Meeting Action: Reject

Panel Statement: The proposal does not enhance clarity or usability. Proposed Figure 90.2 does not apply to all installations and does not clarify exclusive control.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 3

Explanation of Negative:

ANTHONY, M.: The proposal enhances clarity and usability. Any shortcomings in applicability are no greater in magnitude than the shortcomings of the figure at the head of Article 430. The figure clarifies exclusive control. The figure clarifies "exclusive control" in less than 1000 words.

BARRIOS, L.: The panel action should have been to Accept in Principle. The drawing is a good representation of the Service Point definition and shows that this point is not defined by a specific piece of equipment like a disconnecting means, but will change depending on the utility/constomer arrangements. The coverage of the Code and where it applies versus the NESC is a complex one. Even though this figure may not perfectly apply to all examples, it is better than what we have available today. The figure should be shown as a FPN so that it is not considered mandatory text.

LABRAKE, JR., N.: Proposal 1-12 should have been <u>accepted-in-principle</u>. The concept of the figure in this proposal discussed in the panel was thought to be more appropriate as Annex material or as an example in Chapter 9 of the Code. The terms "line side" and "load side" were discussed as more appropriate for equipment termination and in the context of this illustration, "load side" should be referred to as the "NEC side." The Panel should have considered this as a new Annex for "information on premises wiring meeting the utility electric supply." In addition, refer to my ballot statement on Proposal 1-29.

The illustration should be placed in a new informative Annex "TBD" titled "General Information Regarding Utility Electric Supply to Premises Wiring" as follows:

<u>Annex "TBD": "General Information Regarding Utility Electric Supply to Premises Wiring"</u>

<u>1. The following is a general illustration of where utility electric supply and premises wiring meet for what is covered and what is not covered by this Code as described in 90.2. Local conditions of service may locate the utility metering at any point on either side of the service point; see 90.2(B)(5). Conditions of electric service are based on governmental laws or regulations that determine the utility authority to provide electric service under their tariffs. These conditions of electric service affect the location of the service point and facilities under the local serving utility's exclusive control.</u>

See page 19 for Figure 90.2.

Comment on Affirmative:

MCCARVER, R.: ATIS votes to affirm the Panel 1 action on this proposal chiefly because the proposal ignores communications installations. The concept of a service point does not apply, or applies differently to communications systems than to a power utility interface. ATIS constituents are users of both the NEC and the National Electrical Safety Code (NESC). There is value in more clearly defining the relationship of the two codes and, where they overlap, ensuring that consistent and safe practices are followed regardless of which code is used. Panel 1 considered a number of proposals which attempted to accomplish these clarifications. There were similar proposals for the recently completed NESC cycle. Many of these were accepted in the NESC, but none before Panel 1 were accepted at the ROP meeting. ATIS urges those who have not supported the concept of harmonizing the two standards to reconsider and recognize the value of clearly defining the relationship between the NEC and NESC. Many of the arguments asserted have little bearing on safety.

1-13 Log #4507 NEC-P01 **Final Action: Reject**
(90.2)

Submitter: Jim Muir, Washington County Building Services / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

90.2 Scope

(A) ~~Covered~~ <u>Applicability</u>. This Code <u>shall apply to</u> ~~covers~~ the installation… (balance remains the same)

(B) ~~Not Covered~~ <u>Non-Applicability</u>. This is Code ~~does not cover~~ <u>shall not apply to</u> the following: (balance remains the same).

Substantiation: Note: This proposal was developed by the proponent as a member of the Building Code Development Committee (BCDC) with the committee's endorsement.

Other NFPA codes and standards use the term "applicability" or a similar form of "applicability" to describe what is encompassed or not encompassed by the Code. The term "covered" in the electrical code usually refers to encasing material over conductors.

Panel Meeting Action: Reject

Panel Statement: The word "cover" is used properly as a transitive verb to describe the scope. The substantiation does not identify a problem as per the NFPA Regulations Governing Committee Projects section 4.3.3(D).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-14 Log #225 NEC-P01 **Final Action: Reject**
(90.2(A))

Submitter: Joseph A. Tedesco, Boston, MA

Recommendation: Revise as follows:

90.2 Scope (A) Covered. This code covers the installation <u>and use</u> of electrical...no change.

Substantiation: See 110.3(B) Installation <u>and Use</u>.

Panel Meeting Action: Reject

Panel Statement: The submitter's substantiation does not account for the fact that 110.3(B) refers only to listed equipment.

See the NFPA Regulations Governing Committee Projects Section 4.3.3 that states that proposals must include a statement of the problem and substantiation for the proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

HICKMAN, P.: We conclude that the submitter's reference to 110.3(B) was offered as an example of where "and use" is used to substantiate the recommendation and agree with the submitter that the scope of the document should include "and use" since the NEC does cover use as well as installation.

MCMAHILL, L.: This proposal should have been accepted. Although the submitter did not provide clear substantiation for the proposed change, it is apparent that parallel structure from one code section to another is the intent. By accepting the change, parallel structure would have been attained.

1-15 Log #3129 NEC-P01 **Final Action: Reject**
(90.2(A))

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Revise 90.2(A) as follows:

(A) Covered. This Code covers <u>requirements of</u> the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways for the following <u>premises wiring systems</u>:

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.

*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (<u>http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006</u> and <u>http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf</u>) pertaining to this issue.

Specifically, the rationale for this change is to add the term "premises wiring" to parallel the scope of the NESC where it applies to "supply" facilities. This provides for distinction between premises wiring and supply side facilities relative to the service point as defined in both the NEC and NESC. Correlation is made with the added text to the informational notes to 2007 NESC Rules 011B and 011C.

Panel Meeting Action: Reject

Panel Statement: The proposed changes do not add clarity to the existing scope statement in 90.2(A).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: The addition of the phrase "premises wiring" <u>does</u> add clarity, in our view.

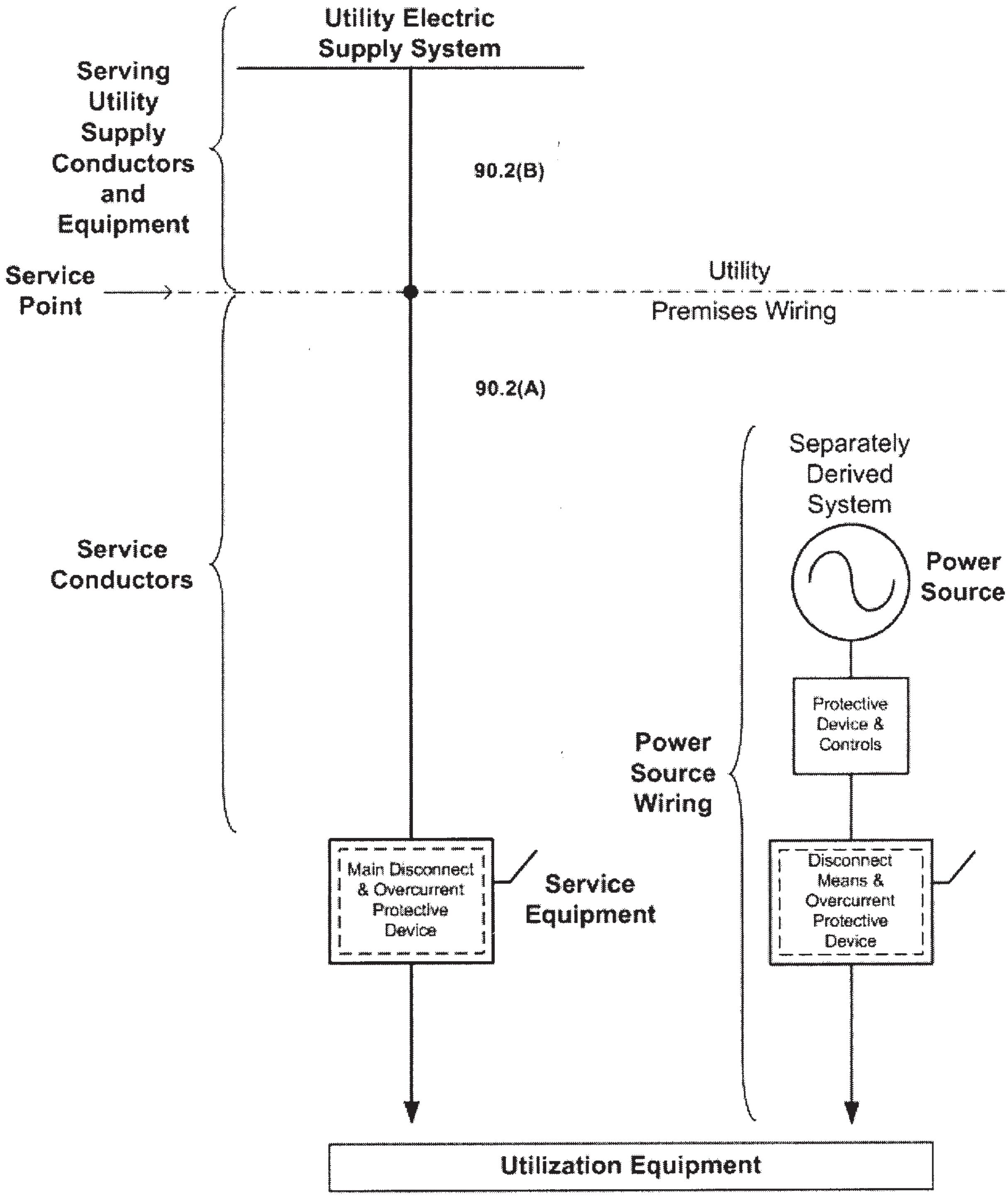


ILLUSTRATION
UTILITY ELECTRIC SUPPLY AND
PREMISES WIRING

Figure 90.2

LABRAKE, JR., N.: Proposal 1-15 should have been accepted-in-principle. Based on discussion in the Panel, the text "covers requirements of" could be changed to "establishes requirements for" to provide the clarity the Panel seeks. The addition of the text "premises wiring systems" in the proposal provides for clear understanding that the itemized list that follows pertain what is covered by the NEC. In addition, refer to my ballot statement on Proposal 1-29.

1-16 Log #3131 NEC-P01 **Final Action: Reject**
(90.2(A), FPN (New))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Add new FPN to 90.2(A) following new item (5) as follows:
FPN: See Figure 90.2 for information on the load side of the service point that 90.2(A) lists as covered by this Code.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is to add a new fine print note to 90.2(A) for referring to the proposed new illustration on 90.2 of what is covered by the NEC similar to the FPN in 250.1 to reference Figure 250.1.
Panel Meeting Action: Reject
Panel Statement: The FPN reference to Figure 90.2 is unnecessary due to the action taken on Proposal 1-12.

See the panel action and statement on Proposal 1-12.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

ANTHONY, M.: Please refer to comment on Proposal 1-12.

LABRAKE, JR., N.: Proposal 1-16 should have been accepted-in-principle. The concept of the figure in Proposal 1-12 discussed in the panel was thought to be more appropriate as Annex material or as an example in Chapter 9 of the Code. The Advisory Note reference proposed would refer to the new Annex based on my ballot statement on Proposal 1-12 if the Panel accepted-in-principle. In addition, refer to my ballot statement on Proposal 1-29.

1-17 Log #3446 NEC-P01 **Final Action: Reject**
(90.2(A)(2), FPN (New))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Add the following Fine Print Note to 90.2(A)(2):

(2) Yards, lots, parking lots, carnivals, and industrial substations
FPN: ANSI C2-2007, *National Electrical Safety Code* contains information useful for meeting the intent of the NEC as indicated in fine print notes (FPN) herein.
Substantiation: Edison Electric Institute agrees with Code Making Panel 1's statement to reject Proposal 1-4 in the A2007 NEC ROP on page 70-3 and Mr. LaBrake's Explanation of Negative to accept Comment 1-1 in the A2007 NEC ROC *. The Fine Print Note in 90.2(A)(2) needs to be reinstated which is designed to provide information and let the user of the NEC know about the NESC, which adds clarity to the National Electrical Code.
* Refer to the NFPA 2007 Annual Meeting Transcript (http://www.nfpa.org/assets/files/PDF/CodesStandards/A07TranscriptFinal.pdf) pertaining to this issue in Code Making Panel 1 of NFPA 70.

This Fine Print Note provides a correlation reference with the NESC. See second sentence of Rule 011A in the 2007 NESC.

This is a companion proposal to the proposed addition to 90.2(C) and definition of "supervised installation" in Article 100.
Panel Meeting Action: Reject
Panel Statement: The recommendation does not enhance clarity or usability. In addition, the panel reaffirms its action and position on Comment 1-1 in the 2007 Annual Revision Cycle Report on Comments.

The panel reaffirms acceptance of the substantiation of Mr. Pauley in that comment and continues to conclude that the proposed FPN does add confusion when one considers that the NEC is an enforcement document that is adopted by practically all jurisdictions in the US. The proposed fine print note reference as a source from the NEC implies that it is capable of being used without interfering with the use of the NEC, and that the code loses nothing by deleting the reference, but has increased confusion/conflict with the reference included.

The submitter has not addressed any of these issues. Insufficient substantiation has been provided to substantiate this fine print note referencing the NESC. NFPA and IEEE appointed a task group to address correlation issues between the NEC and NESC and no consensus has been reached.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

ANTHONY, M.: Many colleges and universities have complicated relationships with municipal and investor-owned power utilities. Most have "systems-within-a system" that form a microgrid; with wiring and equipment on either side of a boundary governed by standard easement and right-of-way agreements. Safety concerns along this boundary typically involve area lighting, emergency power sources, site placement of transformers and generators and alternative energy sources, metering, operation and maintenance of high voltage overhead and underground supply at the service point.

But the problem is neither purely technical nor is it one that can be solved by individual point solutions. A cut from the 2009 version of ANSI's Essential Requirements: Due Process Requirements for American National Standards is shown below for the committee's consideration:
2.4 Coordination and harmonization
Good faith efforts shall be made to resolve potential conflicts between and among existing American National Standards and candidate American National Standards.

2.4.1 Definition of Conflict

Conflict within the ANS process refers to a situation where, viewed from the perspective of a future implementer, the terms of one standard are inconsistent or incompatible with the terms of the other standard such that implementation of one standard under terms allowable under that standard would preclude proper implementation of the other standard in accordance with its terms.
2.4.2 Coordination/Harmonization

ANSI-Accredited Standards Developers shall make a good-faith effort to resolve potential conflicts and to coordinate standardization activities intended to result in harmonized American National Standards Note that clause 4.2.1.3.4 *Withdrawal for Cause* provides a mechanism by which an interested party may at any time request the withdrawal of an existing ANS.. A "good faith" effort shall require substantial, thorough and comprehensive efforts to harmonize a candidate ANS and existing ANSs. Such efforts shall include, at minimum, compliance with all relevant sections of these procedures See, for example, clauses 2.1, 2.4. 2.5, 2.6 and 4.3.. Developers shall retain evidence of such efforts in order to demonstrate compliance with this requirement to the satisfaction of the appropriate ANSI body.

Many colleges and universities are running "utility-like" enterprises and many are their own inspection authority. State utility regulations are uneven and not ready for a "one-size-fits-all" safety rule for the type of electrical installations that will be possible in distributed resource power delivery regimes. There may also be a tendency to retard innovation in alternative energy technologies in which many APPA member institutions are engaged.

One of the problems with this NEC-NESC scope debacle is that a solution to it might not provide a perceptible business benefit until something bad happens -- or is prevented from happening. Protecting electricians, and the public in general, requires a great deal of non-technical thought in addressing the feelings of individual organizations and the community at large. Keeping the lines of communication open to all stakeholders can bring unanticipated returns.

We hope to see the Task Group develop clear, bright-line recommendations for solutions that are sustainable, that can be flexible and relevant as the US power infrastructure evolves. While there may be no standard approach to tackling group issues, APPA will work with all stakeholders to inspire questions and answers, to create receptivity to new ideas, and to seek value beyond pure compliance.

LABRAKE, JR., N.: Proposal 1-17 should have been accepted-in-principle. The panel statement and the discussion during the meeting raised several common issues that need further discussion and a reconsideration of the panel action.

1. The first of these is the common panel statement that "the proposal does not enhance clarity or usability." This misses the whole point of why this was even submitted. The NEC and the NESC are both ANSI safety codes when used within their context. The purpose of this proposal was not to change the Code but to harmonize the NEC with the NESC at their common point. As such, this proposal does not necessarily "enhance the clarity or usability" of the Code but taken as a whole and in interaction with other codes such as the NESC, it does. The clarity and usability they provide is delineating a clear and distinct line between the applicability of the NEC and the NESC.

2. The second issue in the panel statement related to a reaffirmation of the Substantiation in Mr. Pauley's Comment and that a reference to another Code creates a source of confusion. We disagree. The Panel statement for Proposal 1-4 for the A2007 NEC ROP states that "The FPN provides the user of the Code an applicable resource that can be adopted by governmental bodies to

cover industrial substations or multibuilding complexes." It further states that "ANSI C2 provides the specific information for these installations." To remove this FPN would also remove a source of information for the installation of these industrial substations or multibuilding complexes, resulting in a less safe installation. Here's an example: the NEC requires bonding of metal structural items that are "likely to be energized." Obviously, that would include fences around substations. Except that in the case of an underground installation, there would be no requirement in the NEC. However, there is one in the NESC; Rule 110A1.

3. The Panel mistakenly added the panel statement that the "NESC-NEC Ad Hoc Task Group did not reach consensus" onto Proposal 1-17 that is technically not one of the Ad Hoc proposals, although included with this topic but stands on its own separate substantiation. Even if that statement applied to this Proposal and was true, every public proposal received from an individual could conceivably be rejected for that reason. At the IAEI Section meetings several proposals were voted on to submit to the International Office for submission, which were only required to meet a <u>MAJORITY VOTE</u> in order to be accepted. So, in light of the Panel statement this has little bearing for the proposal to be publicly reviewed on its own merit.

1-18 Log #718 NEC-P01 **Final Action: Reject**
(90.2(A)(3))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
90.2 Scope.
(A) Covered. This *Code* covers the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment, and raceways; and optical fiber cables and raceways for the following:
(3) Installations of conductors and equipment that connect to<u>, have been disconnected from, and are capable of being connected to</u> the supply of electricity<u>, including those abandoned and those identified for future use.</u>
Substantiation: Correlation issue. Requirements for installed but abandoned (unidentified) conductors, cables and equipment, as well as conductors, cables and equipment identified for future use, abound throughout the Code but fall outside of its Scope.
By use of only the present verb tense of "connect" in 90.2(A)(3), the Scope of the Code covers only installed conductors and equipment PRESENTLY connected to the electric supply, yet portions of the Code address conductors, equipment, and raceways that have been ABANDONED and that have been IDENTIFIED for FUTURE USE. As examples, see definitions and requirements in 90.8(A), 640.2, 640.6(C), 645.2, 645.5(F), 645.5(G), 725.2, 725.25, 800.2, 800.25, 820.2, 820.25, 830.2, 830.25, 374.7, 408.7, and 110.14(B) ["*… the free ends of conductors …*"].
Panel Meeting Action: Reject
Panel Statement: According to the submitter's substantiation, the proposal's prescriptive requirements are in the specific code sections applicable to wiring, equipment, and special conditions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-19 Log #3632 NEC-P01 **Final Action: Reject**
(90.2(A)(3))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Revise 90.2(A)(3) as follows:
(3) Installations of conductors and <u>utilization</u> equipment that connect to the supply of electricity <u>at the service point or part of a separately derived system where there is no service point</u>
<u>*FPN*: The Institute of Electrical and Electronics Engineers, Inc. ANSI C2-2007, *National Electrical Safety Code* contains information covering the supply of electricity and street and area lighting under the exclusive control of utilities for utility facilities and functions of generation, transmission, and distribution of electricity, lumens, communication signals, and communication data located on the line side of the service point.</u>
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)FPN new, 90.2(B) FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.
This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.
* Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.
Specifically, the rationale for this change is to add the text "at the service point or part of a separately derived system" to correlate with the scope of the NESC where the NESC covers utility facilities and functions up to the service point. This provides for distinction between premises wiring and supply side facilities relative to the service point as defined in both the NEC and NESC. The added fine print note provides a correlation reference with the NESC regarding equipment that could be on private property that are under the exclusive control of the utility. See Rule 011C and informational notes to Rules 011B and 011C in the 2007 NESC.
Panel Meeting Action: Reject
Panel Statement: The recommendation does not enhance clarity or usability. In addition, the panel reaffirms its action and position on Comment 1-1 in the 2007 Annual Revision Cycle Report on Comments.
The submitter has not addressed any of these issues.
See the panel statement on Proposal 1-17.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:
ANTHONY, M.: Please refer to comment on Proposal 1-17.
BARRIOS, L.: Since electrical installations in the US must be installed in accordance with the NEC or the NESC, depending on the location of the installation in relation to the service point, it is appropriate for the NEC to reference the NESC, and likewise for the NESC to reference the NEC. The NESC provides important installation requirements on the utility side of the service point. The panel action should have been to Accept in Part, accepting re-inserting the FPN reference to the NESC in 90.2(A)(3) but not the remainder of the proposal.
LABRAKE, JR., N.: Proposal 1-19 should have been <u>accepted</u>. Refer to my ballot statements on Proposals 1-17 and 1-29.

1-20 Log #3130 NEC-P01 **Final Action: Reject**
(90.2(A)(5) (New))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Add new 90.2(A)(5) as follows:
<u>(5) Supervised installations of</u>
<u>a. underground mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable where not covered by other regulations, or</u>
<u>b. a campus arrangement, or</u>
<u>c. an industrial complex, or</u>
<u>d. utility interactive systems that are not under the exclusive control of utilities.</u>
<u>*FPN*: Supervised installations have conditions of maintenance and engineering supervision to ensure that only qualified persons monitor and service the system.</u>
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents *. A companion proposal regarding "mining installations" is submitted to 90.2(B)(2).
*Refer to the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 in Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (<u>http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006</u> and <u>http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf</u>).
Specifically, the rationale for this change is that the new text provides for distinction between premises wiring and supply side facilities in mining areas relative to the service point as defined in both the NEC and NESC. This clarifies where the NEC applies to equipment installed within premises wiring where restricted access is supervised. A new fine print note is added to describe "supervised installation" in clarifying its meaning. Other regulations such as MSHA would apply to mining operations and this is covered in a companion proposal to 90.2(B)(2).
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the existing 4 items in 90.2(A)(1), (2), (3), and (4).
The code is applicable in accordance with the provisions in 90.2(A)(1), (2), (3), and (4) whether the facility is "supervised" or "unsupervised".
The submitter provided inadequate substantiation for this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ANTHONY, M.: Campus environments need to recover economies of scale. The single building-single system model does not suit our industry well enough. A definition of supervised installation will permit more effective risk characterization and realize the economies of scale which are present in campuses – groups of buildings – that are under a single management.

LABRAKE, JR., N.: Proposal 1-20 should have been accepted-in-principle. Based on the Panel discussion, in this proposal's text item (a), "not covered by other regulations" could have an Advisory Note to clarify these such as associated with 30CFR Parts 56, 57, 75, and 77 in the U.S. In addition, refer to my ballot statements on Proposals 1-17 and 1-29.

1-21 Log #627 NEC-P01 **Final Action: Reject**
(90.2(A)(5) and (6))

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Add new text to read as follows:

(5) Existing Electrical Installations.
Existing electrical installations that do not comply with the provisions of this Code shall be permitted to be continued in use provided the existing installation was code compliant at the time of original installation, or the authority having jurisdiction determines that the lack of conformity with this code presents an imminent danger to occupants. Where changes are required for correction of hazards, a reasonable amount of time shall be given for compliance, depending on the degree of the hazard.
(6) Additions, Alterations, or Repairs.
Additions, alterations, or repairs to any building, structure, or premises shall conform to that required of a new building without requiring the existing building to comply with all the requirements of this Code provided the existing installation was code compliant at the time of original installation. Additions, alterations, installations, or repairs shall not cause an existing building to become unsafe or to adversely affect the performance of the building as determined by the authority having jurisdiction. Electrical wiring added to an existing service, feeder, or branch circuit shall not result in an installation that violates the provisions of the Code in force at the time the additions are made.
Substantiation: The majority of this language exists in the 2005 NEC Annex G.80.9. Since it is in Annex G it is not enforceable unless specifically adopted. Putting this in the body of the NEC will provide the AJH code language that is enforceable and applicable with existing installations, additions, alterations or repairs. Currently, there is no language in the NEC to address the situation an electrical inspector often finds himself or herself in, while performing an inspection they observe violations of the NEC that is outside the scope of the permitted work that they are there to inspect. Most inspectors will address the code violations with the contractor and building owner, however, unless there is a local ordinance, legally the inspector is powerless to require compliance.

The other model codes have similar language:

06 IRC R102.7.1 Additions, alterations or repairs.

Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.

06 IBC 102.6 Existing structures.

The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Property Maintenance Code or the International Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

06 IMC 102.2 Existing Installations.

Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, alteration or abandonment of, nor prevent the continued utilization and maintenance of, a mechanical system lawfully in existence at the time of the adoption of this code.

06 IPC 102.2 Existing Installation.

Plumbing systems lawfully in existence at the time of the adoption of this code shall be permitted to have their use and maintenance continued if the use, maintenance or repair is in accordance with the original design and no hazard to life, health or property is created by such plumbing system.b
Panel Meeting Action: Reject
Panel Statement: 90.2 relates to what is covered and not covered by the NEC.

The proposed text more appropriately belongs in Annex H – Administration and Enforcement. Annex H can be adopted by the local jurisdiction adopting the NEC, if administrative and enforcement provisions are not already in place.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:

ANTHONY, M.: We agree with the panel statement that this language is better placed as a proposal for Annex H. It can be a model for adopting jurisdictions. At the state level there would be time needed for digestion.

I disagree with the panel statement, however; that this material is not suitable for 90.2. My concern is for how this plays out at state building commissions. I encourage the submitter to re-craft and submit in the ROC stage.

1-22 Log #1537 NEC-P01 **Final Action: Reject**
(90.2(A)(5) and (6))

Submitter: Richard Hollander, City of Tucson
Recommendation: Add new text as follows:

(5) Existing Installations.

Existing electrical installations that do not comply with the provisions of this Code shall be permitted to be continued in use provided the existing installation was code compliant at the time of original installation, or the authority having jurisdiction determines that the lack of conformity with this Code presents an imminent danger to occupants. Where changes are required for correction of hazards, a reasonable amount of time shall be given for compliance, depending on the degree of the hazard.

(6) Additions, Alterations, or Repairs.

Additions, alterations, or repairs to any building, structure, or premises shall conform to that required of a new building without requiring the existing building to comply with all the requirements of this Code provided the existing installation was code compliant at the time of original installation. Additions, alterations, installations, or repairs shall not cause an existing building to become unsafe or to adversely affect the performance of the building as determined by the authority having jurisdiction. Electrical wiring added to an existing service, feeder, or branch circuit shall not result in an installation that violates the provisions of the Code in force at the time the additions are made.
Substantiation: The majority of this language exists in the 2008 NEC Annex H 80.9. Since it is in Annex H, it is not enforceable unless specifically adopted. Putting this in the body of the NEC will provide the AHJ code language that is enforceable and applicable with existing installations, additions, alterations or repairs. Currently, there is no language in the NEC to address the situation an electrical inspector often finds himself or herself in, while performing an inspection they observe violations of the NEC that is outside the scope of the permitted work that they are there to inspect. Most inspectors will address the code violations with the contractor and building owner, however, unless there is a local ordinance, legally the inspector is powerless to require compliance.

The other model codes have similar language:

06 IRC R102.7.1 Additions, alterations or repairs.

Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.

06 IBC 102.6 Existing structures.

The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Property Maintenance Code of the International Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

06 IMC 102.2 Existing Installations.

Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, alteration or abandonment of, nor prevent the continued utilization and maintenance of, a mechanical system lawfully in existence at the time of the adoption of this code.

06 IPC 102.2 Existing Installation.

Plumbing systems lawfully in existence at the time of the adoption of this code shall be permitted to have there use and maintenance continued if the use, maintenance or repair is in accordance with the original design and no hazard to life, health or property is created by such plumbing system.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-21.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:

ANTHONY, M.: Please refer to my statement on Proposal 1-21.

1-23 Log #3137 NEC-P01 **Final Action: Reject**
(90.2(B), FPN (New))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Add Fine Print Note to 90.2(B) following 90.2(B)(5):
FPN: See Figure 90.2 for information on the line side of the service point that 90.2(B) lists as not covered by this Code.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.

asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is to add a new fine print note to 90.2(B) for referring to the proposed new illustration on 90.2 of what is not covered by the NEC similar to the FPN in 250.1 to reference Figure 250.1.

Panel Meeting Action: Reject

Panel Statement: The FPN reference to Figure 90.2 is unnecessary due to the action taken on proposal 1-12.

See the panel action and statement on proposal 1-12.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: Please refer to my statement on Proposal 1-12.

LABRAKE, JR., N.: Proposal 1-23 should have been accepted-in-principle. The concept of the figure in Proposal 1-12 discussed in the panel was thought to be more appropriate as Annex material or as an example in Chapter 9 of the Code. The Advisory Note reference proposed would refer to the new Annex based on my ballot statement on Proposal 1-12 if the Panel accepted-in-principle. In addition, refer to my ballot statement on Proposal 1-29.

1-24 Log #3132 NEC-P01 **Final Action: Reject**
(90.2(B)(1))

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Revise 90.2(B)(1) as follows:

(B) Not Covered. This Code does not cover the following:

(1) Installations in ships, watercraft other than floating buildings, railway rolling ~~stock~~ equipment, aircraft, or automotive vehicles other than mobile homes and recreational vehicles

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents *. A companion proposal regarding "railway rolling stock equipment" is submitted to 90.2(B)(3).

*Refer to the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 in Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf).

Specifically, the rationale for this change is to correlate the term "railway rolling equipment" according to the 2007 NESC Rule 011.D.

Panel Meeting Action: Reject

Panel Statement: The proposal does not enhance clarity or usability.

The term "railway rolling equipment" is undefined. There is insufficient substantiation provided indicating that the term "railway rolling stock" is not the term in common use.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-25 Log #3133 NEC-P01 **Final Action: Reject**
(90.2(B)(2))

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Revise 90.2(B)(2) as follows:

(2) Installations underground in mines and self-propelled mobile surface mining machinery and its attendant electrical trailing cable where covered by governmental regulations

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents *. A companion proposal regarding "mining installations" is submitted to 90.2(A)(5).

*Refer to the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 in Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf).

Specifically, the rationale for this change is to clarify that these installations where not covered by the NEC are covered elsewhere such as by the Mine Safety Health Administration (MSHA). Where these other regulations do not exist for mining operations, a companion proposal to 90.2(A)(5) is made for the NEC to cover these installations.

Panel Meeting Action: Reject

Panel Statement: The recommendation does not enhance clarity or usability. The submitter did not provide sufficient substantiation specific to this issue.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

LABRAKE, JR., N.: Proposal 1-25 should have been accepted-in-principle. Based on the Panel discussion, in this proposal's new text, "where covered by governmental regulations" could have an Advisory Note to clarify these such as associated with 30CFR Parts 56, 57, 75, and 77 in the U.S. In addition, refer to my ballot statements on Proposals 1-17 and 1-29.

1-26 Log #3134 NEC-P01 **Final Action: Reject**
(90.2(B)(3))

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Revise 90.2(B)(3) as follows:

(3) Installations of railways for generation, transformation, transmission, or distribution of power used exclusively for operation of rolling ~~stock~~ equipment or installations used exclusively for signaling and communications purposes

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents

*A companion proposal regarding "railway rolling stock equipment" is submitted to 90.2(B)(1).

*Refer to the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 in Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf).

Specifically, the rationale for this change is to correlate the term "railway rolling equipment" according to the NESC Rule 011.D.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 1-24.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-27 Log #3135 NEC-P01 **Final Action: Reject**
(90.2(B)(4) and (5), FPN)

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Revise the Fine Print Note to 90.2(B)(4) and (5) as follows:

FPN to (4) and (5): Examples of utilities may include those public or private entities that are typically designated or recognized by governmental law or regulation by public service/utility commissions and that install, operate, and maintain electric supply (such as generation, transmission, or distribution systems) or communication systems (such as telephone, CATV, Internet, satellite, or data services) to the service point. Utilities may be subject to compliance with codes and standards covering their regulated activities as adopted under governmental law or regulation. Additional information can be found through consultation with the appropriate governmental bodies, such as state regulatory commissions, the Federal Energy Regulatory Commission, and the Federal Communications Commission. Exclusive control generally covers installation, ownership, restricted access, operation, and maintenance by qualified and authorized persons. Restricted access covers areas where exclusive control is maintained.

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.

*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is:

1. To add "public or private" to correlate with 2007 NESC Rule 011A. A private utility is one that is under governmental oversight such as rural electric cooperatives based on the May 11, 1935, Roosevelt signed Executive Order No. 7037 establishing the Rural Electrification Administration (REA) and subsequently in 1994, transferred to a new agency, the Rural Utilities Service (RUS). The added text "to the service point" is to correlate with the scope of the NESC where the NESC covers utility facilities and functions up to the service point. Utilities operating under the NESC are required to maintain control over the supply system up to the service point to assure that:

a. The system is engineered to meet the requirements of expected conditions and

b. The personnel installing, maintaining, and operating the system and its components are qualified to do so, adequately supervised under good engineering practice and use appropriate tools and safe work procedures, as specified in the NESC rules.

2. To add the last 2 sentences to describe the meaning of exclusive control and restricted access.

Panel Meeting Action: Reject

Panel Statement: The recommendation does not enhance clarity or usability, the submitter did not provide adequate substantiation specific to this proposal to warrant the change, and the NESC/NEC task group was unable to reach consensus.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want. Therefore the explanation of how we hope to help the harmonization process, refer to our comment on Proposal 1-17.

Coupled with terms like supervised installation, area lighting, premises wiring and others submitted by the Edison Electric Institute and the American Public Power Assocations, we have a complete body of thought regarding NESC and NEC boundary issues.

LABRAKE, JR., N.: Proposal 1-27 should have been accepted-in-principle. The Panel was concerned that the last sentence added to the Fine Print Note contains mandatory text. This could have been changed by the Panel for example as “Restricted access generally covers areas that are separated from public access by a spatial or physical barrier, such as an equipment enclosure, and that are accessible only under exclusive control.” In addition, refer to my ballot statements on Proposals 1-17 and 1-29.

Comment on Affirmative:

FISKE, W.: It is important for panel 1 to continue to reject the proposal. There is confusion over the divisions between NEC and NESC, utility and non-utility work as it is. Thus far, every NEC proposal advanced has been unhelpful at best when it comes to removing the confusion. The extent of the confusion was illustrated by a paper on arc-flash hazards published in the November/December 2008 issue of IEEE Transactions on Industry Applications. In the article, the authors suggested outsourcing high-energy maintenance work to one’s electric utility “because electric utilities are exempt from compliance with the NEC, Article 90.2(B)(5)(c).” If any change is needed in 90.2(B)(5), it is one containing a clear statement that the requirements of the NEC apply to all in its scope, regardless of the work “normally” performed by any given worker or organization. This may be abundantly clear to CMP-1 members, but it is obviously not clear to all Code users, including some electrical safety specialists.

MCCARVER, R.: ATIS votes to affirm the Panel 1 action on this proposal because the concept of a service point does not apply to communications systems or applies differently than to a power utility interface. In addition, exclusive control does not always imply ownership. See my comment on Proposal 1-12.

1-28 Log #2079 NEC-P01 **Final Action: Reject**
(90.2(B)(4), FPN (New))

Submitter: Steve C. Dryden, Poole Fire Protection, Inc. / Rep. NFPA TC on Telecommunications

Recommendation: Add a new FPN.

For information on cable and equipment requirements in telecommunications facilities not covered by this code, see NFPA 76, Standard for the Fire Protection of Telecommunications Facilities.

Substantiation: The typical facility that qualifies for the exemption from the NEC because it is an installation of “communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations” is a facility that provides telecommunications services. Fire resistance requirements for cables and equipment in these exempt facilities are covered by NFPA 76, Standard for the Fire Protection of Telecommunications Facilities. The NFPA Technical Committee on Telecommunications is responsible for NFPA 76. This proposal was developed by the Technical Committee at a pre-ROP meeting and is being submitted by the chairman on behalf of the Technical Committee.

Panel Meeting Action: Reject

Panel Statement: 90.2(A) and (B) address what is covered and not covered in the NEC; FPNs are informational and unenforceable in the NEC.

In addition, NFPA 76 is specific to fire protection of telecommunications facilities; NFPA 76 does not apply to telecommunications rooms used to provide private telecommunications services.

Code-Making Panel 1 has determined that the FPN is unnecessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-29 Log #3136 NEC-P01 **Final Action: Reject**
(90.2(B)(5))

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Revise 90.2(B)(5) and add new second paragraph and fine print note as follows:

(5) Installations under the exclusive control of an electric utility where such installations

a. Are for utility facilities and functions for the purpose of communications, metering, generation, control, transformation, transmission or distribution of electric energy, lumens, communications data, or signals, or

b. Are street and area lights providing a supply of lumens where these facilities are supplied by underground or overhead conductors, or

~~a.~~c. Consist of service drops or service laterals, and associated metering~~, or~~

~~b. Are located in legally established easements or rights-of-way designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or~~

~~c. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.~~

The locations of utility supply conductors and equipment on the line side of the service point are: on property owned or leased by the electric utility; or in legally established easements or rights-of-way; or by other agreements (written or by condition of service) that are either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction, or governing bodies where unregulated. Agreements include locating utility supply facilities where typical easements or rights-of-way are unobtainable on property for Federal Lands, Native American Reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and State agencies and departments, and lands owned by railroads.

FPN: See ANSI C2-2007, *National Electrical Safety Code* for information that covers utility street and area lighting that are a lighting distribution system under the exclusive control of utilities providing lumens on public or private property.

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees’ Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under “other agreements”. I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment. Please refer to my attached report “*Supporting the Change to 90.2(B)(5) of the 2008 NEC*” on this activity dated Nov. 4, 2008; Adobe document file name: “Report of Support to Change NEC90_2_B_5 LaBrake_11 04 2008.pdf”.

This is the main action to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words “or by other agreements” as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.

*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the following is the rationale for this change:

1. The list items are for installation types and correlate with what is covered by Rule 011A, B, and C in the 2007 NESC. The new second paragraph separates the location aspect of the original 90.2(B)(5)(b) and (c). Refer to companion proposal to 90.2 adding a new Figure 90.2 to illustrate the covered and not covered areas by the NEC.

2. New text item 90.2(B)(5)a is added to correlate with Rules 011A and 011B in the 2007 NESC. Included lumens as a service supplied by a utility. This addition improves the description of the act of what is being controlled exclusively under utilities. It is noted that NESC rules cover the lower voltage wiring within a supply station installed and/or maintained under the exclusive control of utilities that is necessary for the operation of the supply station and is not to be associated with utilization wiring relative to the NEC.

3. New text item 90.2(B)(5)b is added to correlate with Rule 011C in the 2007 NESC.

4. Existing text item 90.2(B)(5)a becomes 90.2(B)(5)c for listing clarity and to follow the sequence from supply to service point. This follows the illustration diagram proposed as Figure 90.2 in a companion proposal.

5. The new second paragraph separates the utility exclusively controlled items from the 2008 NEC 90.2(B)(5) for those situations associated with property locations and provides for distinction between premises wiring and supply side facilities relative to the service point as defined in both the NEC and NESC. This new paragraph incorporates text from former 90.2(B)(5)b and 90.2(B)(5)c and clarifies by correcting a grammatical error in the 2008 NEC from the addition of the word "or" between "easements" and "rights-of-way". The final text item in this new paragraph's first sentence appropriately associates text that is specific only to "other agreements" and

· Provides clear and unambiguous text for 90.2(B)(5) with respect to utility installations where easements and rights-of-way cannot legally be obtained for their installations on the line side of the service point.

· Recognizes that there are areas in which an easement or right-of-way cannot legally be obtained and provides text to permit "other agreements" under the utility's conditions of service (e.g. tariffs with service applications) for those installations. A list in the second sentence is provided to aid the code user in determining where this permission will apply.

· The list identifies where easements or rights-of-way cannot be obtained from entities such as Federal Lands (e.g., military bases, National Parks, National Forests, National Battlefields, Bureau of Land Management property), local agencies (e.g., Port Districts and Airport Authorities), Native American Sovereign Lands/Indian Reservations (through the U.S. Department of the Interior Bureau of Indian Affairs), lands controlled by State agencies and departments, and lands owned by railroads.

· These agreements can be recognized for the location of electric facilities by and under the exclusive control of utilities on property by the proper Federal and State authorities having jurisdiction. This is the prime concern that this proposed change to 90.2(B) will correct the problem affecting the utilities' provision to supply electricity according to the National Electrical Safety Code (NESC) on those properties mentioned above as identified in the adoption process of the 2008 NEC.

6. Governing bodies where not regulated refers to a private utility that is under governmental oversight such as rural electric cooperatives based on the May 11, 1935, Roosevelt signed Executive Order No. 7037 establishing the Rural Electrification Administration (REA) and subsequently in 1994, transferred to a new agency, the Rural Utilities Service (RUS).

7. By accepting the new second paragraph, substantial problems can be avoided for electric utilities and their customers where certain entities do not grant easements or allow rights-of-way to utility supply facilities. Conflicts would have to be resolved at regulatory bodies, the state, or local jurisdictional level through local revision of the NEC scope in its adoption process if this change is not accepted. As such, confusion can be and is generated in the field regarding installations where legally acquired easements and rights-of-way cannot be obtained.

8. The added fine print note to 90.2(B)(5) is to clarify the intent how this area lighting term is used in 2007 NESC Rule 011C. Adding this fine print note to 90.2(B)(5) in the NEC will provide for correlation with both the NEC and the NESC documents' purpose and scope sections. Area lighting is provided by utilities on public and private property where there may not be a premises wiring system involved and, therefore, no service point. A new definition of "area lighting" is being proposed in the NESC at this time.

Panel Meeting Action: Reject

Panel Statement: The panel concludes that the recommendation does not enhance clarity or usability and reaffirms its action and position on Comment 1-1 in the 2007 Annual Revision Cycle Report on Comments relative to adding a FPN reference to the NESC.

The submitter has not adequately addressed any of these issues. Sufficient substantiation has not been provided to substantiate this specific recommendation.

NFPA and IEEE appointed a Task Group to address correlation issues between the NEC and the NESC and no consensus was reached.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: Please refer to my statement on Proposal 1-27.

LABRAKE, JR., N.: Proposal 1-29 should have been <u>accepted-in-principle</u>. This proposal was one of a group of proposals that were intended to clarify and delineate a clear and distinct line between the applicability of the NEC and the NESC. It is important to note that this proposal's substantiation refers to a report that was attached to Proposal 1-107, which provides much of the supporting rationale to make the change. The Panel should have considered revising the text to note that other agreements are written and incorporate the style shown in Proposal 1-30 and the concept of outside a building introduced in Proposal 1-31.

The panel statement and the discussion during the meeting raised several common issues that need further discussion and a reconsideration of the panel action.

1. The first of these is the common panel statement that "the proposal does not enhance clarity or usability." This misses the whole point of why these were even submitted. The NEC and the NESC are both ANSI safety codes when used within their context. The purpose of these proposals was not to change the Code but to harmonize the NEC with the NESC <u>at their common point</u>. As such, each individual proposal does not necessarily "enhance the clarity or usability" of the Code but taken as a whole and in interaction with other codes such as the NESC, they do. This was the purpose of stating that they were part of a group in the substantiation and reviewing them as a CMP-1 Task Group beforehand. The clarity and usability they provide is delineating a clear and distinct line between the applicability of the NEC and the NESC.

2. The second common panel statement was a lack of substantiation. This is a somewhat inaccurate statement and, as I pointed out to the full panel in our discussion, there were 29 pages of substantiation after proposal 1-107 that pertained to all companion proposals: 1-9, -12, -15, -16, -19, -20, -23, -24, -25, -26, -27, -29, -79, -104, and -107 and 4-7, 4-14, and 4-18. In addition, several proposals by other submitters are included with this topic and stand on their own separate substantiations.

3. The next commonly stated panel statement was that the "NESC-NEC Ad Hoc Task Group did not reach consensus." While true, this should not be considered a strong reason for rejection and it was not stated as such in this proposal's substantiation. If that is true, every public proposal received from an individual could conceivably be rejected for that reason. At the IAEI Section meetings several proposals were voted on to submit to the International Office for submission, which were only required to meet a <u>MAJORITY VOTE</u> in order to be accepted. So, in light of the Panel statement this has little bearing for the proposal to be publicly reviewed on its own merit.

But ignoring that part, these proposals were submitted without consensus (but a majority viewpoint) of the NESC-NEC Ad Hoc Task Group in order to start the process of harmonization. The timing of this was such that the NEC ROP and ROC period for this cycle will take place between the NESC equivalent periods. The NESC proposals related to this harmonization were submitted to meet a July 17, 2008 deadline and the NESC cycle was discussed with the Panel where the public comment period on NESC proposals is Sep. 2009-May 2010. The conjunction of these dates, because of the dissimilar revision schedules of the two documents, will not occur again until the revisions for the 2026 NEC (and the 2027 NESC). Losing this opportunity will not eliminate the possibility of harmonization but it will significantly slow the process.

There were also issues raised during the discussion of these Proposals that need further review. The first is the statement, said many times, that "utilities could use the NEC and, by the way, why don't they?" It just isn't that simple.

1. Both the NEC and the NESC create a safe installation <u>within the context of each code</u>. But moving from one to the other is a dangerous task. As was said in Jim Pauley's Comment 1-1 (Proposal 1-4) for the A2007 NEC ROC, there are conflicts between the two codes. Here's an example: the NEC requires bonding of metal structural items that are "likely to be energized." Obviously, that would include fences around substations. Except that in the case of an underground installation, there would be no requirement in the NEC. However, there is one in the NESC; Rule 110A1.

2. So the next question is "why not incorporate those aspects into the NEC?" This gets to the heart of the differences between the two codes. The NESC is less of a prescriptive document than the NEC. Adding just a part of one document into the other alters the context of each code and, as noted earlier, each is a safe code <u>within</u> the context of that code. The context includes not just the sections of each code but also the work practices and construction standards used to achieve the required safety.

The next issue raised was the question of "where is the problem?" or "what is restricted?"

1. As was noted in the panel discussion, "other agreements" was accepted in the A2001 NEC ROC. The panel statement for Comment 1-26a (Proposal 1-10) that placed those words in the 2002 NEC states "The wording was added to identify access by easements, rights-of-way or by other agreements associated with the authority of public service commissions, utility commissions, or other regulatory agencies having jurisdiction is to clarify that those agencies generally have authority over those types of installations and establish the rules under which they are governed." Further the Panel stated "The utility industry's right to produce and distribute electrical energy using NESC rules or whether this industry should be prohibited or excluded from installing any type of lighting has never been an NEC issue."

2. The comment that removed the phrase "other agreements" in the A2007 NEC ROC took that phrase away from its context of association with regulatory bodies that govern utilities and mandate the codes they follow in the installation, operation, design, and maintenance of those facilities. The result is an "out of context" interpretation that contains extreme statements. As was noted in the ballot for Comment 1-3 (Proposal 1-5) in the A2007 NEC ROC, "The commenter's claim that `the use of the term "or by other agreement" is in essence, a total exemption of the NEC for utilities" is not true." The ballot further explains that the agreements referred to are from regulatory agencies. In other words, the substantiation for the removal was taken out of context.

3. Additionally, the 2008 NEC has not been in effect in many locations for a long enough time for the removal of this phrase to be a problem. The best that can be done is list specific instances where the problem might occur depending on local interpretation. And that points out why these were submitted in the first place: <u>the need to clarify where the dividing line is</u>.

Therefore, 90.2(B)(5) should then read as follows with a new item 90.2(B)(6):

(5) Installations under the exclusive control of an electric utility where such installations

a. Are for utility facilities and functions for the purpose of communications, metering, generation, control, transformation, transmission or distribution of electric energy, lumens, communications data, or signals, or

b. Are for street and area lights providing a supply of lumens where these facilities are supplied by underground or overhead conductors, or

c. Consist of service drops or service laterals, and associated metering.

(6) Locations of utility supply conductors and equipment on the line side of the service point that are an integral part of the exclusive control of an electric utility where such installations

a. Are on property owned or leased by the electric utility, or

b. Are located in legally established easements or rights-of-way, or

c. Are located by other agreements, written or by condition of service, that meet the requirements that are either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction, or governing bodies where unregulated, provided further that such installations are outside a building or terminate immediately inside a building wall. Agreements include locating utility supply facilities where typical easements or rights-of-way are unobtainable on property for Federal Lands, Native American Reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and State agencies and departments, and lands owned by railroads.

Advisory Note: See ANSI C2-2007, *National Electrical Safety Code* for information that covers utility street and area lighting that are a lighting distribution system under the exclusive control of utilities providing lumens on public or private property.

Comment on Affirmative:

FISKE, W.: See my Comment on Affirmative on Proposal 1-27 (Log #3135).

MCCARVER, R.: See my Affirmative with Comment on Proposal 1-12.

SASSAMAN, H.: The NEC should apply to installations on the load side of the service point regardless of who does the work. The NESC should apply to the supply side of the service point regardless of who does the work. The term "other agreements" is ambiguous and has significant potential for resulting in a hole in the Code that utilities or other entities might use an excuse or exemption from complying with the NEC for installations that otherwise would be required to.

1-30 Log #3444 NEC-P01 **Final Action: Reject**
(90.2(B)(5))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise 90.2(B)(5) as follows in a new 90.2(B)(5) and new 90.2(B)(6):

(5) Installations under the exclusive control of an electric utility where such installations

a. Are for utility facilities and functions for the purpose of communications, metering, generation, control, transformation, transmission or distribution of electric energy, lumens, communications data, or signals, or

b. Are street and area lights providing a supply of lumens where these facilities are supplied by underground or overhead conductors, or

~~a.~~c. Consist of service drops or service laterals, and associated metering.~~, or~~

~~b. Are located in legally established easements or rights-of-way designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or~~

~~c. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.~~

(6) Locations of utility supply conductors and equipment on the line side of the service point that are an integral part of the exclusive control of an electric utility where such installations

a. Are on property owned or leased by the electric utility, or

b. Are located in legally established easements or rights-of-way, or

c. Are located by other agreements, written or by condition of service, that are either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction, or governing bodies where unregulated. Agreements include locating utility supply facilities where typical easements or rights-of-way are unobtainable on property for Federal Lands, Native American Reservations through the U.S. Department of the Interior Bureau of Indian Affairs, military bases, lands controlled by port authorities and State agencies and departments, and lands owned by railroads.

Substantiation: Overview

Generally, most electric utility installations' generation, transmission and distribution (including lighting and metering) are covered by the National Electrical Safety Code (NESC). However, electrical installations in office buildings, warehouses, vehicle garages, etc. are covered by the National Electrical Code (NEC). In the 2008 NEC revision process, the NEC Committee changed the portions of the NEC that discuss what is covered by the NEC and what is not-covered.

The 2008 NEC revision, of which the EEI opposed *, could be very detrimental to the electric utility. This causes some installations that were typically done according to the NESC to be required under the NEC. The issues surround the removal of language that electric utility installations made in accordance with "other agreements" that are recognized by public utility or public service commissions could be done under the NESC and removal of references to the NESC for certain medium and high voltage installations that are not adequately addressed in the NEC. The members of the NEC consensus body were concerned with work being done by utilities in some isolated cases on the customer side of the service point and that the "other agreements" language clearly refers only to the utility or supply side of the service point. EEI is working with its electric utility representatives and other interests to resolve this conflict in the purpose and scope of the NEC and the NESC.

* Refer to the NFPA 2007 Annual Meeting Transcript (http://www.nfpa.org/assets/files/PDF/CodesStandards/A07TranscriptFinal.pdf) pertaining to this issue in Code Making Panel 1 of NFPA 70.

The Issue

A major concern for electric utilities is the NEC 2008 version of Section 90.2(B)(5). This section has been revised and omits language that excludes utilities from permitting to locate and build transmission and distribution lines to serve customers that do not have formal easement or rights-of-ways contracts. These customers include various federal lands, Native American sovereign lands and Indian reservations, and lands controlled by State or Local Agencies and Departments or railroads. The exclusion of the term "other agreements", removes one of the primary ways utilities get permission to locate and construct lines that serve these customers. This change to the 2008 NEC places facilities covered by the term "other agreements" under NEC jurisdiction. This same section in the 2005 NEC and previous versions of the Code recognized that rights-of-ways, easements and "other agreements" are not covered by the NEC but these facilities are governed by the National Electrical Safety Code (NESC) subject to state commission oversight.

To the extent a utility needs to rely on the right-of-way provision, rights-of-way are typically granted directly by landowners and are not usually "designated" or even necessarily formally "recognized" by state commissions or other regulatory agencies. The NEC does not cover transmission and distribution facilities under the exclusive control of utilities. However, other types of facilities that might affect the utility by the change of wording in 90.2(B)(5) include area lighting, such as street and parking lot lighting, and other utility-installed facilities that have been viewed as utility-controlled for safety purposes but might not be part of a T&D system. This has been brought to question by other NEC interest groups regarding demarcation of responsibilities of utilities providing supply services on private property.

The Impact

The National Electrical Code typically does not cover supply system wiring, since utility wiring falls under another code (the National Electrical Safety Code.) The NEC affects utilities at the "service point" where the utility wiring meets the "customer" wiring. The wording of the Code is very critical to electric utilities, since it can affect the connected loads and other requirements on the utility.

The term "other agreements" omitted in the 2008 NEC results in confusion as to whether the NEC applies to utility facilities on lands of various federal, native American sovereign and Indian reservations, and controlled by State or Local Agencies and Departments or railroads and subject these agreements to an additional layer of NEC requirements over the NESC requirements thereby creating the potential for duplication and conflict between the Code provisions.

Actions

Where the 2008 NEC is adopted as currently written, it will be substantially more complicated for utilities to obtain permission to construct lines that serve customers on Federal lands, Indian lands and Port Authorities, and may make it impossible for utilities to serve these customers.

The 2008 NEC language affects every state and every local authority that does not grant easements or rights-of-ways for their land. For some utilities providing area lighting to customers who request, this area lighting under the exclusive control of the utility would require easements that were formerly covered under service agreements.

At a minimum, the 2008 NEC language can delay construction and raise the overall cost to customers with no increase in safety or reliability. At a maximum, the NEC language can cause customers to be denied service because there is no way to locate and build utility lines to serve them. Thus consumers/customers can be harmed by undue electric service delays and extra costs incurred to address this confusion in establishing rights-of-way for the electric utility equipment on customer property.

EEI is moving forward with educating and informing utilities and their trade allies about responsibilities on either side of the service point and specific related codes at Local and National Levels. Mr. Neil LaBrake, Jr. of National Grid who represents EEI in the NEC Committee made a presentation to the Eastern Section IAEI on "Where the Utility Supply and Premises Wiring Meet" at their 2008 Annual Meeting. The presentation was well received by inspectors, installers, and designers who attended.

EEI continues to seek to clarify the Scopes of both the National Electrical Code and National Electrical Safety Code and supports the "good faith" effort of the NFPA/IEEE NESC-NEC Committees Ad Hoc Task Group. This support is sought to provide a resolution to certain conflicts in scopes regarding electric utility installations, large industrial installations and installations of high voltage wiring and systems of large multi-building complexes claimed to be covered by both NESC and NEC documents.

Specifically, the rationale for change in this proposal is:

1. Separate the installation and location aspects of exclusively controlled utility wiring and equipment presently confusing the list items in 90.2(B)(5).

2. Clarifying the text in the NEC to correlate with what is covered by Rule 011A, B, and C in the 2007 NESC.

3. Including lumens as a service supplied by a utility, which improves the description of the act of what is being controlled exclusively under utilities.

4. That NESC rules cover the lower voltage wiring within a supply station

installed and/or maintained under the exclusive control of utilities that is necessary for the operation of the supply station and is not to be associated with utilization wiring relative to the NEC.

5. Clarifying text item 90.2(B)(5)a to become 90.2(B)(5)c for listing clarity and to follow the sequence from supply to service point.

6. Providing new section 90.2(B)(6) associates those situations with property locations and distinguishes between premises wiring and supply side facilities relative to the service point as defined in both the NEC and NESC.

7. New text item 90.2(B)(6)a is from former 90.2(B)(5)c, which is clarified by this new section's main sentence and proposed list item 90.2(B)(5)a.

8. New text item 90.2(B)(6)b is from former 90.2(B)(5)b, which is clarified by correcting a grammatical error in the 2008 NEC from the addition of the word "or" between "easements" and "rights-of-way".

9. New text item 90.2(B)(6)c appropriately associates text that is specific only to "other agreements" under written form or condition of service such as by tariff for service applications. The list in the second sentence of new 90.2(B)(6)c identifies where easements or rights-of-way cannot be obtained from entities such as Federal Lands (e.g., military bases, National Parks, National Forests, National Battlefields, Bureau of Land Management property), local agencies (e.g., Port Districts and Airport Authorities), Native American Sovereign Lands/Indian Reservations (through the U.S. Department of the Interior Bureau of Indian Affairs), lands controlled by State agencies and departments, and lands owned by railroads. These agreements can be recognized for the location of electric facilities by and under the exclusive control of utilities on property by the proper Federal and State authorities having jurisdiction. This is the prime concern that this proposed change to 90.2(B) will correct the problem affecting the utilities' provision to supply electricity according to the National Electrical Safety Code (NESC) on those properties mentioned above as identified in the adoption process of the 2008 NEC.

This is a companion proposal to the proposed addition of a new definition "exclusive control of utility" in Article 100.

Panel Meeting Action: Reject

Panel Statement: The panel concludes that the recommendation does not enhance clarity or usability.

Sufficient substantiation has not been provided to substantiate this specific recommendation.

NFPA and IEEE appointed a Task Group to address correlation issues between the NEC and the NESC and no consensus was reached.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 3

Explanation of Negative:

ANTHONY, M.: Please refer to my statement on Proposal 1-17.

BARRIOS, L.: During the 2008 Code cycle, Panel 1 removed the phrase "other agreements" because it was vague and unenforceable. The submitter has provided clarification of what "other agreements" cover in this proposal.

LABRAKE, JR., N.: Proposal 1-30 should have been accepted-in-principle. The Panel should have considered revising the text to note that other agreements are written and incorporate the Advisory Note information shown in Proposal 1-29 and the concept of outside a building introduced in Proposal 1-31. The Panel mistakenly added the reason that the "NESC-NEC Ad Hoc Task Group did not reach consensus" onto Proposal 1-30 that is technically not one of the Ad Hoc proposals, although included with this topic but stands on its own separate substantiation. In addition, refer to my ballot statement on Proposal 1-29.

Comment on Affirmative:

SASSAMAN, H.: The NEC should apply to installations on the load side of the service point regardless of who does the work. The NESC should apply to the supply side of the service point regardless of who does the work. The term "other agreements" is ambiguous and has significant potential for resulting in a hole in the Code that utilities or other entities might use an excuse or exemption from complying with the NEC for installations that otherwise would be required to.

1-31 Log #4575 NEC-P01 **Final Action: Reject**
(90.2(B)(5)(b))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Revise to read as follows:

Are located in legally established easements, rights of way, or by other agreements either designated by or recognized by public service commissions, or other regulatory agencies having jurisdiction for such installations, provided further that such installations are outside a building or terminate immediately inside a building wall, or...".

Substantiation: This proposal reverts this language to the 2005 wording, but with a proviso that should prevent the objections raised in support of the 2008 proposal. The proviso language comes from 90.2(C) which is the traditional boundary beyond which variances from NEC rules must only issue under 90.4. The current NEC wording is flawed both procedurally and technically.

It is procedurally flawed because it is beyond the scope of the NEC. When this sort of lighting is installed, it is on the line side of any service point. It will never be maintained by the owner, nor either will it be accessed or maintained by an electrical contractor unless that contractor has a subcontracting relationship with the electric utility that owns the luminaire. Therefore, it is beyond the scope of the NEC. The NEC cannot simply decide, on its own initiative, to expand its reach without a corresponding revision of the scope of the NESC. That is not happening.

It is technically flawed because it ignores the consequences of utility ownership of the luminaires. Utility ownership of this lighting follows dictates of the NESC, in all 50 states and in foreign countries under comparable regulation. To assert a safety issue on this lighting is to assert a deficiency in the NESC. Such a deficiency might be evident from loss experience, but no loss experience was cited to support the NEC proposal and comment. That leaves engineering analysis.

The entire premise behind allowing the NESC, substantially different from the NEC, to apply to utility work is a simple one: The organizational permanence, engineering supervision, and workforce training in the utility environment is fundamentally different than for premises wiring. Therefore, different standards can be applied to installations under their exclusive control.

Criticizing the lack of separate equipment grounding (per NESC) or the lack of a service disconnect, or the lack of overcurrent protection out of this context, for example, has as much consistency as criticizing a major industrial occupancy for running a medium-voltage transformer with 250% secondary protection. Now, the industrial occupancy traded off a reduction in secondary protection for enhanced supervision. Is it unsafe? If improperly supervised for the foreseeable future, yes. If properly supervised as contemplated in Table 450.3(A), no. Therefore, is it less safe than the normal 125%? It is plainly acceptable under the terms of our consensus installation standard.

Here's the real point: It's only less safe if you ignore the operational context. That sort of trade-off occurs all over the NEC. By now we're used to it. Similarly, is a street light grounded to the grounded conductor unsafe? If it isn't exclusively under the control of utility personnel for the foreseeable future, yes. If properly operated and controlled as contemplated in the NESC, no. As long as the utilities play by the rules, there is no safety issue, and that is undoubtedly why no loss experience was cited in the 2008 NEC proposal substantiation.

The following drawing, of an actual installation in the submitter's jurisdiction, conclusively demonstrates the problems with the current wording. If CMP 1 chooses to reject this proposal, the submitter expects to read the panel statement with great interest in the hope of learning exactly why the luminaire nearest the drug store, but not the other three luminaires, presents such a hazard that the NEC would try to overturn established utility practice going back over a century. This is not the time, and there is no credible substantiation for the NEC to continue a jurisdictional battle for supremacy with another ANSI standard, and the consequences of continuing the fight on these terms may prove dire indeed for NFPA.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The recommendation does not enhance clarity or usability. The panel reaffirms its action on Comment 1-3 of the 2007 Annual Revision Cycle Report on Comments.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 3

Explanation of Negative:

ANTHONY, M.: This proposal essentially restores previous language that, as far as I have been able to determine, has not caused a problem for either the minority or majority on this issue. As best as I can tell, neither side has presented much in the way of case history where this jurisdictional issue had reached the courts. There was a great deal of anecdotal evidence of third party electrical contractors – working under contract for utilities – that were ignoring NEC installation rules in area lighting, generator, and metering projects. But none have reached the courts.

This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want.

Some insight into the significance of harmonization of the NEC and NESC for the last mile of power distribution can be found in a document prepared by the National Association of Regulatory Utility Commissioners (NARUC). This document recognizes both documents thus:

NESC: The National Electric Safety Code provides the foundation by which utilities
install electric power systems to meet safety guidelines. Many States require the utilities
to comply with the NESC and other States have their own version of the NESC.

NEC: The National Electric Code establishes the safety standard for non-Company
electrical systems. Many States and localities have their own variation of the NEC.

It is in our interest to resolve this with acceptance of this proposal, or have a third-party resolve it for us. Whenever we hit brick walls like this we should be innovating; innovation in processes, installation best practices or innovation in electrical products themselves. Innovation is a slow process of accretion--building small insight upon interesting fact upon tried-and-true process—that eventually percolates within hard work over time.

LABRAKE, JR., N.: Proposal 1-31 should have been accepted-in-principle. The Panel should have considered revising the text to note that other agreements are written and incorporate the Advisory Note information shown in Proposal 1-29 and the concept of outside a building introduced in this proposal. In addition, refer to my ballot statement on Proposal 1-29.

MCCARVER, R.: The Panel has ignored the arguments in the substantiation of the proposal. The action on Comment 1-3 in the 2008 cycle was a simple accept with a statement the the panel did not necessarily agree with the commenter's substantiation. There is nothing in the panel action on this proposal that addresses the technical merit of its substantiation.

1-32 Log #153 NEC-P01 **Final Action: Accept**
(90.2(B)(5), FPN to (4) and (5))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "communication" to "communications".
Substantiation: Section 3.3.3 of the NEC Style Manual States: "**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all* components or parts of a given type or class." Changing "communication" to "communications" will correlate with the title of Chapter 8, "Communications Systems"**.**
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-33 Log #1454 NEC-P01 **Final Action: Accept in Principle**
(90.2(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

The authority having jurisdiction for enforcing this Code may grant exception for the installation of conductors and equipment that are not under the exclusive control of the electric utility that are used to connect the utility supply system to the service ~~entrance~~ conductors of the premises served, provided such installations are outside a building or structure or terminate immediately after emergence into the building or structure.

Substantiation: Edit. The responsibility of the AHJ is already defined in the definition of AHJ. The FPN to the definition of Service-Entrance Conductors, Underground System indicates there may be no service-entrance conductors. The provision should also cover structures which are not deemed "buildings". "Inside a building wall" does not allow for conductors that are on the surface. "After emergence into the building or structure" will allow for conductors covered by 230.6. Service lateral conductors may not be under exclusive control of the utility.
Panel Meeting Action: Accept in Principle

Revise the existing code text to read as follows:

"**(C) Special Permission.** The authority having jurisdiction for enforcing this *Code* may grant exception for the installation of conductors and equipment that are not under the exclusive control of the electric utilities and are used to connect the electric utility supply system to the service conductors of the premises served, provided such installations are outside a building or structure, or terminate within service equipment at a location inside nearest the point of entrance of the service conductors."

Panel Statement: The revised wording meets the intent of the submitter and more closely correlates with the existing text in 230.70(A)(1).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MCMAHILL, L.: The text "within service equipment" and "or terminate within service equipment at a location inside... " should not have been included in the sentence. Understandably, not all service conductors terminate "within service equipment". Some service conductors terminate in vaults or auxiliary gutters. By removing this text, the section will more closely correlate with the existing text in Section 230.70(A)(1).

1-34 Log #3448 NEC-P01 **Final Action: Reject**
(90.2(C))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise 90.2(C) to add a new second paragraph as follows:
(C) Special Permission. The authority having jurisdiction for enforcing this *Code* may grant exception for the installation of conductors and equipment that are not under the exclusive control of the electric utilities and are used to connect the electric utility supply system to the service entrance conductors of the premises served, provided such installations are outside a building or terminate immediately inside a building wall.

Within this Code's requirements, other codes and standards and good engineering practice can be recognized by the authority having governmental jurisdiction to apply to specific systems having supervised installation that are under engineering supervision and the control of qualified persons authorized by a regulating or controlling body, such as those associated with an industrial complex or utility interactive system.

Substantiation: Edison Electric Institute bases this proposal on Code Making Panel 1's statement to reject Proposal 1-4 in the A2007 NEC ROP on page 70-3 and Mr. LaBrake's Explanation of Negative to accept Comment 1-1 in the A2007 NEC ROC *.
* Refer to the NFPA 2007 Annual Meeting Transcript (http://www.nfpa.org/assets/files/PDF/CodesStandards/A07TranscriptFinal.pdf) pertaining to this issue in Code Making Panel 1 of NFPA 70.

This proposed second paragraph to 90.2(C) provides for reference in the NEC such as to the NESC for more information to cover special systems such as those 1000 volts and greater. The NESC can cover industrial complexes and utility interactive systems (such as lightly regulated generation plants). See 2007 NESC Rule 011A, second sentence. Refer to companion proposals for a FPN to 90.2(A) and defined term of "supervised installation" in Article 100. Having the Fine Print Note in 90.2(A)(2) reinstated provides information to let the user of the NEC know about the NESC, which adds clarity to the National Electrical Code.
Panel Meeting Action: Reject
Panel Statement: The recommendation does not enhance clarity or usability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:

ANTHONY, M.: We disagree with the committee's judgment regarding clarity and usability. The work of the task groups produced a recommendation that is clear to us.

BARRIOS, L.: The proposed language introduces latitude for AHJ's to accept other based codes and standards and sound engineering judgement for facilities having competent engineering staff overseeing the design, installation and operation of the facilities. The panel action should have been Accept in Principle and revised to read as follows "The authority having jurisdiction for enforcing this Code can recognize other codes and standards and good engineering practice to specific systems having supervised installations that are under engineering supervision and the control of qualified persons authorized by a regulating or controlling body, such as those associated with an industrial complex or utility interactive system".

LABRAKE, JR., N.: Proposal 1-34 should have been accepted-in-principle. The text "can be recognized" can be changed to "shall be permissible" to be in accordance with 3.1.2 of the NEC Style Manual.

The panel statement "the proposal does not enhance clarity or usability" misses the whole point of why this was even submitted. The NEC and the NESC are both ANSI safety codes when used within their context. The purpose of these proposals was not to change the Code but to harmonize the NEC with the NESC at their common point. As such, this proposal probably does not necessarily "enhance the clarity or usability" of the Code but taken as a whole and in interaction with other codes such as the NESC, it does.

Both the NEC and the NESC create a safe installation within the context of each code. But moving from one to the other is a dangerous task. As was said in Jim Pauley's Comment 1-1 (Proposal 1-4) for the A2007 NEC ROC, there are conflicts between the two codes. Here's an example: the NEC requires bonding of metal structural items that are "likely to be energized." Obviously, that would include fences around substations. Except that in the case of an underground installation, there would be no requirement in the NEC. However, there is one in the NESC; Rule 110A1. There are differences between the two codes. The NESC is less of a prescriptive document than the NEC. Adding just a part of one document into the other alters the context of each code and each is a safe code within the context of that code. The context includes not just the sections of each code but also the work practices and construction standards used to achieve the required safety. Thus, the need for prescriptive text in 90.2(C) in the NEC to provide the enforcer of the NEC the means to use the NESC or other related industry standards where additional information is able to be used.

1-35 Log #4565 NEC-P01 **Final Action: Reject**
(90.3)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
90.3 Code Arrangement.

This Code is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, ~~and~~ 7 and 8 apply to special occupancies, special equipment, ~~or other~~ special conditions or communications systems. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, ~~and~~ 7 and 8 for the particular conditions.
~~Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.~~
Chapter 9 consists of tables.

Annexes are not part of the requirements of this Code but are included for informational purposes only.
The same changes are needed in Figure 90.3, as shown below.

Chapter 1 – General Chapter 2 - Wiring and Protection Chapter 3 - Wiring Methods and Materials Chapter 4 - Equipment for General Use	Applies Generally to All Electrical Installations
Supplements or Modifies Chapters 1 through 4	Chapter 5 - Special Occupancies Chapter 6 - Special Equipment Chapter 7 - Special Conditions Chapter 8 – Communications Systems
~~Chapter 8 - Communications Systems~~	~~Chapter 8 is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.~~
Chapter 9 – Tables	Applicable as Referenced
Annex A through Annex H	Informational only; not mandatory

Substantiation: It is important to make this change because the safety implications of the wiring in Chapter 8 should be discussed at a level that exceeds that of CMP 16, which has total responsibility now (subject, of course, to the oversight of the Technical Correlating Committee). One example to consider is grounding of wires, cables and conductors, which is addressed, of course, in Article 250, which Chapter 8 does not need to follow. The wiring covered by Chapter 8 is often not low voltage wiring and it is inappropriate that Chapter 2, for example, should not apply. Chapter 8 should become a special condition type of chapter, just like Chapters 5 through 7.

In many ways, the responsibility of overall requirements for Chapter 8 wiring (which is, indeed, low voltage wiring, in most cases, albeit not in all cases) is not that different from the responsibility of overall requirements for Chapters 5, 6, and 7, and therefore wiring and communications systems should be treated the same way as the "special occupancies", "special equipment" and "special conditions" systems. In fact, communications systems could easily be considered special equipment just like the equipment in Chapter 6.

When chapter 8 was initially being treated differently, it was thought that it would include only low voltage wiring. However, there are now "medium power wiring" systems in articles 800, 820 and 830, as well as in articles 725, 760 and 770. Thus, there is actually less difference between the wiring systems of articles 725, 760 and 770 and those of articles 800, 820 and 830 than is apparent initially. In fact, network-powered broadband communications systems can have up to 150 V and should be required to meet all grounding requirements of article 250, rather than having a selection of rules made in article 820: this is a worker safety issue.

The proposed wording is consistent with CMP 1 suggestions when a similar proposal was introduced for the 2008 NEC. Proposals are also being made to chapter 8 articles (800, 820 and 830), but it is important to ensure that proper guidance for wiring systems is given throughout the NEC so that Chapter 8 does not stand in a vacuum.

I understand that the responsibility for scopes belongs to the NEC Technical Correlating Committee, but this is being brought to the NEC TCC attention for CMP 1 and TCC action.

Panel Meeting Action: Reject

Panel Statement: While the panel is not opposed to the principle brought forth by the proposal, the submitter has made no correlating proposals to Code-Making Panel 16 relative to this proposal's substantiation. The submitter's proposals 16-139, 16-250, and 16-319 agree that "Chapter 8 is independent of Chapters 1 through 4".

The proposed application of Chapters 1-7 to communications systems would be expected to have a significant impact on these installations that has not been justified by the proposal.

The panel requests that the Technical Correlating Committee forward this proposal to Code-Making Panel 16 for information.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ANTHONY, M.: This proposal could have been an Accept in Principle in Part. Consider the following change:

90.3 Code Arrangement.

This Code is divided into the introduction and nine chapters, as shown in Figure 90.3. Chapters 1, 2, 3, and 4 apply generally; Chapters 5, 6, ~~and~~ 7 and 8 apply to special occupancies, special equipment, ~~or other~~ special conditions or communications systems. These latter chapters supplement or modify the general rules. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular occupancies, equipment, conditions , or systems.

Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.

Chapter 9 consists of tables.

Annexes are not part of the requirements of this Code but are included for informational purposes only.

This proposal makes an important distinction for telecommunications professionals in the education facilities industry.

Comment on Affirmative:

MCCARVER, R.: As with a similar proposal from the previous Code cycle, the Panel action to reject this proposal is correct. Once again, there is no compelling reason to change the Code arrangement relative to Chapter 8. Communications systems are different from power systems, and many of the requirements of Chapters 1 through 7 make no sense if applied to communications systems. Panel 16 has exercised proper care and diligence in maintaining requirements for communications systems. There is no evidence that the subject matter should be discussed at any level other than Panel 16. It remains true that, where appropriate, parts of the Code outside Chapter 8 are referenced there. This arrangement has been shown over the years to be a reasonable and effective one as evidenced by a lack of reported safety issues in these installations. In order to accept the proposal, each and every requirement of Chapters 1 through 7 would have to be considered for application to communications systems. The magnitude of this task and the confusion that would follow are not warranted by any arguments in this substantiation. The Panel 1 statement says that the Panel does not oppose the principle of this proposal, but it should oppose the principle of taking action where none is warranted and that would detract from Code clarity and usability.

1-36 Log #171 NEC-P01 **Final Action: Reject**
(90.4)

Submitter: Felix Giannini, Lexco, Inc.
Recommendation: Changes to Article 90.4: FROM:
90.4 Enforcement. This Code is intended to be suitable for ~~mandatory application by governmental bodies,~~ including...
TO:
90.4 Enforcement. This Code is intended to be suitable for adoption by a Governing Authority (A duly elected legislative body empowered to enact legislation in behalf of the Local, State, Federal or National government to which it has been elected), including...
Substantiation: It is my proposal to change "governmental bodies" to Governing Authority". This seems to be a problem throughout many of the NFPA publications -- reference The Life Safety Code Handbook - 2003 edition and LIFE SAFETY CODE 101 2003, the NFPA 72, National Fire Alarm Code 2007 as well as NEC 2005. In the NEC 2005, reference is made to the "governmental bodies" in Section 90.4 Enforcement, however, I can find no other reference or definition as to what the "governmental bodies" are in that code book. This creates confusion with respect to the term "Governing Authority" used in the other above referenced code books. I believe that a definition should be included in the Definitions Section 100 too, so as to make the term clear and perhaps legally effective, this should be addressed in any and all other codes that use that term as well as similar terms.
Panel Meeting Action: Reject
Panel Statement: The governmental bodies referred to are merely those who enact and apply the code. It is not within the purview of the code to define who those bodies are.
A governmental body applying the NEC is not necessarily elected.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: The panel should have accepted the change of the text to read "adoption by a Governing Authority". The term "Governing Authority" is used in several other codes and standards, and the Governing Authority is generally the person, organization, agency or entity responsible for adopting codes and standards. Such person, organization, agency or entity may or may not be an elected legislative body.

1-37 Log #4521 NEC-P01 **Final Action: Reject**
(90.4)

Submitter: Medard Kopczynski, Town of Keene / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
90.4 Enforcement.
This Code is ~~intended to be suitable for mandatory application~~ mandatory and shall be enforced by governmental bodies that exercise legal jurisdiction over electrical installations, including signaling and communications systems, and for use by insurance inspectors. The authority having jurisdiction ~~for enforcement of the Code has the responsibility for making~~ ~~has the authority to interpretations of~~ has the authority to interpret the rules, ~~for deciding on the approval of~~ to approve equipment and materials, and ~~for granting the~~ to grant special permission ~~contemplated in a number of the rules~~ as required by this Code.
~~By special permission, the authority having jurisdiction may waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.~~
~~This Code may require new products, constructions, or materials that may not yet be available at the time the Code is adopted. In such event, the authority having jurisdiction may permit the use of the products, constructions, or materials that comply with the most recent previous edition of this Code adopted by the jurisdiction.~~
(A) Equivalency. Nothing in this Code shall prohibit methods of construction, materials, and designs not specifically prescribed in this Code where equivalent alternatives are approved by the authority having jurisdiction.
(B) Approval of Alternatives. Alternative systems, methods, or devices approved as equivalent by the authority having jurisdiction shall be recognized as being in compliance with this Code.
(C) Tests. Whenever the authority having jurisdiction determines that there is insufficient evidence of proof of equivalency with the prescribed requirements of this Code, the authority having jurisdiction shall be authorized to require tests showing proof of equivalency. Tests required by the authority having jurisdiction shall be provided by the owner at no expense to the jurisdiction. Tests shall be conducted as specified in this Code or, where test methods are not specified in this Code, they shall be conducted as required by the authority having jurisdiction.
(D) Approval. The authority having jurisdiction shall determine whether the proposed alternate methods of construction, materials, and designs are at least equivalent to the prescribed requirements of this Code.
Substantiation: Note: This proposal was developed by the proponent as a member of the Building Code Development Committee (BCDC) with the committee's endorsement.
The revision to the first sentence deletes the term "intended to be suitable" because it is not enforceable code language. The revision to the second sentence clarifies the provision by eliminating the word "responsible". The AHJ is responsible for enforcing this Code, and the Code should "authorize" the AHJ to interpret the code, approve equipment and materials, and grant special permission.
The last paragraph, which addresses equivalency, has been deleted and replaced with equivalency provisions that are found in other NFPA codes, such as NFPA 5000 and NFPA 101. The proposed text is more concise and offers the AHJ and the users the ability to use alternates, with more specific guidance. This gives the AHJ the authority to approve alternates and to back their decisions with scientific tests to prove equivalency.
Panel Meeting Action: Reject
Panel Statement: Not all governmental bodies adopt the NEC; therefore, the code cannot be mandatory in all cases.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-37a Log #CP100 NEC-P01 **Final Action: Accept**
(90.5)

TCC Action: It was the action of the Technical Correlating Committee that the term "FPN" be revised to appear as "Informational Note" globally.
In addition, all Annexes will become "Informative Annexes".
Submitter: Code-Making Panel 1,
Recommendation: Revise the wording in the existing code to read as follows:
90.5 Mandatory Rules, Permissive Rules, and Explanatory Material.
(A) Mandatory Rules. Mandatory rules of this Code are those that identify actions that are specifically required or prohibited and are characterized by the use of the terms shall or shall not.
(B) Permissive Rules. Permissive rules of this Code are those that identify actions that are allowed but not required, are normally used to describe options or alternative methods, and are characterized by the use of the terms shall be permitted or shall not be required.
(C) Explanatory Material. Explanatory material, such as references to other standards, references to related sections of this Code, or information related to a Code rule, is included in this Code in the form of Advisory Notes. Advisory Notes are informational only and are not enforceable as requirements of this Code.
Brackets containing section references to another NFPA document are for informational purposes only and are provided as a guide to indicate the source of the extracted text. These bracketed references immediately follow the extracted text.
Advisory Note: The format and language used in this Code follows guidelines established by NFPA and published in the NEC Style Manual. Copies of this manual can be obtained from NFPA.
(D) Informative Annexes. Non-mandatory information relative to the use of the NEC is provided in informative annexes. Informative annexes are not part of the enforceable requirements of the NEC, but are included for information purposes only."
In addition, the panel intends that the words "Fine Print Note" and "FPN" be changed to "Advisory Note" throughout the entire code and that all "Annexes" be identified as "Informative Annexes".
Substantiation: These revisions will more clearly delineate the adoptable and enforceable requirements of the NEC.
"Fine print" refers to a type size, rather than clearly portraying its advisory nature. The NEC contains notes that are enforceable requirements of the code, such as table notes. "Fine print" in some legal documents does not necessarily make the text unenforceable requirements. This change will make the advisory nature of these notes clear.
Many standards now contain normative and informative annexes. Normative annexes are requirements and informative annexes are not. With this new trend in standards, this change in the NEC would clarify the nature of these annexes.
Code-Making Panel 1 recommends that the Technical Correlating Committee correlate the necessary editorial revisions throughout the Code and consider the need to revise the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-38 Log #4829 NEC-P01 **Final Action: Reject**
(90.5)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Add the following text to the first paragraph:
Fine print notes are also used to refer to an informative annex where a list of reference documents is maintained to minimize the duplication of FPNs referencing other documents. These FPNs utilize a number contained in a set of braces { } which represents the document reference position in the list.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: Fine print notes and annexes are in accordance with the National Electrical Code Style Manual Sections 4.2 and 2.1.6, respectively. The National Electrical Code Style Manual is the responsibility of the NEC Technical Correlating Committee.
The proposed language is redundant to the first sentence in 90.5(C), which specifically states that FPNs may include references to other standards.
The panel disagrees that adding the proposed annex will improve usability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-39 Log #4503 NEC-P01 **Final Action: Reject**
(90.5 and 90.6)

Submitter: Bob Foote, Town of Georgetown / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
Consideration should be given to deleting Sections 90.5 and 90.6 and putting the information in a preamble to the code. See the preamble to NFPA 5000 found just in front of Chapter 1. It reads as follows:
"IMPORTANT NOTE: This NFPA document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading "Important Notices and Disclaimers Concerning NFPA Documents." They can also be obtained on request from NFPA or viewed at www.nfpa.org/disclaimers.
NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.
Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.
A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for mandatory extracts are given in Chapter 2 and those for nonmandatory extracts are given in Annex E. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division…".
Substantiation: Note: This proposal was developed by the proponent as a member of the Building Code Development Committee (BCDC) with the committee's endorsement.
Both Sections 90.5 and 90.6 are not enforceable code text. They are explanatory information that does not belong in the body of the code as requirements.
Panel Meeting Action: Reject
Panel Statement: This proposal does not contain recommended text as required by Section 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Refer to the panel action and statement on Proposal 1-7.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-40 Log #4522 NEC-P01 **Final Action: Reject**
(90.5(B))

Submitter: Medard Kopczynski, Town of Keene / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
B) Permissive Rules. Permissive rules of this Code are those that identify actions that are allowed but not required, are normally used to describe options or alternative methods, and are characterized by the use of the term should ~~terms shall be permitted or shall not be required.~~
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
Most, if not all, of the 300 NFPA codes and standards utilize the NFPA official definitions for "Should" which "indicates a recommendation or that which is advised but not required." This will bring the NEC in line with the official definition of "Should" for permissive rules.
Note that the NEC does follow the nomenclature of "shall" for the mandatory rules in section 90.5(A).
Panel Meeting Action: Reject
Panel Statement: The proposed wording is not in accordance with 3.1.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-41 Log #1538 NEC-P01 **Final Action: Reject**
(90.7)

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
90.7 Examination of Equipment for Safety.
For specific items of equipment and materials referred to in this *Code*, examinations for safety made under standard conditions provide a basis for approval where the record is made generally available through promulgation by organizations properly equipped and qualified for experimental testing, inspections of the run of goods at factories, and service-value determination through field inspections. This avoids the necessity for repetition of examinations by different examiners, frequently with inadequate facilities for such work, and the confusion that would result from conflicting reports on the suitability of devices and materials examined for a given purpose.
It is the intent of this *Code* that factory-installed internal wiring or the construction of equipment need not be inspected at the time of installation of the equipment, except to detect alterations or damage, if the equipment has been listed by a ~~qualified electrical~~ nationally recognized testing laboratory that is recognized as having the facilities described in the preceding paragraph and that requires ***sentence cut off***
Substantiation: OSHA requires equipment to be tested by a nationally recognized testing laboratory. Standard – 29 CFR 1910.
Panel Meeting Action: Reject
Panel Statement: "Nationally Recognized Testing Laboratory" is a term specifically defined by OSHA as it relates to workplace safety programs enforced by OSHA, and its use would be inconsistent with 3.2.5.3 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-42 Log #1341 NEC-P01 **Final Action: Reject**
(90.8)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
It is elsewhere provided in this Code that the number of wires and cables ~~circuits~~ be varyingly restricted.
Substantiation: Conductor fill requirements limit the number of wires and cables, but the number of circuits is not specifically limited; it may indirectly limit the number of circuits by limiting the number of conductors or prohibiting a mixture of certain systems.
Panel Meeting Action: Reject
Panel Statement: The term "wires" is a general term that would include "cables". The use of the term "circuits" is appropriate as the Code does limit the number of overcurrent protective devices in one panelboard, for example. The intent is to limit both wires and circuits. Cables contain wires; therefore, the proposed wording is redundant.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: The panel should have accepted the proposal in principle by deleting the words "wires and" from the sentence. The title of the section relates to the number of circuits in enclosures. This change would clarify that other code requirements may limit the number of circuits, such as branch- and feeder-circuits, in panelboards and switchboards.

1-43 Log #150 NEC-P01 **Final Action: Accept**
(90.8(A))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "communication" to "communications".
Substantiation: Section 3.3.3 of the NEC Style Manual States: "**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all* components or parts of a given type or class." Changing "communication" to "communications" will correlate with the title of Chapter 8, "Communications Systems".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-44 Log #4887 NEC-P01 **Final Action: Reject**
(90.8(A))

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Deleted the following text:
~~(A) Future Expansion and Convenience. Plans and specifications that provide ample space in raceways, spare raceways, and additional spaces allow for future increases in electric power and communications circuits. Distribution centers located in readily accessible locations provide convenience and safety of operation.~~

Substantiation: The current wording is explanatory material. It is not enforceable code. It seems to be in direct conflict with 90.1(B) & 90.1(C). I also submitted a proposal to amend the FPN following 90.1(B) to include the deleted text from 90.8(A).
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 1-7.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
BARRIOS, L.: Section 90.8 should be removed or relocated. It is out of place in Article 90. Sections 90.2-90.9 cover administration of the code such as scope, arrangement, enforcement, explanation of mandatory and permissive material, interpretations, units of measure. 90.8 which covers general information for wiring planning has nothing to do with the objective of administering the code and therefore doesn't belong here.
MCMAHILL, L.: This proposal should have been accepted to work in conjunction with the submitter's proposed change to section 90.1(B), FPN, proposal 1-7.

1-45 Log #4888 NEC-P01 **Final Action: Reject**
(90.8(B))

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Revise text as follows:
90.8(B) Number of circuits in Enclosures. It is elsewhere provided in this Code that the number of wires and circuits confined in a single enclosure be varyingly restricted. ~~Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault in on circuit.~~
Add FPN: Limiting the number of circuits in a single enclosure minimizes the effects from a short circuit or ground fault in one circuit.
Substantiation: The deleted text seems more appropriate as explanatory material. It is not enforceable code.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 1-7.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ANTHONY, M.: The submitter is correct. The Panel Statement that refers to Proposal 1-7 does not fully apply.
MCMAHILL, L.: This proposal should have been accepted to work in conjunction with the submitter's proposed changes to sections 90.1(B), FPN, proposal 1-7 and section 90.8(A), proposal 1-44.

1-46 Log #308 NEC-P01 **Final Action: Reject**
(90.10 (New))

Submitter: Joel A. Rencsok, Scottsdale, AZ
Recommendation: Add a new section to read as follows:
90.XX Construction Documents. Electrical construction documents shall be prepared prior to the installation of any electrical work and shall contain all installation requirements contained within this Code. Plans for the electrical installation shall contain the following minimum requirements:
1. A legend of all symbols used.
2. A complete site electrical plan showing locations of utility transformer(s), service entrance equipment, exterior lighting, transformers and all other electrical equipment.
3. A complete floor plan showing the type and layout of all equipment requiring connection to the electrical distribution system, including the type of wiring to be installed.
4. Working space about service equipment, switchboards, panelboards and motor control centers. Reference sections 110.26 and 110.30.
5. All rooms or spaces shall be identified on the plans as to its use.
6. Any area(s) classified as hazardous. Reference section 500.4(A).
7. Any area(s) that is classified for technology equipment. See Article 645.
8. The maximum available fault current that is being supplied by the utility.
9. Fault current calculations from the service point to the lowest rated overcurrent device or equipment. Reference section 110.10.
10. Complete Code load calculations for service equipment, switchboard(s), panelboard(s) and motor control center(s) as computed in accordance with Article 220.
11. The conduit, conductor type and size(s), length, and locations of all service and feeder raceway(s). Reference sections 310.10 and 215.5.
12. The volt-ampere rating of each outlet, the horsepower rating or actual nameplate data of the equipment served.
13. The type and rating of every motor or other equipment-disconnecting device.
14. The kva rating of each transformer, capacitor unit, converter, or similar equipment.
15. Service equipment, switchboard, panelboard and motor control center schedules showing volt-ampere and ampere rating feeder(s), feeder overcurrent device, branch circuit(s), branch circuits overcurrent device, spare devices and future spaces where circuits can be installed.
16. Identification of all circuits as required by sections 110.22 and 408.4.
17. A one-line diagram of the complete electrical distribution system, including service equipment, switchboard(s), panelboard(s), motor control center(s) and other equipment installed showing feeder size(s) and class, type, size and arrangement of all overcurrent device(s) to be installed.
18. The interrupting rating of equipment intended to break current at fault levels. Reference section 110.9.
19. All wiring as required by Article 700.
20. All wiring as required by Article 695.
21. All bonding and grounding as required by Article 250.
Substantiation: Plans are given to electrical contractors, which cannot be installed, to comply with the minimum requirements in this code. This new section addition will help set a minimum standard for plan preparation and will help inspectors inspect the installation. This will also reduce the time for inspections and installation redos.
Panel Meeting Action: Reject
Panel Statement: The list is overly prescriptive and does not necessarily improve the safety of the installation.
The proposal is too encompassing as not all projects necessarily require documents of the nature suggested by the submitter.
The submitter did not provide adequate technical substantiation to warrant the change.
Adding this material may create a conflict with local administrative provisions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: This is a good idea that might find a home in another NFPA document. The submitter should be encouraged to submit a proposal similar to this to other technical committees such as NFPA 70B (Chapter 31), NFPA 5000 (Chapter 1), or NFPA 1 (Chapter 1); for example.

1-47 Log #2330 NEC-P01 **Final Action: Reject**
(90.10)

Submitter: Stephen Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Add new text as follows:
90.10 Acronyms and Abbreviations. The following frequently used acronyms and abbreviations shall be permitted to be used throughout this code.
A) Person or Organization
1) AHJ- Authority Having Jurisdiction
2) NFPA- National Fire Protection Association
3) IEEE- Institute of Electrical & Electronic Engineers
4) UL- Underwriters Laboratories
5) ANSI- American National Standards Institute
6) SI- International System of Units
7) ISA- Instrumentation Systems and Automation Society
B) Raceways
1) EMT- Electrical Metallic Tubing
2) ENT- Electrical Nonmetallic Tubing
3) FMC- Flexible Metal Conduit
4) FMT- Flexible Metallic Tubing
5) IMC- Intermediate Metal Conduit
6) LFMC- Liquidtight Flexible Metal Conduit
7) LFNC- Liquidtight Flexible Nonmetallic Conduit
8) HDPE- High Density Polyethylene Conduit
9) RTRC- Reinforced Thermosetting Resin Conduit
10) RMC- Rigid Metal Conduit
11) PVC- Rigid Polyvinyl Chloride Conduit
C) Devices or Equipment
1) AFCI- Arc-Fault Circuit-Interruptor
2) CB- Circuit Breaker
3) GFCI- Ground-Fault Circuit-Interruptor
4) GFPE- Ground-Fault Protection of Equipment
5) OCPD- Overcurrent Protective Device
6) SPD- Surge-Protective Devices
7) TVSS- Transient Voltage Surge Suppressors
D) Conductors, Special Purpose Single
1) EBJ- Equipment Bonding Jumper
2) EGC- Equipment Grounding Conductor
3) GC- Grounded Conductor
4) GEC- Grounding Electrode Conductor
5) MBJ- Main Bonding Jumper
6) SBJ- System Bonding Jumper
E) Cables & Circuits
1) AC- Armored Cable
2) FC- Flat Cable Assemblies
3) FCC- Flat Conductor Cable
4) IGS- Integrated Gas Spacer Cable
5) MC- Metal-Clad Cable
6) MI- Mineral-Insulated, Metal-Sheathed Cable
7) MV- Medium Voltage Cable
8) NPLFA- Non-Power-Limited Fire Alarm Circuit
9) NM- Nonmetallic-Sheathed Cable
10) NMC- Nonmetallic-Sheathed Cable (Corrosion Resistant)
11) NMS- Nonmetallic-Sheathed Cable with Signaling, Data, &

Communication Conductors
12) NVCC- Nonmetallic Underground Conduit with Conductors
13) ITC- Instrumentation Tray Cable
14) PLFA- Power-Limited Fire Alarm Circuit
15) PLTC- Nonmetallic Sheathed Power-Limited Tray Cable
16) SE- Service-Entrance Cable
17) TC- Power and Control Tray Cable
18) UF- Underground Feeder and Branch-Circuit Cable
19) USE- Underground Service-Entrance Cable

Substantiation: Acronyms are a part of our everyday 21st century life. The 2008 NEC uses them on a limited basis for mostly cables and raceways. According to the style manual 3.2.3 once identified at first use in an article, it can be used throughout that article as an acronym. In NEC 210.12 this is done for AFCI, but not for RMC, IMC, EMT, etc. in the exceptions and not for GFCI in 210.8 or PLTC in 725.2 for some examples. There are many places where acronyms could be used and are not, for instance in article 250 for the various different grounding conductors. We believe that by having one place to identify an acronym and then using them throughout the NEC, we can maintain our understanding of NEC and shorten the NEC by several pages. Some common knowledge acronyms like DC and AWG and some rarely used like CI cable have been left off the list intentionally.
Panel Meeting Action: Reject
Panel Statement: 3.2.3 of the NEC Style Manual already addresses the use of acronyms in the Code and the addition of acronyms to Article 90 is not substantiated or viewed as beneficial to users. The submitter's references to Article 210 and 725 are noted and Code-Making Panel 1 is requesting that the Technical Correlating Committee forward this proposal to Code-Making Panels 2 and 3 for information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 100 — DEFINITIONS

1-48 Log #489 NEC-P01 **Final Action: Reject**
(100.Abandoned (New))

Submitter: Joe Tedesco, Tedesco Electrical Code Consultants, Inc.
Recommendation: Add new text as follows:
Abandoned. Electrical equipment that is not in use, or terminated at utilization equipment and not identified for future use with a tag.
Substantiation: The term is used in more than 2 places in the NEC. See NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with Section 4.3.3.(d) of the NFPA Regulations Governing Committee Projects.
See the panel statement on Proposal 1-49.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: We agree with the panel action but disagree with the panel statement that cites Section 4.3.3(d) as the reason for the rejection.

1-49 Log #740 NEC-P01 **Final Action: Reject**
(100.Abandoned (New))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
ARTICLE 100 Definitions
I. General
Abandoned (as applied to equipment and wiring methods). Installed but not terminated at equipment other than a connector or not connected to the supply of electricity, and not identified for future use by means specified elsewhere in this *Code*.
Substantiation: *NEC® Manual of Style* 2.2.2.1: Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
NEC® Manual of Style 2.2.2: Code Panel 3 rejected Proposal 3-1 (Log #2673) for a definition of "Abandoned Cable" in 2008 *NEC®* based on the rationale these individual definitions having "subtle differences" in REQUIREMENTS. The specific methods by which identification for future use is achieved are REQUIREMENTS conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 and constitute violations of *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …"). These similar-but-slightly differentiated REQUIREMENTS in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 are REDUNDANT to the actual requirement statements properly located in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Unlike rejected Proposal 3-1 (Log #2673) for a definition of "Abandoned Cable" in 2008 *NEC®*, this proposed generalized definition for "Abandoned" in Article 100 omits the specific mention of these individual REQUIREMENTS and relies on 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25 to continue to provide that REQUIREMENT information.
Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discrete definitions can be broadly consolidated into a single definition in Article 100 that is not specific to cables. As such, the intent of the Submitter of Comment 3-1 (Log #1435) for 2008 *NEC®* to remove abandoned cable is still achieved and potentially could be expanded as other Proposers and the reviewing Code Panels deem it necessary to encompass other wiring methods or equipment with this generalized definition.
Words regarding the possibility of ceasing connection to an electric supply have been added beyond existing definitions to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).
Companion proposals have been made to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
Panel Meeting Action: Reject
Panel Statement: The term "abandoned" is used in several articles, to describe specific cable types. However, some of those articles determine when a cable is not being used differently. The term is also used in three locations to describe an outlet that is no longer in use in floor raceway systems, for example.
Code-Making Panel 3 has noted subtle differences in requirements where the term is used in various parts of the Code. Therefore, broad application of the term is not appropriate in all parts of the Code.
The proposal does not comply with Section 4.3.3.(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: The panel should have accepted in principle this proposal by providing two new definitions for "Abandoned" and by revising the submitter's proposed text as follows:
Abandoned (as applied to equipment). Discontinued normal use and operation of a system or apparatus.
Abandoned (as applied to wiring methods). Conductors or cables that are not terminated at equipment and not identified for future use with a tag.
Comment on Affirmative:
ANTHONY, M.: I agree with the panel action but disagree with the panel statement that cites Section 4.3.3(d) as the reason for the rejection.
4.3.3 Content of Proposals. Each Proposal shall be submitted to the Council Secretary and shall include the following:
(a) Identification of the submitter and his or her affiliation (i.e., TC, organization, company), where appropriate
(b) Identification of the Document, edition of the Document, and paragraph of the Document to which the Proposal is directed
(c) Proposed text of the Proposal, including the wording to be added, revised (and how revised), or deleted
(d) Statement of the problem and substantiation for Proposal
As you can see, the term "substantiation" in item (d) itself is not substantiated.

1-50 Log #808 NEC-P01 **Final Action: Reject**
(100.Abandoned Cable (New))

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Add new text to read as follows:
Abandoned Cable. Installed cable which is not terminated at equipment other than a connector, and is not tagged for future use.
Substantiation: Replaces definitions in source references. Generalizes definition to apply to many types of cables.
Panel Meeting Action: Reject
Panel Statement: The term "abandoned" is used in several Articles, to describe specific cable types. However, some of those Articles determine when a cable is not being used differently.
Code-Making Panel 3 has noted subtle differences in requirements where the term is used in various parts of the code. Therefore, broad application of the term is not appropriate in all parts of the code.
The submitter has not provided the source references as mentioned in the substantiation; therefore, the proposal does not comply with Section 4.3.3.(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: The issue of how we handle abandoned cables and wires has been with us for several code cycles now. The TCC should appoint a task force to pull all the good ideas together and see if it is possible to make some write some practical code from the best of them.

1-51 Log #4519 NEC-P01 **Final Action: Reject**
(100.Accessible (as applied to equipment), Accessible (as applied to wiring methods), Accessible, Readily (Readily Accessible), FPN (New))

Submitter: Salvatore DiCristina, Rutgers, The State University of New Jersey / Rep. Building Code Development Committee (BCDC)
Recommendation: Add a Fine Print Note (FPN) to each of these following definitions to read as follows:
Accessible (as applied to equipment). Admitting close approach; not guarded by locked doors, elevation, or other effective means.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Accessible, Readily (Readily Accessible). Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, and so forth.
FPN: The term "Accessible," as used in this code, is not intended to apply to barrier free construction for persons with disabilities.
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
The use of the term accessible in recent building construction codes implies that features are available to persons with a variety of physical disabilities. Although the NEC has historically used the term accessible to describe the serviceability of equipment and systems, the term now may have unrealistic consequences. For example, I do not believe it is the intent for a person using a wheelchair to be able to approach a roof mounted disconnecting switch. The addition of this Fine Print Note will provide the same results while avoiding conflicts in definitions found in other codes and standards such as NFPA 101, 5000, ADAAG and ICC/ANSI A117.1.
Panel Meeting Action: Reject
Panel Statement: The recommendation does not enhance clarity or usability. In addition, the proposed FPN contains mandatory text. See 3.1.3 in the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: I agree with the panel action but disagree with the panel statement. This proposal does enhance clarity but what is clear is that electrical safety best practice needs to be developed apart from the civil rights legislation that governs accessibility issues.

3-3 Log #113 NEC-P03 **Final Action: Reject**
(100.Air Duct)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add new definition to read as follows:
Air Duct. A conduit or passageway for conveying air to or from heating, cooling, air conditioning, or ventilating equipment, but not including the plenum. [90A:3.3.5].
Substantiation: The definition of an air duct is in the definitions section of Articles 800 and 820. The style manual requires that a definition be placed in Article 100 rather than multiple articles. Furthermore, the term "air duct" is used in Article 100 in the definition of a plenum and in sections 250.104(B), 454.58 and 551.56(F) and 552.57(F).
Panel Meeting Action: Reject
Panel Statement: Code-Making Panel 3 recommends that the NEC Technical Correlating Committee assign this definition to the appropriate Panel. The phrase "air duct" is not used in any of the articles under the jurisdiction of Code-Making Panel 3.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
KAHN, S.: The proposer's substantiation is correct - when definitions appear in more than one article, they belong in Article 100. The fact that the term does not appear in articles under the jurisdiction of CMP-3 is irrelevant.

6-3 Log #2458 NEC-P06 **Final Action: Reject**
(100.Ampacity)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Peter Pollak, Pollak & Associates
Recommendation: Revise text to read as follows:
Ampacity. The maximum allowable current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.
Substantiation: The existing definition doesn't properly define the term ampacity as it includes the entire family of all allowable currents, which is not the intent. For example, the ampacity of a number 14 AWG Cu (12 AWG Al) is 15 amperes. Without the addition of "maximum allowable", the existing definition of ampacity can lead an inexperienced person to think that the ampacity of a number 14 AWG Cu (12 AWG Al) can be: 15, 14, 13, 12,...or 1 ampere(s). In order to be useful, a definition needs to be accurate, rather than assume everyone will understand what is actually meant.
Panel Meeting Action: Reject
Panel Statement: This is not a definition of permissible use. The added text does not clarify or benefit usability. The existing definition is accurate.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 7 Negative: 4
Explanation of Negative:
CLINE, S.: I believe that the action should have been to Accept in Part.
I agree that the term "allowable" is improper within a definition of electrical properties. It is an unnecessary permissible-use term, and adds no clarity.
However, I believe the submitter's logic is correct that the definition is not specific, and therefore not as clear as it would be with the term "maximum"" added. Any current less than the maximum can also be carried "continuously under the conditions of use without exceeding its temperature rating."
As experienced users we all "know" that the term implies the maximum, but there was a time when we didn't know. If your child asked "What is the capacity of this glass?" doesn't your mind immediately go to its maximum capacity?
HUDDLESTON, JR., R.: Adding the words "maximum allowable" before the word "current" in the Article 100 definition of 'Ampacity' makes the definition rigorously correct. When it is stated in Table 310.16 that at 75C, without any adjustments or corrections, a THHW conductor of size 8 AWG has an ampacity of 50 amperes, what is really meant is that the MAXIMUM ALLOWABLE ampacity for this conductor at 75C without any adjustment or correction is 50 amperes. As the definition currently exists (without the words "maximum allowable"), one could say that the ampacity of 8 AWG THHW conductors without any adjustments or corrections could be 10 amperes, 15 amperes, 20 amperes, etc...and this would be correct according to the definition given in Article 100. However, we all know that when we refer to the ampacity of a conductor we really mean how much current can the insulated conductor provide without getting too hot.
HUNTER, R.: In the code we deal with minimums and maximums, this fits well when referring to ampacities.
PICARD, P.: The definition provided by submitter was appropriate; the ampacity is the maximum allowable current.

1-52 Log #692 NEC-P01 **Final Action: Reject**
(100.Arc Flash hazard,Various Definitions)

Submitter: Joseph Tedesco, Boston, MA
Recommendation: ARTICLE 100 Definitions
Add the following as extracted text from NFPA 70E 2009, insert this at the end of each definition: [70E, 2009]
Arc Flash Hazard. A dangerous condition associated with the possible release of energy caused by an electric arc.
FPN No. 1: An arc flash hazard may exist when energized electrical conductors or circuit parts are exposed or when they are within equipment in a guarded or enclosed condition, provided a person is interacting with the equipment in such a manner that could cause an electric arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard.
FPN No. 2: See Table 130.7(C)(9) for examples of activities that could pose an arc flash hazard.
FPN No. 3: See 130.3 for arc flash hazard analysis information.
Arc Flash Hazard Analysis. A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash protection boundary, and the appropriate levels of PPE.
Arc Flash Suit. A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and beekeeper-type hood fitted with a face shield.
Arc Rating. The value attributed to materials that describes their performance to exposure to an electrical arc discharge. The arc rating is expressed in cal/cm2 and is derived from the determined value of the arc thermal performance value (ATPV) or energy of breakopen threshold (EBT) (should a material system exhibit a breakopen response below the ATPV value) derived from the determined value of ATPV or EBT.
FPN: Breakopen is a material response evidenced by the formation of one or more holes in the innermost layer of flame-resistant material that would allow flame to pass through the material.
Balaclava (Sock Hood). An arc-rated FR hood that protects the neck and head except for facial area of the eyes and nose.
Bare-Hand Work. A technique of performing work on energized electrical conductors or circuit parts, after the employee has been raised to the potential of the conductor or circuit part.
Barricade. A physical obstruction such as tapes, cones, or A-frame-type wood or metal structures intended to provide a warning about and to limit access to a hazardous area.
Barrier. A physical obstruction that is intended to prevent contact with

equipment or energized electrical conductors and circuit parts or to prevent unauthorized access to a work area.

Boundary, Arc Flash Protection. When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.

Boundary, Limited Approach. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which a shock hazard exists.

Boundary, Prohibited Approach. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which work is considered the same as making contact with the electrical conductor or circuit part.

Boundary, Restricted Approach. An approach limit at a distance from an exposed energized electrical conductor or circuit part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the energized electrical conductor or circuit part.

Conductive. Suitable for carrying electric current.

Conductor, Insulated. A conductor encased within material of composition and thickness that is recognized by this standard as electrical insulation. [70, 2008]

Current-Limiting Overcurrent Protective Device. A device that, when interrupting currents in its current-limiting range, reduces the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance.

Cutout. An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link), or may act as the disconnecting blade by the inclusion of a nonfusible member.

Deenergized. Free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

Disconnecting (or Isolating) Switch (Disconnector, Isolator). A mechanical switching device used for isolating a circuit or equipment from a source of power.

Electrical Hazard. A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

FPN: Class 2 power supplies, listed low voltage lighting systems, and similar sources are examples of circuits or systems that are not considered an electrical hazard.

Electrical Safety. Recognizing hazards associated with the use of electrical energy and taking precautions so that hazards do not cause injury or death.

Electrically Safe Work Condition. A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.

FPN: For further information, see ANSI/UL 1203-2006, Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.

Exposed (as applied to energized electrical conductors or circuit parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

Externally Operable. Capable of being operated without exposing the operator to contact with energized electrical conductors or circuit parts.

Flame-Resistant (FR). The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

FPN: Flame resistance can be an inherent property of a material, or it can be imparted by a specific treatment applied to the material.

Fuse. An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it.

FPN: A fuse comprises all the parts that form a unit capable of performing the prescribed functions. It may or may not be the complete device necessary to connect it into an electrical circuit.

Ground Fault. An unintentional, electrically conducting connection between an ungrounded conductor of an electrical circuit and the normally non–current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

Incident Energy. The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. One of the units used to measure incident energy is calories per centimeter squared (cal/cm2).

Insulated. Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.

FPN: When an object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subject. Otherwise, it is, within the purpose of these rules, uninsulated.

Interrupter Switch. A switch capable of making, carrying, and interrupting specified currents.

FPN: Equipment intended to interrupt current at other than fault levels may have its interrupting rating implied in other ratings, such as horsepower or locked rotor current.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or services meets appropriate designated standards or has been tested and found suitable for a specified purpose.

FPN: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. Use of the system employed by the listing organization allows the authority having jurisdiction to identify a listed product.

Premises Wiring (System). Interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed. This includes: (a) wiring from the service point or power source to the outlets; or (b) wiring from and including the power source to the outlets where there is no service point.

Shock Hazard. A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.

Single-Line Diagram. A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or system.

Step Potential. A ground potential gradient difference that can cause current flow from foot to foot through the body.

Switchgear, Arc-Resistant. Equipment designed to withstand the effects of an internal arcing fault and that directs the internally released energy away from the employee.

Switchgear, Metal-Clad. A switchgear assembly completely enclosed on all sides and top with sheet metal, having drawout switching and interrupting devices, and all live parts enclosed within grounded metal compartments.

Switchgear, Metal-Enclosed. A switchgear assembly completely enclosed on all sides and top with sheet metal (except for ventilating openings and inspection windows), containing primary power circuit switching, interrupting devices, or both, with buses and connections. This assembly may include control and auxiliary devices. Access to the interior of the enclosure is provided by doors, removable covers, or both. Metal-enclosed switchgear is available in non-arc-resistant or arc-resistant constructions.

Switchboard. A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. Switchboards are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets. [70, 2008]

Switching Device. A device designed to close, open, or both, one or more electric circuits.

Touch Potential. A ground potential gradient difference that can cause current flow from hand to hand, hand to foot, or another path, other than foot to foot, through the body.

Unqualified Person. A person who is not a qualified person.

Working On (energized electrical conductors or circuit parts). Coming in contact with energized electrical conductors or circuit parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing. There are two categories of "working on": Diagnostic (testing) is taking readings or measurements of electrical equipment with approved test equipment that does not require making any physical change to the equipment; repair is any physical alteration of electrical equipment (such as making or tightening connections, removing or replacing components, etc.).

Substantiation: The NEC is also used for enforcing electrical safety and the references to these definitions may help the users and industry understand why we have 110.16 and few FPN's that call attention to NFPA 70E, 2004 in the NEC now. If the CMP disagrees, then perhaps an Annex will be considered.

Panel Meeting Action: Reject

Panel Statement: Arc flash hazard is a work practice issue that is addressed in NFPA 70E. NFPA 70 (NEC) is an installation code. Adding an extensive list of definitions from NFPA 70E to the NEC is unnecessary as the proposed definitions are located in Article 100 of NFPA 70E where the terms are used. The proposed terms not defined in NEC Article 100 are not used in the NEC.

Fine Print Note No. 1 in 110.16 provides information relative to where to locate work practices regarding arc flash hazards.

The submitter has not provided sufficient substantiation for the proposed definitions to be included in the NEC as required by the NFPA Regulations Governing Committee Projects, Section 4.3.3(d).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

ANTHONY, M.: The substantiation is sufficient. This important material would be better placed in other, related, NFPA electrical documents, however.

2-3 Log #705 NEC-P02 **Final Action: Accept in Principle**
(100.Arc-Fault Circuit Interrupter (AFCI) (New))

Submitter: Nathan Tutt, I.B.E.W. Electrician/Apprentice Instructor
Recommendation: Add new text to read as follows:
Arc-Fault Circuit Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.
Substantiation: The proper and most useful place for definitions is in Article 100, Part I Definitions.
This definition was found in 210.12(A), note that the NEC Style Manual requires a defined term used in more than one article be defined in Article 100. See 760.121(B), 440.65, or 550.25.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 2-162.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-53 Log #3581 NEC-P01 **Final Action: Reject**
(100.Area Lighting (New))

Submitter: Michael Hyland, American Public Power Association
Recommendation: Add new text as follows:
Area Lighting. A lighting distribution system that provides lumens on public or private property.
FPN: See 90.2(A) where area lighting is not under the exclusive control of utilities. ANSI C2-2007, *National Electrical Safety Code* contains information that covers area lighting under the exclusive control of utilities.
Substantiation: This proposal is developed based upon meetings of a Task Group of the NESC and NEC Committees on July 10th and Sep. 30th, 2008. Subsequently, NESC members of the Task Group provided input to this proposal. Several companion proposals are submitted to Article 100 Definitions for Premises Wiring (Systems) and Premises.
This is an action to harmonize the purpose and scope sections of two ANSI standards, the NEC and the NESC, to mitigate conflicts between documents as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007*. Also, this action resolves the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words “or by other agreements”.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.
Specifically, the rationale for this change is that this term is used in 2007 NESC Rule 011C. Adding this new term in the NEC will correlate both the NEC and the NESC documents’ purpose and scope sections.
Area lighting is provided by utilities on public and private property. Neither the public nor the private property is under the exclusive control of the utility as the words imply. Also, there may not be a premises wiring system involved and, therefore, no service point. This new definition is also proposed in the NESC at this time.
Panel Meeting Action: Reject
Panel Statement: The term “area lighting” does not appear in two or more articles in the NEC; therefore, it is inconsistent with Section 2.2.2.1 of the NEC Style Manual.
The proposed definition does not add clarity or usability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ANTHONY, M.: I do not agree with the panel statement that cites Section 2.2.2.1 of the NEC Style Manual as a basis for rejection. A simple search on any of the definitions for “duty” (continuous....periodic....varying) will reveal that these terms only appear once in the NEC. The word “abandoned” shows up 19 times in the NEC and yet it does not have a definition. So whether or not a term is defined may have something to do with a diversity of opinion in what “usability” means. While this particular definition may need some sharpening, having a definition for area lighting would help the NESC and NEC harmonize their documents. The use of this term may appear in future versions of the NEC in other articles having to do with luminaires, disconnect switches, services, overcurrent protection, etc.
LABRAKE, JR., N.: Proposal 1-53 should have been accepted. The panel statement that the definition is not used in two or more Articles is true, but as was discussed in the panel, there is no place in the NEC for the definition of terms used in Article 90 such as in other articles in the XXX.2 section. In addition, refer to my ballot statements on Proposals 1-17 and 1-29 and the substantiation in proposal 1-107 regarding the need for defining this term.
Alternatively, the Panel could consider the proposed term in a new informative Annex discussed in my ballot statement on Proposal 1-12 as follows:
Annex “TBD”: “General Information Regarding Utility Electric Supply to Premises Wiring”
2. The following are terms for general understanding of where utility electric supply and premises wiring meet for what is covered and what is not covered by this Code as described in 90.2.
Area Lighting. A lighting distribution system that provides lumens on public or private property.
Advisory Note: See 90.2(A) where area lighting is not under the exclusive control of utilities. ANSI C2-2007, *National Electrical Safety Code* contains information that covers area lighting under the exclusive control of utilities.

18-3 Log #3259 NEC-P18 **Final Action: Reject**
(100.Attachment Plug (Plug Cap) (Plug))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
A device attached to a flexible cord or portable power cable that, by insertion into a receptacle, cord connector body, or flanged surface outlet establishes a connection between the attached flexible cord or portable power cable and the conductors permanently connected to the receptacle, cord connector body, or flanged surface outlet.
Substantiation: Present definition is incomplete, since attachment plugs are also used with the other devices in the proposal.
Panel Meeting Action: Reject
Panel Statement: The term “flanged surface outlet” is not a defined term denoting a specific device. Some flanged surface outlets are a form of a receptacle when constructed using listed receptacle and coverplate. Others may be integrally formed with a coverplate and receptacle permanently attached or may be identified as a “flanged receptacle.” Not all flanged surface outlets are outletbox installed. They can be affixed to a panel or a piece of electrical utilization equipment or can be installed within or on a cabinet, or box but not solely installed in an outletbox.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

1-54 Log #206 NEC-P01 **Final Action: Accept**
(100.Automatic)

Submitter: Glossary of Terms Technical Advisory Committee,
Recommendation: Replace the definition of automatic with the following definition:
Automatic. Performing a function without the necessity of human intervention.
~~Automatic. Self-acting, operating by its own mechanism when actuated by some ipersonal influence, as, for example, a change in current, pressure, temperature, or mechanical configuration.~~
Substantiation: This proposal is intended to generate consistent definitions and minimize the number of duplicate definitions in the NFPA Glossary of Terms in accordance with the scope of the NFPA Glossary of Terms Technical Advisory Committee.
Similar proposals are being submitted to NFPA 70E, 96, 99, 101, 101B, 550 and 901.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

5-3 Log #2973 NEC-P05 **Final Action: Reject**
(100.Auxiliary Electrode (New))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Add new definition for auxiliary electrode, as follows:
Auxiliary Electrode. Any grounding electrode that is not required by Article 250 or other Articles of this Code.
Substantiation: CMP 5 did the industry a great service when it changed the name “supplementary electrode” to “auxiliary electrode”, removing the confusion between the two. There will, however, continue to be some amount of confusion until the term is defined.
Panel Meeting Action: Reject
Panel Statement: The panel notes that the term used in Section 250.54 is “auxiliary grounding electrode”. The intended use of auxiliary grounding electrodes is clearly described in Section 250.54.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

9-2 Log #2397 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Alberto E. Planas, Planas - Worthy Group, Inc.
Recommendation: Add text to read as follow:
Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.
Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.
Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.
The term “Barrier” is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)

Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-3 Log #2402 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Diane B. Truhlar, Isotec, Inc.

Recommendation: Add text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-4 Log #2403 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Ken Ericksen, Isotec, Inc.

Recommendation: Add text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-5 Log #2404 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Matthew D. Hayes, Isotec, Inc.

Recommendation: Add text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-6 Log #2405 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Sergio Bautista, Isotec, Inc.

Recommendation: Add text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-7 Log #2406 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Shannon Eichele, Isotec, Inc.
Recommendation: Add text to read as follows:
Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.
Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.
Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.
The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)
Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.
Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-8 Log #2545 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels 3 and 16 for action within their respective Articles.
This action will be considered by Code-Making Panels 3 and 16 as a public comment.
Submitter: Robert C. Duncan, Duncan Consulting, Inc. / Rep. Isotec, Inc.
Recommendation: Add new text as follows:
Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.
Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.
Article 100 of the National Electrical Code provides for the definition for a term that is used in two or more articles.
The term "Barrier" is used in the following Sections:
314.28
368.234(B)
404.8(B)
406.4(G)
408.3(A)(2)
408.3 (A)(3), Exception
430.97(A), Exception
504.30(A)(2)(5), Exception 640.46
725.48(B)(4)(1)
725.136(B)
725.136(D)(2)(a)
725.136(G)
727.5, Exception No. 1
760.136(B)
760.136(D)(2)(a)
770.133(A), Exception No. 5
800.133(A)(1)(c), Exception No. 1
820.133(A)(1)(b), Exception No. 1
830.133(A)(1)(d), Exception No. 1
Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.
Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.
Panel Meeting Action: Reject
Panel Statement: Based on a presentation by the submitter to CMP-9 at the ROP meeting, it is apparent that the intended subject of this proposal is a flexible material that can be incorporated into a cable assembly. CMP-9 requests that the TCC refer this proposal to CMP-3 and CMP-16 for action in limited energy cable articles for the purposes of qualifying for system separation. Barriers used within the scope of CMP-9 responsibilities are rigid and accord with dictionary definitions, and therefore do not need to be defined in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-9 Log #2729 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Kendra Munnell, Isotec, Inc.
Recommendation: Add new text to read as follows:
Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polymide, Glass Polyester, melamine resin or other insulating material.
Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.
Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.
The term "Barrier" is used in the following Sections:
314.28(D)
368.234(B)
404.8(B)
406.4(G)
408.3(A)(2)
408.3(A)(3), Exception
430.97(A), Exception
504.30(A)(2)(5,) Exception
640.46
725.48(B)(4)(1)
725.136(B)
725.136(D)(2)(a)
725.136(G)
727.5, Exception No. 1
760.136(B)
760.136(D)(2)(a)
770.133(A,) Exception No. 5
800.133 (A)(1)(c), Exception No. 1
820.133 (A)(1)(b), Exception No. 1
830.133 (A)(1)(d), Exception No. 1
Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.
Merriam-Webster defined "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them".
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-10 Log #3494 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Elizabeth J. Niziolek, Isotec, Inc.
Recommendation: Add text to read as follows:
Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways, such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.
Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.
Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.
The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1

Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(f)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "Something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-11 Log #3583 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: James E. Miller, Isotec, Inc.
Recommendation: Add new text as follows:
<u>Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>
Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D)
Section 368.234(B)
Section 404.8(B)
Section 406.4(G)
Section 408.3(A)(2)
Section 408.3(A)(3) Exception
Section 430.97(A) Exception
Section 504.30(A)(2)(5) Exception
Section 640.46
Section 725.48(B)(4)(1)
Section 725.136(B)
Section 725.136(D)(2)a
Section 725.136(G)
Section 727.5 Exception No. 1
Section 760.136(B)
Section 760.136(D)(2)a
Section 770.133(A) Exception No. 5
Section 800.133(A)(1)(c) Exception No.1
Section 820.133(A(1)(b) Exception No.1
Section 830.133(A)(1)(d) Exception No.1

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-12 Log #3584 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Dan Hellios, Burns and Son's Electric / Rep. Isotec, Inc.
Recommendation: Add new text as follows:
<u>Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>
Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D)
Section 368.234(B)
Section 404.8(B)
Section 406.4(G)
Section 408.3(A)(2)
Section 408.3(A)(3) Exception
Section 430.97(A) Exception
Section 504.30(A)(2)(5) Exception
Section 640.46
Section 725.48(B)(4)(1)
Section 725.136(B)
Section 725.136(D)(2)a
Section 725.136(G)
Section 727.5 Exception No. 1
Section 760.136(B)
Section 760.136(D)(2)a
Section 770.133(A) Exception No. 5
Section 800.133(A)(1)(c) Exception No.1
Section 820.133(A(1)(b) Exception No.1
Section 830.133(A)(1)(d) Exception No.1

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-13 Log #3585 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

TCC Action: The Technical Correlating Committee understands that the action on this proposal should be "Reject".
Submitter: David Mecklenburger, Isotec, Inc.
Recommendation: Add new text as follows:
<u>Barrier - A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>
Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D)
Section 368.234(B)
Section 404.8(B)
Section 406.4(G)
Section 408.3(A)(2)
Section 408.3(A)(3) Exception
Section 430.97(A) Exception
Section 504.30(A)(2)(5) Exception
Section 640.46
Section 725.48(B)(4)(1)
Section 725.136(B)
Section 725.136(D)(2)a
Section 725.136(G)
Section 727.5 Exception No. 1
Section 760.136(B)
Section 760.136(D)(2)a
Section 770.133(A) Exception No. 5
Section 800.133(A)(1)(c) Exception No.1
Section 820.133(A(1)(b) Exception No.1
Section 830.133(A)(1)(d) Exception No.1

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Accept
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-14 Log #3586 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Ken Bernd, Gepco International, Inc. / Rep. Isotec, Inc.
Recommendation: Add new text as follows:
<u>Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>
Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D)

Section 368.234(B)
Section 404.8(B)
Section 406.4(G)
Section 408.3(A)(2)
Section 408.3(A)(3) Exception
Section 430.97(A) Exception
Section 504.30(A)(2)(5) Exception
Section 640.46
Section 725.48(B)(4)(1)
Section 725.136(B)
Section 725.136(D)(2)a
Section 725.136(G)
Section 727.5 Exception No. 1
Section 760.136(B)
Section 760.136(D)(2)a
Section 770.133(A) Exception No. 5
Section 800.133(A)(1)(c) Exception No.1
Section 820.133(A(1)(b) Exception No.1
Section 830.133(A)(1)(d) Exception No.1

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-15 Log #3611 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Antonio Hernandez, Isotec, Inc.
Recommendation: Add new text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them."

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-16 Log #3612 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Arturo Guzman, Isotec, Inc.
Recommendation: Add new text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them."

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-17 Log #3613 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Juan R. Valle, Isotec, Inc.
Recommendation: Add new text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines "Barrier" as "something material that blocks or is intended to block passage or separates". The technical dictionary describes barriers as "a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them."

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-18 Log #3614 NEC-P09 **Final Action: Reject**
(100.Barrier (New))

Submitter: Julio Z. Perez, Isotec, Inc.
Recommendation: Add new text to read as follows:

Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.

Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term "Barrier" is used in the following Sections:
Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)

Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines “Barrier” as “something material that blocks or is intended to block passage or separates”. The technical dictionary describes barriers as “a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.”

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-19 Log #3615 NEC-P09 **Final Action: Reject**

(100.Barrier (New))

Submitter: Douglas Guevara, Isotec, Inc.

Recommendation: Add new text to read as follows:

<u>Barrier. A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>

Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term “Barrier” is used in the following Sections:

Section 314.28(D) Section 725.136(D)(2)(a)
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4(G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)(a)
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines “Barrier” as “something material that blocks or is intended to block passage or separates”. The technical dictionary describes barriers as “a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.”

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-20 Log #3773 NEC-P09 **Final Action: Reject**

(100.Barrier (New))

Submitter: Jason Page, O’Tech Corp.

Recommendation: Add new text to read as follows:

<u>Barrier - A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized steel), Nonmetallic (Polymeric Material), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>

Substantiation: There is currently confusion between the authority having jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term “barrier” is used in the following Sections:

314.28(D)
368.234(B)
404.8(B)
406.4(G)
408.3(A)(2)
408.3(A)(3) Exception
430.97(A) Exception
504.30(A)(2)(5) Exception
640.46
725.48(B)(4)(1)
725.136(B)
725.136(D)(2(a)
725.136(G)
727.5 Exception No.1
760.136(B)
760.136(D)(2)(a)
770.133(A) Exception No. 5
800.133(A)(1)(c) Exception No.1
820.133(A)(1)(b) Exception No.1
830.133 (A)(1)(d) Exception No.1

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster defines “Barrier” as “something material that blocks or is intended to block passage or separates”. The technical dictionary describes barriers as “a partition, slab or plate of insulating material placed between blades of switches, wire on conductors in order to separate or insulate them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-21 Log #4747 NEC-P09 **Final Action: Reject**

(100.Barrier (New))

Submitter: Ray Grabowski, Isotec, Inc.

Recommendation: Add new text as follows:

<u>Barrier - A material that blocks or is intended to block passage used in boxes, cables and raceways. Such as Metallic (Galvanized Steel), Nonmetallic (Polymeric Materials), Iron (Ferrite or Alpha Iron), Bakelite, Epoxy, Polyimide, Glass Polyester, melamine resin or other insulating material.</u>

Substantiation: There is currently confusion between the authority having Jurisdiction and contractors in the field.

Article 100 of the National Electrical Code provides for a definition for a term that is used in two or more articles.

The term “Barrier” is used in the following Sections:

Section 314.28(D) Section 725.136(D)(2)a
Section 368.234(B) Section 725.136(G)
Section 404.8(B) Section 727.5 Exception No. 1
Section 406.4 (G) Section 760.136(B)
Section 408.3(A)(2) Section 760.136(D)(2)a
Section 408.3(A)(3) Exception Section 770.133(A) Exception No. 5
Section 430.97(A) Exception Section 800.133(A)(1)(c) Exception No. 1
Section 504.30(A)(2)(5) Exception Section 820.133(A)(1)(b) Exception No. 1
Section 640.46 Section 830.133(A)(1)(d) Exception No. 1
Section 725.48(B)(4)(1)
Section 725.136(B)

Most codes state that undefined terms, and the meaning of terms not specifically defined in most code documents, shall be defined by collegiate dictionaries in the sense that the context implies.

Merriam-Webster define “Barrier” as “somothane material that blocks or is intended to block passage or separates”. The technical dictionary describes barriers as “a partition, slab or plate of insulating material placed between blades of switches, wire or conductors in order to separate or insulate them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-8.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-4 Log #584 NEC-P02 **Final Action: Reject**

(100.Bathroom and 210.8(A)(7))

Submitter: Mitch Feininger, North Dakota State Electrical Board

Recommendation: Revise text to read as follows:

Bathroom. An area with a tub or shower and one or more of the following: a basin or toilet./~~laundry, utility, and wet bars/sinks~~ - where the receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink/

Exception to (7): Receptacles that are not readily accessible.

Substantiation: The intent of this proposal is to address 1/2 baths that have a sink and a stool and are in the same “room” as a laundry room where there is a sink by the stool over 6 ft away from the washing machine. It is highly unlikely that a person using the washing machine in this area will be wet. It also expands CFCI requirements near sinks while excluding refrigerators in kitchens in dwellings.

Panel Meeting Action: Reject

Panel Statement: The submitter’s recommendation adds a requirement to the definition of a bathroom, that does not comply with 2.2.2 of the NEC Manual of Style. Also the Submitter has not substantiated the addition of an exception to 210.8(A)(7). Proposals that address separate sections of the Code should be submitted on separate proposal forms in compliance with the Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-5 Log #2246 NEC-P02 **Final Action: Accept in Principle**

(100.Bathroom)

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector

Recommendation: Add new and delete text to read as follows:

Bathroom. An area including a basin with one or more of the following: a toilet, a tub, ~~or~~ a shower~~.~~<u>, a urinal, a foot bath, or a bidet</u>.

Substantiation: The definition is restrictive to the items that would make a bathroom. The intent of the change is to extend the definition to cover all items that one might encounter in a room that would make a bathroom.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

"**Bathroom.** An area including a basin with one or more of the following: a toilet, a urinal, a tub, a shower, a foot bath, a bidet, or similar plumbing fixtures."

Panel Statement: The panel has accepted the submitter's recommendation in principle and added additional words to include similar plumbing fixtures.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-6 Log #2247 NEC-P02 **Final Action: Accept in Principle in Part**
(100.Bathroom)

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector

Recommendation: Add new and revise text to read as follows:

Bathroom. An area including ~~a basin with one~~ two or more of the following: a basin, a toilet, a tub, ~~or~~ a shower~~.~~, a urinal, a foot bath, or a bidet.

Substantiation: The definition is restrictive to the items that would make a bathroom. The intent of the change is to extend the definition to cover all items that one might encounter in a room that would make a bathroom.

Panel Meeting Action: Accept in Principle in Part

Panel Statement: See panel action and statement on Proposal 2-5. The panel rejects the revised text that would make a basin optional.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-7 Log #3468 NEC-P02 **Final Action: Reject**
(100.Bathroom)

Submitter: James G. Lally, IBEW/NECA Technical Institute

Recommendation: Revise definition as follows:

Bathroom. An area including ~~a basin with one~~ a combination of any two or more of the following: a toilet, a tub, a shower, or a basin.

Substantiation: As an inspector, I see many situations where people remodel or finish older basements that have toilets and showers or tubs and toilets that do not have basins. They put make-up tables in these rooms and are used as bathrooms for practical purposes.

Panel Meeting Action: Reject

Panel Statement: The panel rejects the revised text that would make a basin optional. The proposed text would expand the definition to include many areas that are not considered to be a bathroom and would affect enforceability.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-8 Log #2970 NEC-P02 **Final Action: Reject**
(100.Bedroom (New))

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add text to read as follows:

ARTICLE 100 Definitions

I. General

Bedroom. A habitable room or space intended primarily for sleeping. In a dwelling unit, a habitable room or space intended or capable of being used primarily for sleeping, even where it serves other uses such as a home office, an entertainment or hobby area, a temporary storage space, or the like for the present occupant(s).

Substantiation: Usability and enforceability of the *Code*. "Bedroom" and "bedrooms" is used without definition throughout the *Code*. The last sentence is included to end disputes as what constitutes a bedroom where the current occupant(s) has converted the room or space for other purposes during that occupancy.

Panel Meeting Action: Reject

Panel Statement: There are a number of different types of rooms specified in the code that have commonly understood meanings, such as sunroom, dining room, living room, family room, etc. The requirements of the code are intended to apply to these rooms in accordance with their use.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

5-4 Log #2928 NEC-P05 **Final Action: Accept**
(100.Bonding Jumper)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

Bonding Conductor or Jumper. A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

Substantiation: The term "Bonding Jumper" includes the connotation of being a conductor of short or limited length. These bonding jumpers are most often contained within enclosures or are secured to raceways as where bonding jumpers are secured on the exterior of conduits.

Yet, we find bonding conductors or jumpers of 20 ft or longer in length installed to bond grounding electrodes together as required in Articles 800, 810, 820 and 830. Bonding conductors or jumpers are also installed to bond grounding electrodes together as required in 250.50 and 250.53.

Proposals are made to other sections of the NEC to ensure these bonding conductors are installed properly and are protected from physical damage.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal because it provides the necessary Code-wide consistency in the use of defined words and terms related to grounding and bonding. Including the words "Conductor or" improves clarity and meaning in applications that refer to conductive paths which are often greater in length than bonding jumpers.

5-5 Log #4016 NEC-P05 **Final Action: Accept in Principle**
(100.Bonding Jumper, Equipment)

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting and clarify whether it is the Panel's intent to replace the definition "Bonding Jumper-Equipment" with "Supply-Side Bonding Jumper (SSBJ)".

This action will be considered by the panel as a public comment.

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Revise text to read as follows:

Bonding Jumper, Equipment. The connection between two or more portions of the equipment grounding conductor; or a connection from a system bonding jumper and the first disconnecting means of a separately derived system.

Substantiation: The term "equipment bonding jumper" is used in 250.30(A)(2) and is used as a fault carrying conductor for the separately derived system. It is sized by 250.102(C), Table 250.66 or 12.5% not by 250.122 as are equipment grounding conductors.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

Supply-Side Bonding Jumper (SSBJ). A reliable conductor installed on the supply side of a service or separately derived system to ensure the required electrical conductivity between metal parts required to be electrically connected.

Panel Statement: The definition of this conductor is necessary to ensure the proper identification and installation of bonding conductors installed within or on the supply side of service equipment and between the source of a separately derived system and the first disconnecting means. The equipment bonding jumper is sized from Table 250.122 based upon the rating of the overcurrent protective device whereas the size of the bonding jumper for separately derived systems is sized by 250.102(C) from Table 250.66 plus the 12.5% rule. As a result, these terms cannot be combined in one definition.

The panel concludes this action meets the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MELLO, C.: The panel action was supposed to actually create another term and definition of "supply side bonding jumper", and therefore there would be no change to the existing term "bonding jumper – equipment" and the existing definition. The panel action as recorded, "Revise text to read as follows:" would eliminate the present term of "bonding jumper – equipment" and it definition and replace it with the new term "supply side bonding jumper" and the new definition. When done correctly, both terms should be established and defined.

5-6 Log #535 NEC-P05 **Final Action: Reject**
(100.Bonding Jumper, System (New))

Submitter: James W. Moore, Samaritan's Purse World Medical Mission, Gregory P. Bierals

Recommendation: Add new text as follows:

Bonding Jumper, System. The connection between the grounded circuit conductor and the equipment grounding conductor at any single point on a separately derived system from the source to the first system disconnecting means or overcurrent device, or at the source of a separately derived system that has no disconnecting means or overcurrent devices.

Substantiation: This term and definition will correlate with section 250.30(A)(1), which was added in 2005.

Panel Meeting Action: Reject

Panel Statement: The definition of the system bonding jumper is appropriately covered in 250.2.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

2-9 Log #2568 NEC-P02 **Final Action: Reject**
(100.Branch Circuit, Individual)

Submitter: Charles Palmieri, Palmieri Assoc.

Recommendation: Add the following text (as indicated) to the definition; Branch Circuit, Individual. A branch circuit that supplies only one utilization equipment, or a single receptacle.

Substantiation: Duplex receptacles are commonly installed for cord and plug connected appliances, which in many cases (by manufactures standard) require an individual branch circuit. Once the duplex receptacle is installed, the circuit becomes a multi-outlet branch circuit. I am not certain that this was the intent of the manufacturer when it required an individual branch circuit, nor was it the intent of the panel when it adopted the definition of individual branch circuit as it is now written. This issue is further exasperated when one refers to exhibit 100.7 of the 2008 Handbook. The illustration implies that only a single contact device may be installed on a individual branch circuit. If the language is modified as I have proposed, a lot of arguments may be put to rest in the field.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that a single receptacle is required. A receptacle other than a single receptacle could be used, and other means such as configuration or arrangement of the equipment could limit the application to a single utilization equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-10 Log #544 NEC-P02 **Final Action: Reject**
(100.Branch Circuit, Multiwire)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Revise the definition of Branch Circuit, Multiwire as follows:

Branch Circuit, Multiwire. ~~A branch circuit that consists of two or more ungrounded conductors that have a voltage between them, and a grounded conductor that has equal voltage between it and each ungrounded conductor of the circuit and that is connected to the neutral or grounded conductor of the system.~~ <u>A branch circuit originating from the same panelboard or similar distribution equipment, consisting of a grounded conductor and two or more ungrounded conductors that have a voltage between them and which supply only line-to-neutral loads.</u>

Substantiation: In the scope of Article 100 it states the following:

Part I of this Article contains definitions intended to apply wherever the terms are used throughout this *Code*.

A defined term should be able to be used throughout the *Code* without having to modify its definition.

Section 210.4(A) modifies the definition of the term multiwire branch circuit, by adding the last sentence, "All conductors of a multiwire branch circuit shall originate from the same panelboard or similar distribution equipment".

Section 210.4(C) also modifies the definition by restricting multiwire branch circuits to supply only line-to-neutral loads.

Section 240.15(B)(1) modifies the definition by restricting multiwire branch circuits that serve only single-phase line-to-neutral loads.

Sections 210.4(A)(C) and 240.15(B)(1) does not restrict the modified definition to being used only in those articles and can be used to supplement the weak definition in Article 100 and could be applied throughout the Code.

Panel Meeting Action: Reject
Panel Statement: The submitter's recommendation introduces requirements into the definition of a multiwire branch circuit, that does not comply with 2.2.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-11 Log #620 NEC-P02 **Final Action: Reject**
(100.Branch Circuit, Multiwire)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Revise text to read as follows:

A branch circuit that <u>originates from the same distribution equipment</u> and consists of two or more ungrounded conductors that have a voltage between them, and a grounded <u>neutral</u> conductor that has equal voltage between it and each ungrounded conductor of the circuit <u>that supplies line to neutral loads</u> ~~and that is connected to the neutral or grounded conductor of the system~~.

Substantiation: In the scope of Article 100 it states the following:

Part I of this article contains definitions intended to apply wherever the terms are used throughout this *Code*.

A defined term should be able to be used throughout the *Code* without having to modify its definition.

Section 210.4(A) MODIFIES THE DEFINITION OF THE TERM MULTIWIRE BRANCH CIRCUIT BY ADDING THE LAST SENTENCE, "All conductors of a multiwire branch circuit shall originate from the same panelboard or similar distribution equipment".

Section 210.4(C) also modifies the definition by restricting multiwire branch circuits to supply only line-to-neutral loads.

Section 240.15(B)(1) modifies the definition by restricting multiwire branch circuits that serve only single-phase line-to-neutral loads.

Sections 210.4(A)(C) and 240.15(B)(1) do not restrict the modified definition to being used only in those articles and can be used to supplement the weak definition in Article 100 and could be applied throughout the *Code*.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-10.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-2a Log #CP1000 NEC-P10 **Final Action: Accept**
(100.Branch-Circuit Overcurrent Device)

Submitter: Code-Making Panel 10,
Recommendation: Revise text to read as follows:

~~Branch-Circuit~~ **Overcurrent <u>Protective</u> Device<u>, Branch-Circuit</u>.** A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Branch-circuit overcurrent protective devices are provided with interrupting ratings appropriate for the intended use but no less than 5,000 amperes.

Substantiation: This definition is editorially revised to correlate with the Panel Action on Proposals 10-6 & 10-7.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

COOK, D.: I agree with the Panel action to editorially revise terms related to overcurrent devices in order to group those definitions together. See Cook comment on proposal 10-3 for preferred term.

10-3 Log #2735 NEC-P10 **Final Action: Reject**
(100.Branch-Circuit Overcurrent Device)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Revised text as follows:

~~Branch Circuit~~ Overcurrent Device <u>(General)</u>. A device capable of providing protection for service, feeder, and branch circuits and equipment over the full range of overcurrents between its rated current and its interrupting rating. Branch-circuit overcurrent protective devices are provided with interrupting ratings appropriate for the intended use but no less than 5,000 amperes.

Substantiation: The revisions to this definition provide clarity for the user. As currently defined, branch-circuit overcurrent device also covers feeder and service overcurrent devices. However, the term branch-circuit overcurrent device is not used in the NEC when addressing feeder or service overcurrent devices. By removing the specific "Branch Circuit" wording, the definition becomes more general and will apply to all conditions where overcurrent devices are mentioned without causing confusion as to application of the definition.

Panel Meeting Action: Reject
Panel Statement: Clarity would not be improved unless proposals were made and accepted to change all 71 occurrences of "branch circuit device" or similar phrases in the 2008 NEC. "Branch-circuit overcurrent device" occurs 24 times. "Branch-circuit device" occurs 3 times. "Branch-circuit overcurrent protective device" occurs 8 times. "Branch-circuit short-circuit and ground-fault protective device" occurs 31 times. "Branch circuit protective device" occurs 9 times.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

COOK, D.: Submitter's substantiation has merit based on my personal experience with typical industry designers, contractors, installers, and enforcement. The Panel statement identifies a number of places "branch circuit overcurrent device" is used in various ways throughout the NEC. The terms feeder overcurrent device and service overcurrent device are also used multiple times in the NEC. The current Article 100 definition for "branch circuit overcurrent device" seems to apply to all of those overcurrent devices. That seems to provide a basis for accepting the proposal to change the term from "Branch Circuit" to "General". Obviously additional effort would be needed to review the locations throughout the NEC where branch circuit, feeder, or service overcurrent device is used and correlate those terms. Changing the definition to Overcurrent Device (General) using the existing definition would seem to provide clarity for the term. It should be noted the CMP-10 panel action on Proposal 10-72 includes the following text; "containing service or feeder circuit overcurrent devices". Are those "branch circuit" overcurrent devices?

1-55 Log #3841 NEC-P01 **Final Action: Accept in Principle**
(100.Building)

Submitter: Don L. Hamouz, Aurora, CO
Recommendation: Add new text to read as follows:

BUILDING. A structure that stands alone or that is cut off from adjoining structures by firewalls (<u>or fire barriers</u>) with all openings therein protected by approved fire doors.

Substantiation: It has been my experience that Architects and Engineers have difficulty in substantiating this coordination when determining the number of electrical services to a multiple occupancy building(s). This creates interpretational differences between jurisdictions for designers, and contractors, and inspection entities.

The existing language is modified to eliminate confusion between the electrical and building codes as to the precise definition of these types of accommodations. The new language would better accommodate contemporary construction design, and still be in compliance with 2006 IBC Section 508 for "Mixed Use and Occupancy" based on construction types and Separated/Non-separated use.

It would allow a less stringent design for electrical and building codes, while still being economically practical, and still provide fire separation between occupancies that had UL listing certification.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 1-56.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ANTHONY, M.: Our interest group would like to wait for public review of this proposal. Conceptually, it makes sense to harmonize an NEC definition of a building with other NFPA and ANSI documents. Some attention should be given to how this definition affects how power utility tariffs might be written as a consequence of it. As we have seen elsewhere in this code cycle, there is an NEC concept of a building, and then there is a power utility concept of a building. Let's see if public discussion produces new information.

1-56 Log #4502 NEC-P01 **Final Action: Accept in Principle in Part**
(100.Building)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels 3, 4, 5, 9, 12, 13, 14, 15, 16, 18, and 19, the Technical Correlating Committee on Building Code (BLD-AAC), and the Technical Committee on Building Construction for information.

Submitter: Bob Foote, Town of Georgetown / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

Building. ~~A structure that stands alone or that is cut off from adjoining structures by fire walls with all openings therein protected by approved fire doors.~~ <u>A structure, usually enclosed by walls and a roof, constructed to provide support or shelter. Buildings separated by fire walls and adequate opening protectives shall be considered separate buildings.</u>

Substantiation: Note: This proposal was developed by the proponent as a member of the Building Code Development Committee (BCDC) with the committee's endorsement.

The definition of "building" in the NEC uses the term "structure", which is also defined in the NEC. Based on the definition of "structure" in the NEC, a fence could be considered a "building". The replacement definition for "building" is based on the definition found in NFPA 5000, section 3.3.65. The second sentence of the definition is intended to assist in determining when separate electrical distribution is required.

Panel Meeting Action: Accept in Principle in Part

The panel accepts part of the recommended wording to read as follows:

A permanent structure having a roof and walls that stands alone or that is cut off from adjoining structures by fire walls or fire barriers with all openings therein protected by approved fire doors and used to enclose an occupancy."

The panel rejects the wording "and adequate opening protectives shall be considered separate buildings.

Panel Statement: The panel derived the change to this definition from the NFPA Glossary of Terms and Proposals 1-55 and 1-56 to meet the submitter's concerns.

The panel notes that the NFPA Glossary has a preferred definition for "Building" from NFPA 220: "A permanent structure having a roof and walls and used to enclose an occupancy."

The panel does not accept the addition of the wording "and adequate opening protectives shall be considered separate buildings" because it contains a requirement.

The panel requests that the Technical Correlating Committee refer this proposal to NFPA Technical Committees of 220 and 5000, and also to all NEC Code-Making Panels where the defined term is used.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ANTHONY, M.: Please refer to statement in Proposal 1-55.

6-4 Log #3470 NEC-P06 **Final Action: Reject**
(100.Cable (New))

Submitter: David G. Humphrey, Midlothian, VA

Recommendation: Add text to read as follows:

<u>Cable. A stranded conductor (single-conductor cable) or a combination of conductors insulated from one another (multiple conductor cable).</u>

Substantiation: The term "single conductor cable" is used in this code especially in Article 392. Article 100 has not defined what constitutes a "single conductor cable" since the 1940 edition of the NEC. There is often some user confusion between the term single conductor cable, single conductor, cable assembly etc. This definition will make exactly what is and what is not a "single conductor cable" clear.

Panel Meeting Action: Reject

Panel Statement: The proposed definition is wrong. A conductor need not be insulated to be part of a cable. A single conductor may be stranded or solid. In addition, the word being defined may not be used in the definition.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

8-4 Log #219 NEC-P08 **Final Action: Reject**
(100.Cable Tray)

Submitter: Terry Peters, The Society of the Plastics Industry

Recommendation: Revise as follows:

<u>**Cable Tray.** A support designed expressly for holding wires, cables, and raceways with additional functions as permitted in this *Code*. Cable trays include, but are not limited to the following types, ladder, ventilated, ventilated channel, ventilated trough, solid bottom, solid bottom with solid metal cover, solid channel, steel, aluminum, metallic and nonmetallic.</u>

Substantiation: The term "cable tray" is used throughout the code without a definition. It should be defined. The definition of "raceway" was used as a model in developing this definition.

Panel Meeting Action: Reject

Panel Statement: The definition of a cable tray is included in Section 392.2, the Article that covers cable tray. Adding a definition in Article 100 will not add clarity to the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-5 Log #217 NEC-P08 **Final Action: Reject**
(100.Cable Tray System (New))

Submitter: Terry Peters, The Society of the Plastics Industry

Recommendation: Add new text to read:

<u>**Cable Tray System.** A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.</u>

Substantiation: The term "cable tray system" is used in multiple articles but the definition is in Article 392. The style manual requires that a definition be placed in Article 100. The NEC style manual states:

"2.2.2.1 Article 100. In general, Article 100 shall contain definitions of terms that appear in two or more other articles of the *NEC*."

Panel Meeting Action: Reject

Panel Statement: NEC Style Manual 2.2.2.1 allows the definition to be in Article 392. "Cable tray" is not a generic term, it is a product and the definition more appropriately remains in Article 392 where the rules of installation appear.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

5-7 Log #3640 NEC-P05 **Final Action: Reject**
(100.Common Neutral (New))

Submitter: Donald A. Ganiere, Ottawa, IL

Recommendation: Add new text to read as follows:

<u>Common Neutral. A neutral conductor used in a circuit with two or more ungrounded conductors having no potential between them.</u>

Substantiation: The term common neutral is used in Articles 215 and 225. It is not defined in either article and the term needs to be defined for proper understanding of the code rules.

Panel Meeting Action: Reject

Panel Statement: The proposed definition does not add any clarity to the use in those sections cited in the substantiation. The proper usage of a common neutral is adequately covered in 215.4 and 225.7(B). Section 215.4 deals with multiple feeder circuits using one neutral and is not one circuit as implied in the proposed definition.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

6-5 Log #4723 NEC-P06 **Final Action: Reject**
(100.Compact Stranding)

Submitter: Jerry Lee Richardson, ESG

Recommendation: Add the following text to Article 100 as follows:

<u>**Compact Stranding.** Stranded conductor which has been compressed in manufacture to reduce voids.</u>

In Table C.1(A), Table C.2(A), Table C.3(A), Table C.4(A), Table C.5(A), Table C.6(A), Table C.7(A), Table C.8(A), Table C.9(A), and Table C.10(A) delete the following text:

~~Definition: Compact stranding is the result of manufacturing process where the stranded conductor is compressed to the extent that the interstices (voids between strand wires) are virtually eliminated.~~

A companion proposal has been sent to CMP-8 relative to Annex C.

Substantiation: Definitions duplicated in ten tables will be replaced by a single definition in Article 100.

Panel Meeting Action: Reject

Panel Statement: This definition is not necessary in Article 100 based on the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
PICARD, P.: The proposed definition does not add clarity, nor does it adequately define "compact stranding".

8-6 Log #4723a NEC-P08 **Final Action: Reject**
(100.Compact Stranding)

Submitter: Jerry Lee Richardson, ESG
Recommendation: Add the following text to Article 100 as follows:
Compact Stranding. Stranded conductor which has been compressed in manufacture to reduce voids.
In Table C.1(A), Table C.2(A), Table C.3(A), Table C.4(A), Table C.5(A), Table C.6(A), Table C.7(A), Table C.8(A), Table C.9(A), and Table C.10(A) delete the following text:
~~Definition: Compact stranding is the result of manufacturing process where the stranded conductor is compressed to the extent that the interstices (voids between strand wires) are virtually eliminated.~~
A companion proposal has been sent to CMP-6 relative to the definition.
Substantiation: Definitions duplicated in ten tables will be replaced by a single definition in Article 100
Panel Meeting Action: Reject
Panel Statement: This definition is applicable to the use and understanding of the tables in Annex C relative to compact stranding. A reference back to Article 100 would need to be included at each table making the relocation proposed not user friendly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-57 Log #202 NEC-P01 **Final Action: Reject**
(100.Concealed (as applied to wiring methods))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
"Concealed (as applied to wiring methods). Rendered inaccessible by the structure or finish of the building wires. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them."
Substantiation: The definition of "concealed" needs to be clarified to show that it applies to wiring methods because applying the current definition of concealed to the term "concealed space: can lead to confusion. "Concealed space" is defined in the NFPA Glossary as "That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, attics, and in whose size might normally range from 44.45 mm (1 3/4 in.) stud spaces to 2.44 m (8 ft) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting."
Panel Meeting Action: Reject
Panel Statement: The proposal is unnecessary. Without exception, all references to "concealed" in the NEC are clear under the existing definition.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-58 Log #114 NEC-P01 **Final Action: Reject**
(100.Concealed Space)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add definition to read as follows:
Concealed Space. That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, attics, and in whose size might normally range from 44.45 mm (1 3/4 in.) stud spaces to 2.44 m (8 ft) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting. [NFPA 96:3.3.42.1].
Substantiation: The term concealed space is used in 320.30(D)(1), 330.30(D)(1), 332.30(B), 334.30(B), 348.30(A), 350.30(A), 376.10(2), 604.4, 760.53(A)(1), 760.130(B)(1), 770.154(A), 800.154(A) and 820.154(A). This definition is an extract from NFPA 96, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations. It is the only definition of concealed space in the NFPA Glossary.
Panel Meeting Action: Reject
Panel Statement: Adding the definition of "Concealed Space" from the NFPA Glossary of terms would add confusion and possibly create a less restrictive code requirement. The code sections noted by the submitter are intended for spaces that are rendered inaccessible by the structure or finish of the building. If the definition of "Concealed Space" were added to the NEC, it would allow suspended ceilings and attic spaces to be considered concealed spaces. This, in turn, would allow the installation of unsupported cables in such spaces. See "Securing and Supporting" requirements in several cable wiring method articles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-59 Log #200 NEC-P01 **Final Action: Reject**
(100.Concealed Space, Nonconcealed Space, FPN)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
Concealed Space. That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, attics, and in whose size might normally range from 44.45 mm (1 3/4 in.) stud spaces to 2.44 m (8 ft) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting. [NFPA 96:3.3.42.1]
Nonconcealed space. That portion of a building that is not a concealed space.
Substantiation: Sections 320.30(D)(1), 330.30(D)(1), 332.30(B), 334.30(B)(1), 348.30(A) Exception No. 1, 350.30(A) exception No. 1, 376.10(2), 604.4 Exception No. 1, 760.53(A)(1), 760.130(B)(1) deal with wiring in concealed spaces.
Sections 725.154(E)(3), 800.154(C)(3) and 820.154(C)(3) have application requirements for cables in nonconcealed spaces.
Although the terms are widely used, neither concealed spaces nor nonconcealed spaces are defined in the NEC. Utilizing the definition of "concealed" in Article 100 to understand a "concealed space" leads to a misunderstanding of what concealed and nonconcealed spaces are. I have also submitted a proposal to clarify that the definition of "concealed" in Article 100 applies only to wiring methods.
Panel Meeting Action: Reject
Panel Statement: The submitter has not identified a problem or stated how the problem would be resolved by adding the definition. The proposal does not satisfy 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
The word "nonconcealed" implies not a concealed space. The prefix "non" means "not", such as nonmetallic, nonfusible, nonlinear, noncombustible, etc.
See the panel action and statement on Proposal 1-58.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-22 Log #1819 NEC-P09 **Final Action: Reject**
(100.Conduit Body)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first paragraph and substitute: A fitting that provides access to enclosed conductors through a removable cover(s) and is provided with one or more hubs for connection to a wiring method or equipment.
Substantiation: Edit. A conduit body is not necessarily part of a conduit or tubing system. They may be used with cables, cords, or open conductors.
Panel Meeting Action: Reject
Panel Statement: Although a cord might enter a conduit body, the conduit body (if properly used) will be attached to a raceway at another end. Therefore the use described in the substantiation agrees with the definition, and no change is warranted. In addition, the usage of the term 'fitting' is inconsistent with existing product standards.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-12 Log #2007 NEC-P02 **Final Action: Reject**
(100.Connected Load (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows: Connected Load. Electrical equipment that requires current and power (watts or volt-amperes) for its intended function(s) and supplied by an attachment plug and cord or direct connection to supply circuit conductors. A receptacle, cord connector body, or flanged surface outlet is not considered a connected load.
Substantiation: The Code refers to connected load and calculated load without distinction. Some loads are calculated without an actual load being connected, which infers a distinction.
Panel Meeting Action: Reject
Panel Statement: The term "connected load" is well understood and no further clarification is needed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-13 Log #3277 NEC-P02 **Final Action: Reject**
(100.Continuous Load)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
A load other than a motor(s) where the ~~maximum~~ current is ~~expected~~ likely to be continuous for 3 hours or more
Substantiation: Edit. Motor load should be excluded so the 25 percent ampacity factor for continuous load should not be in addition to the 25 percent factor for most motor loads. I have submitted several proposals that will apply the 25 percent factor only to the largest of the largest motor or continuous load which is sufficient to allow for temporary overload or heating effect of continuous load at terminals and overcurrent devices, which are not likely to be simultaneous which will remove what is in effect a double derating. A sign or lighting circuit load where the current is cycled on and off for part of the load

at intervals less than 3 hours will not be a continuous load since the maximum current is not continuous for 3 hours.
Panel Meeting Action: Reject
Panel Statement: Continuous loads are irrespective of the load type. The same requirements should apply to all continuous loads.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-4 Log #1929 NEC-P18 **Final Action: Reject**
(100.Cord Connector (Body))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: CORD CONNECTOR (BODY). A contact device connected to a flexible cord or cable for the attachment of a plug cap or flanged surface inlet.
Substantiation: There is no definition for this device as there is for plug cap and receptacle.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

No definitive substantiation has been provided that a definition is required or necessary.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

1-60 Log #1451 NEC-P01 **Final Action: Reject**
(100.Disconnecting Means)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

~~A~~ An identified device or group of devices or other identified means by which the conductors of a circuit or equipment can be ~~disconnected~~ isolated from their source of supply.
Substantiation: The device(s) should be suitable for the use; i.e., voltage, current, number of poles, etc. All means of disconnect may not be suitable such as plug/receptacle, terminal lugs, wire connectors, links, etc.
Panel Meeting Action: Reject
Panel Statement: The proposed definition contains the requirement "identified" that is not permitted by 2.2.2. of the NEC Style Manual.

Not all disconnecting means are required to be identified.

No substantiation was provided for inserting "or equipment", or for changing "disconnected" to "isolated".

The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-61 Log #3263 NEC-P01 **Final Action: Reject**
(100.Disconnecting Means)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:

A device, or group of devices, or other means, identified for the purpose with provisions for manual external operation by which a conductor(s) or equipment or both can be disconnected...
Substantiation: Many devices can be a means of disconnection which may not be suitable such as terminal lugs, wire connectors, screws, limit switches, pressure switches, temperature switches, proximity switches, et. Many sections do not indicate a specific type of disconnecting means, and if they do this definition is then modified. This definition does contain requirements as do many definitions, but not in the sense they are Code "rules"; this distinction should be made clear in the Style Manual.
Panel Meeting Action: Reject
Panel Statement: As the submitter of this proposal has noted, the NEC Style Manual Section 2.2.2, prohibits definitions from containing requirements or recommendations.

As proposed, the disconnecting means would need to be identified and externally operable.

In addition, the revised definition would be overly restrictive by requiring that all disconnecting means have "provisions for manual external operation."

This would prohibit disconnecting means from being installed behind covers or electrically actuated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-62 Log #1502 NEC-P01 **Final Action: Reject**
(100.Disconnecting Means Capable of Being Locked in the Open (Off) Position (New))

Submitter: Edward G. Kroth, Verona, WI
Recommendation: Add new text to read as follows:

Disconnecting Means Capable of Being Locked in the Open (off) Position. A disconnecting means is said to be capable of being locked in the open (off) position when the provisions for locking or adding a lock to the disconnecting means remains in place at the switch or circuit breaker whether the lock is installed or not. Note that portable means for adding a lock to the switch or circuit breaker do not meet the standard of this definition and shall not be permitted.
Substantiation: If this definition is accepted, then it would allow the elimination of similar sentences from approximately 27 sections in Chapters 4, 5 and 6. For example, in 430.102(B) Exception the entire 2nd sentence could be removed. Also, as a further example, in Part VI of Article 620 similar sentences could be eliminated five different times in just two pages of NEC text. I realize that the NEC does not need to read like a novel, but I see no reason why needless boring repetition cannot be removed if a simple new definition can suffice. This falls in line with other recent moves towards usability.
Panel Meeting Action: Reject
Panel Statement: The term "disconnecting means" is currently defined in the NEC. Adding an additional definition that is modified by the use of additional text would likely cause confusion for the code user. The proposed definition also includes requirements or recommendations that are in violation of the NEC Style Manual Section 2.2.2.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-63 Log #1560 NEC-P01 **Final Action: Reject**
(100.Disconnecting Means, Lockable (New))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Add a new definition as follows:

Disconnecting Means, Lockable. A disconnecting means with provisions for being locked in the open position by either a keyed or combination lockout device in which the provision for applying the lockout device remains in place on the disconnecting means and the disconnecting means remains operable until the lockout device is applied.
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
Panel Meeting Action: Reject
Panel Statement: The proposed definition contains multiple requirements, which contradicts 2.2.2. of the NEC Style Manual.

This issue is best handled in other Articles such as Article 110, for example.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-64 Log #768 NEC-P01 **Final Action: Reject**
(100.Distribution Equipment (New))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Add text to read as follows:

Distribution Equipment. Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that monitors or controls the flow of electricity.
Substantiation: By removing the list from 110.16, naming it, and relocating it in Article 100, we now have a term we can use when we are discussing this category of equipment. As such, all distribution equipment will have to follow the rules for equipment, but not all equipment will have to follow the rules for distribution equipment.
Panel Meeting Action: Reject
Panel Statement: The term "Distribution Equipment" is generally used in Chapters 5, 6, 7 and 8. In other code articles the term is used in the context to designate similar equipment, such as switchboards and panelboards.

The definition may be more appropriately defined within the given Articles based on the context of its use. In addition, not all distribution equipment is intended to monitor or control the flow of electricity. For example, distribution equipment used in theaters and television studios or network-powered broadband communication systems may not necessarily monitor or control the flow of electricity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-65 Log #769 NEC-P01 **Final Action: Reject**
(100.Distribution Equipment (New))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:

Distribution Equipment. Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, motor control centers, bus plugs, enclosed disconnect switches, enclosed circuit breakers, and transfer switches that monitors or controls the flow of electricity.
Substantiation: By adding these additional items, we help clarify the type of equipment which falls in this category. See my proposed definition - Distribution Equipment.

This will help us to describe this type of equipment and the special precautions this equipment requires compared to other types of equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-64.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

14-3 Log #1269 NEC-P14 **Final Action: Reject**
(100.Dusttight)

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
Article 100 Definitions
Dusttight. Constructed so that dust will not enter the enclosing case under specified test conditions.
<u>FPN. See ANSI/ISA-12.12.01-2000, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Division 1 and 2 Hazardous (Classified) Locations.*</u>
Substantiation: A definition of a term that can be further clarified in another standard or publication as stated in 90.5(C), should include that information in a FPN. We have also submitted a proposal to delete repeated definitions and FPN's in 500.2.
Panel Meeting Action: Reject
Panel Statement: This term is used in places other than Chapter 5, where the ISA standard is not the appropriate reference standard. CMP-14 notes that the substantiation reference to 90.5(c) is inappropriate, because it does not state that one can use an FPN to further define the term.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

(Note: Sequence 14-4 was not used)

2-14 Log #52 NEC-P02 **Final Action: Accept**
(100.Dwelling Unit)

Note: This Proposal appeared as Comment 1-28 on Proposal 1-27 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-27 was:
Revise text to read:
Dwelling Unit. One or more rooms arranged for ~~the use of one or more individuals living together, providing~~ complete, independent <u>housekeeping purposes, with space for</u> ~~living facilities, including permanent provisions for living;~~ <u>eating, living, and</u> sleeping, ~~eating,~~<u>; facilities for</u> cooking, and <u>provisions for</u> sanitation.
Submitter: Timothy M. Croushore, Allegheny Power
Recommendation: Please reject the original proposal.
Substantiation: The proposed statement in the substantiation that "the definition does not change the intent of any of the codes..." is not correct. Rather, adding the new term "housekeeping purposes" introduces a new concept that is not currently in any of the NFPA standards. Deleting the term "permanent provisions for..." eliminates a long standing clarification for cooking between a portable microwave oven and an installed cook-top in a counter top. Also, the revised definition would now have all guest rooms of hotels and motels and college dormitories as dwelling units. The revised definition does not add clarity to the definition of dwelling unit. Rather, it changes the definition.
Panel Meeting Action: Accept
Panel Statement: The definition of dwelling unit remains as defined in 2008 NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-66 Log #4770 NEC-P01 **Final Action: Reject**
(100.Dwelling, Multifamily)

Submitter: William Benard, Gemini Electric Inc.
Recommendation: Revise text to read as follows:
Dwelling, Multifamily. A building that ~~contains~~ <u>consists solely</u> <u>of</u> three or more dwelling units <u>or other occupancy elements related exclusively to the three or more dwelling occupancies.</u>
Substantiation: The definition of "Dwelling, One-Family" and "Dwelling, Two-Family" include the word: "solely", which excludes any other entity to be within the "buildings" defined. The definition of "Dwelling, Multifamily" does not include such specificity. It can therefore be construed that a "Dwelling, Multifamily" may include other elements of occupancy as long as it contained the minimum "three or more dwelling units." It would therefore be possible for a building with multiple mercantile enterprises to be included within a structure defined as "Dwelling, Multifamily" as long as the building contained three or more dwelling units. This becomes an issue when the term "Multifamily" is employed in section 334.10(2) and 334.12(2) as a means to limit the identified use of a wiring method due to the specific use or purpose of a building. The term "solely" needs to be added to the definition with the option to include ancillary occupancies to a "Dwelling, Multifamily" such as a common meeting room with appurtenant kitchen, exercise rooms, a pool, or spa intended for the exclusive use of the tenants. The extra occupancies would then be included within the scope of "solely". The addition of "<u>or other occupancy elements related exclusively to the three or more dwelling occupancies</u>" would recognize the ancillary elements and still consider the building as "Dwelling, Multifamily."
Panel Meeting Action: Reject
Panel Statement: The existing definition is the preferred definition in the NFPA Glossary of Terms. The definition is used in NFPA Standards 30, 70 and 73, and a similar definition is used in NFPA 72.
The proposed definition would also restrict multifamily dwelling to dwelling units (occupancies) only. This would generally prohibit other types of occupancies within the building or structure. For example, a high-rise condominium building (multifamily dwelling) would be prohibited from having other occupancies, such as retail or assembly occupancies, or a parking garage.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-67 Log #706 NEC-P01 **Final Action: Reject**
(100.Effective (New))

Submitter: Billie Van Duyne, I.B.E.W. Electrician/Apprentice Instructor
Recommendation: Add new text to read as follows:
<u>Effective. An installation that facilitates the proper operation of the device(s) and utilization equipment within a given circuit or installation. Producing the desired effect, by taking in account for low impedance, ability to safely carry the maximum currents present, proper ratings for the device(s) for the condition(s) present, proper rating(s) for the utilization equipment(s) for the condition(s) present as well as current and voltage supplied at the utilization equipment(s).</u>
Substantiation: Realizing that the code is not intended to be a training manual for the untrained person(s), often the craftsperson needs to be reminded of what is involved when properly installing a circuit, conduit run, grounding system, etc.
Each installation is different in the field, but to be effective, things like voltage drop, available fault currents, atmospheric conditions, component short circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the circuit-protective devices used to clear a fault to do so without extensive damage to the electrical components of the circuit. (110.10).
The term "effective" could be used throughout the code to emphasize what is involved with an installation, which can be best determined by the craftsperson present.
Panel Meeting Action: Reject
Panel Statement: The proposed new term is too limiting for broad use in the code -- for example, the term "installation" is used in the definition, but there are other places in the code where the word "effective" is used that do not apply to installations.
The term "effective" is used throughout the code in different contexts.
The need for the proposed definition in Article 100 is not substantiated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-15 Log #3550 NEC-P02 **Final Action: Reject**
(100.Electrical Fault Circuit Interrupter (EFCI) (New))

Submitter: Steven R. Montgomery, 2D2C Inc.
Recommendation: Add new text to read as follows:
<u>Electrical Fault Circuit Interrupter (EFCI). A device intended for the protection of personnel, receptacles, utilization equipment, and cords. The EFCI functions to de-energize the outlet when current or supply voltage is outside established safe limits.</u>
Substantiation: A definition of an Electrical Fault Circuit Interrupter (EFCI) is needed to describe this fire prevention technology presently manufactured by multiple suppliers and under consideration for adoption in several places elsewhere in NFPA 70.
Note that multiple sister proposals have been submitted as a new 210.13, 210.50(C), 406.3(D)(4) and 550.13(A)(4).
Panel Meeting Action: Reject
Panel Statement: There are no product requirements for EFCI protection. The FFIs submitted by CSA and Intertek appear to be test programs designed by the product manufacturer. They conclude that safe plug performs as specified by the manufacturer. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-16 Log #2953 NEC-P02 **Final Action: Reject**
(100.Electrical-Fault Circuit-Interrupter (EFCI) (New))

Submitter: Fred W. Brown, HI Electron
Recommendation: Add a new definition: Electrical-Fault Circuit-Interrupter (EFCI). A contact device intended for the protection of personnel, utilization equipment, and cord(s). The EFCI is de-energized without a connected output, and functions to de-energize the outlet when utilization equipment and cord(s) exceeds their rated current or when the supply voltage is outside established safe limits.
Substantiation: Electrical-Fault Circuit-Interrupter (EFCI) senses a lower level of fault and overload current conditions than branch circuit protection devices and AFCIs. The article "Stop Fires Before They Start by Steve Montgomery" points out that EFCI provide protection against over and under voltage, open neutral conductors, high resistance connections, damage wiring, overloading of small appliance cords, etc. that branch circuit overcurrent protection devices and AFCIs might not protect against. Even with the increased sensitive the EFCI they will not be a cause of nuisance tripping. EFCI detect a potential cause of electrical fires and safely segregate it.

Electrical-Fault Circuit-Interrupter (EFCI) uses a relay to normally disconnect electricity at the receptacle sockets. EFCI only turns electricity on at the socket when it detects the insertion of an electrical plug. The detection mechanism is an RFID tag embedded in a device plug or attached to the face of a device plug that complies with the Right Plug standard.

This definition should be included in Article 100 if EFCI proposals are accepted.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-15.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-68 Log #1323 NEC-P01 **Final Action: Reject**
(100.Enclosed)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:

Surround by a case, housing, or walls that prevents or minimizes the likelihood of accidental contact with energized parts or to protect equipment from physical damage.
Substantiation: Enclosures do not always prevent accidental contact, otherwise no one would ever be shocked at an enclosed switch, and fences do not always deter people as witnessed by electrocutions of those who climb into high-voltage substations. Enclosures can also prevent or minimize contact by animals.
Panel Meeting Action: Reject
Panel Statement: Entrance through or around a fence and removal of a cover are actions that defeat the safeguards built into the enclosure.

An enclosure such as a housing, fence, or wall, does prevent accidental contact with energized parts, although it may not prevent any possible contact with such parts.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

LABRAKE, JR., N.: I am voting with the panel action and am noting that during the panel discussion of this proposal, the issue of enclosures also providing equipment protection was raised. The following is proposed as an alternate that addresses this question:

Enclosed. Surrounded by a case or housing, fence, or wall(s) designed to protect the contained equipment and limit the likelihood, under normal conditions, of dangerous approach or accidental contact by persons or objects. ~~That prevents persons from accidentally contacting energized parts.~~

1-69 Log #3258 NEC-P01 **Final Action: Reject**
(100.Enclosed)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

Surrounded by a case, housing, fence, or wall(s) that prevents persons, animals, or objects from accidentally contacting energized parts.
Substantiation: Edit. Animals and objects should be included. Objects are included in the definition of Guarded.
Panel Meeting Action: Reject
Panel Statement: It is unreasonable to expect an enclosure to prevent all animals from coming into contact with energized parts (mice for instance).

The submitter has not substantiated a problem with the existing definition, or how the proposed definition alleviates the problem. This does not satisfy 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

The panel does not agree with the submitter that the recommended change is editorial.

See the panel action and statement on Proposal 1-4.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

MCMAHILL, L.: Generally, all life forms should be afforded reasonable protection from accidentally contacting energized parts. In addition, material things (objects) should be included in the definition. The panel should have revised the definition as follows: Surrounded by a case, housing, fence, or wall(s) that prevents ~~persons from~~ accidentally contacting energized parts.

1-69a Log #3443 NEC-P01 **Final Action: Reject**
(100.Engineering Supervision (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Add the following definition to Article 100:
Engineering Supervision: Technical oversight by an engineer in charge having practical skills for applying scientific principles and practices in the design, construction, maintenance, operation and performance of an installation, equipment, or system.
FPN: By law, many governmental jurisdictions require engineers to be licensed in order to practice to demonstrate their professional service to the protection of public health, safety, and welfare. Engineering Supervision of a structure, equipment, or system installation begins with the initial engineering design, continues with construction and establishment and overseeing of on-going operation and maintenance, and ends with final retirement and removal.
Substantiation: EEI recognizes the need for the term "engineering supervision" to be defined for consistent and uniform application of its meaning used throughout the NEC in articles such as 240, 250, 310, 500, 501, 505, 625, and 708. This is also provided in response to public need as shown in proposals and comments documented in the A2007 NEC ROP and ROC.

Having an engineer overseeing the installation and maintenance of an installation does not eliminate common practice of having technical persons perform and oversee portions of the work according to their individual expertise. All it means is that they will be working under the oversight of an engineer. This brings the NEC in compliance with existing state law and provides an opportunity for the engineer to verify that the correct persons are overseeing each portion of a project.
Information is added in the form of a fine print note relative to what constitutes "expertise" and establishment of credentials and the nature of engineering from beginning to end of a structure, equipment, or system installation.
Panel Meeting Action: Accept in Principle in Part

The panel Accepts in Principle the proposed definition and Rejects the proposed Fine Print Note.
Panel Statement: The panel Accepts in Principle the definition of "Engineering Supervision". See the action taken on Proposal 1-71.

The panel Rejects the FPN because it contains requirements in violation of 3.1.3 of the NEC Style Manual and is unnecessary as it does not enhance clarity or usability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 6 Negative: 6
Explanation of Negative:

FISKE, W.: Engineering Supervision is highly situational, and as such does not lend itself to definition. Although the definition accepted by CMP-1 (contained in proposals 1-70 and 1-71) is satisfactory for many situations, there are also many instances of engineering supervision that do not meet the proposed definition. CMP-1 should have given more credence to the comments made by CMP-14 in rejecting a proposed definition of Engineering Supervision in the 2008 Code cycle. Those comments are in the substantiation for 2011 proposals 1-264 and 1-270.

HICKMAN, P.: We are not sure what "technical oversight" means or what "thoroughly familiar with scientific principles" means as it relates to design, construction, maintenance, operation and performance of an installation, equipment or system. We conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.

HITTINGER, D.: This proposal should be rejected. See my comments on proposal 1-71.

LABRAKE, JR., N.: Proposal 1-69a should have been Accepted-in-Principle with the following revised text:

Engineering Supervision: The technical oversight by an individual having practical skills for applying scientific principles and practices in the design, construction, maintenance, operation and performance of an installation, equipment, or system.
Advisory Note: By law, many governmental jurisdictions require individuals to be licensed in order to practice to demonstrate their professional service to the protection of public health, safety, and welfare.

The Edison Electric Institute recognizes the need for the term "engineering supervision" to be defined for consistent and uniform application of its meaning used throughout the NEC in such articles as 240, 250, 310, 500, 501, 505, 625, and 708. This is also provided in response to public need as shown in proposals and comments documented in the A2007 NEC ROP and ROC.

This brings the NEC into harmony with the laws of many states and provides an opportunity for an engineer to verify that the correct persons are overseeing each portion of a project.

However, in the definition accepted by the Panel, specific text is needed for what is meant by term "thoroughly familiar with" relative to the other terms.

Also, in the proposed text in this Comment, information is contained in the Advisory Note relative to what constitutes "expertise" and establishment of credentials and the nature of engineering from beginning to end of a structure, equipment, or system installation.

MONIZ, G.: See NEMA's statement on Proposal 1-71.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

Comment on Affirmative:

MCMAHILL, L.: The panel should note that with the use of the word "engineer" in the definition it would have contained a requirement.

1-70 Log #459 NEC-P01 **Final Action: Reject**
(100.Engineering Supervision (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Lanny G. McMahill, Phoenix, AZ

Recommendation: Add new definition to Article 100 as follows:

Engineering Supervision: Technical oversight by one thoroughly familiar with scientific principles and practices in the design, construction, maintenance, operation and performance of an installation, equipment or system.

Substantiation: The term engineering supervision is used in several NEC Articles; yet, it is not defined in the NEC. This proposal is intended to provide a definition for the term and to support the work of the NEC Task Group that generated the proposed definition. The need exist to define this term to clarify the intended use in the NEC. The proposed definition as worded clarifies that engineering supervision is technical oversight by someone well versed in engineering principles and practices as it relates to the design, construction, maintenance, etc. of an installation, equipment or system.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 7 Negative: 5

Explanation of Negative:

FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).

HICKMAN, P.: We are not sure what "technical oversight" means or what "thoroughly familiar with scientific principles" means as it relates to design, construction, maintenance, operation and performance of an installation, equipment or system. We conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.

HITTINGER, D.: This proposal should be rejected. See my comments on proposal 1-71.

MONIZ, G.: See NEMA's statement on Proposal 1-71.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

Comment on Affirmative:

LABRAKE, JR., N.: I am voting with the panel action where it is agreed the definition is needed in Article 100. However, this proposal should be <u>Accepted-in-Principle</u> for other text to be considered. Refer to my ballot statement on Proposal 1-69a.

1-71 Log #528 NEC-P01 **Final Action: Reject**
(100.Engineering Supervision (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Technical Correlating Committee on National Electrical Code®,

Recommendation: Add new text to read as follows:

<u>Engineering Supervision: Technical oversight by one thoroughly familiar with scientific principles and practices in the design, construction, maintenance, operation and performance of an installation, equipment or system.</u>

Substantiation: This proposal was developed by a Task Group formed at the direction of the NEC Technical Correlating Committee to review the term "Engineering Supervision". The Task Group members were: James T. Dollard, Jr. (CMP 10), H. Landis Floyd, II (CMP 1), G. W. Kent (CMP 6), Robert L. LaRocca (CMP 2), Lanny G. McMahill (CMP 1), Gil Moniz (CMP 1), Gregory J. Steinman (CMP 5) and Mike O'Meara (CMP 14).

The Task Group found that the term "Engineering Supervision" appeared in more than two articles of the NEC and in accordance with Section 2.2.2.1 of the NEC Style Manual adding a definition in Article 100 is appropriate and will be of assistance to the Code User. Although the term is used in several Articles, the degree of supervision and the qualifications for those performing "engineering supervision" may differ from Article to Article, but the concept remains the same. The one performing "engineering supervision" has technical oversight and must be thoroughly familiar with scientific principles and practices in the design, construction, maintenance, operation, and performance of an installation, equipment or system. The proposed definition provides the basis for this concept and allows each Code Making Panel using the term to determine the degree of oversight and the qualifications necessary.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 7 Negative: 5

Explanation of Negative:

FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).

HICKMAN, P.: We are not sure what "technical oversight" means or what "thoroughly familiar with scientific principles" means as it relates to design, construction, maintenance, operation and performance of an installation, equipment or system. We conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.

HITTINGER, D.: This proposal should be rejected. There are many terms used in two or more articles in the Code that are not defined because they are well understood. The concept of adding a general definition for "engineering supervision" was explored during the 2008 Code cycle and even though this definition is not the same content as what was submitted during that cycle, the majority of the Code Making Panels that would be affected by a global definition in Article 100 did not agree with this concept.

Some of the wording in this definition like "Technical oversight" and "thoroughly familiar with scientific principles" as it relates to design, construction, maintenance, operation and performance of an installation, equipment or system is too broad for article 100 and not enforceable. The extent that the term "engineering supervision" is used throughout the Code may have many different implications.

MONIZ, G.: See NEMA's statement on Proposal 1-71.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

Comment on Affirmative:

FLOYD, H.: I agree with the definition, but would have rather seen "engineering" instead of "scientific". Perhaps the requirement not to use the term being defined in the definition is what prevented "engineering" from being used. However, the panel should reconsider if the intent of the Style Guide requirement prohibits the use of "engineering principles", and permits the definition as shown below:

"**Engineering Supervision:** Technical oversight by one thoroughly familiar with the ~~scientific~~ <u>engineering</u> principles and practices in the design, construction, maintenance, operation and performance of an installation, equipment, or system."

LABRAKE, JR., N.: I am voting with the Panel Action where it is agreed the definition is needed in Article 100. However, this proposal should be Accepted-in-Principle for other text to be considered. Refer to my ballot statement on Proposal 1-69a.

1-72 Log #612 NEC-P01 **Final Action: Reject**
(100.Engineering Supervision (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new definition:
Engineering Supervision. The direct work by, or under the direct supervision of a qualified, licensed, professional engineer who is engaged primarily in the design or maintenance of electrical installations.
Substantiation: The term "Engineering Supervision" is used many places throughout the Code. Per the Style Manual the term should be included in Art. 100. Ref. Style Manual Section 2.2.2.1: "Article 100. In general, Article 100 shall contain definitions of terms that appear in two or more other articles of the NEC."
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 1-71, which meets the intent of the submitter.
Definitions shall not contain requirements as indicated in 2.2.2. of the NEC Style Manual.
No substantiation was provided to introduce the words "qualified, licensed, professional engineer".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 5
Explanation of Negative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.
HITTINGER, D.: See my comments on Proposal 1-71.
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.
Comment on Affirmative:
LABRAKE, JR., N.: I am voting with the panel action where it is agreed the definition is needed in Article 100. However, other text needs to be considered, refer to my ballot statement on Proposal 1-69a.

1-73 Log #770 NEC-P01 **Final Action: Reject**
(100.Equipment)

TCC Action: The Technical Correlating Committee disagrees with the panel statement.
Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
Equipment. A general term, including ~~material~~, conductors, cables, raceways, boxes, fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as part of, or in connection with, an electrical installation.
Substantiation: By removing the word "material" and replacing it with "conductors, cables, raceways, boxes", we now have a solid definition of what material is. This is just one step in my attempt to change the definition of equipment into something that is clearly understood and defined by other terms in Article 100. Please see my additional changes for this definition.
Panel Meeting Action: Reject
Panel Statement: The proposed changes to the term are too limiting for broad use in the code. Conductors and cable are wiring rather than equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
BARRIOS, L.: The panel action should have been to Accept in Part, accepting the deletion of the word "material" and not accepting the remainder of the proposal. The term "material" is too vague and should not be considered as "equipment". For example, pulling compound used to simplify pulling conductors and cable through a conduit could be referred to as material used in the electrical installation, but I'm not sure the compound could be referred to as "equipment".
MCMAHILL, L.: This proposal should have been accepted. The submitter was simply trying to provide examples of "equipment". The word "material" is not the best example of "equipment" as used in the NEC.
Comment on Affirmative:
HICKMAN, P.: We do not necessarily agree with the panel statement.

1-74 Log #771 NEC-P01 **Final Action: Reject**
(100.Equipment)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
Equipment. A general term, including material, fittings, devices, ~~appliances, luminaires, apparatus, machinery,~~ utilization equipment, and the like used as part of, or in connection with, an electrical installation.
Substantiation: By removing the words apparatus and machinery and replacing them with utilization equipment, we now have a list which includes words that are clearly defined in Article 100 (with the exception of material-see my proposal for that change). Since appliances and luminaires are types of utilization equipment, they should be removed to avoid redundancy.
Panel Meeting Action: Reject
Panel Statement: The use of the word "Equipment" in the definition of "Equipment" is not permitted by 2.2.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-75 Log #772 NEC-P01 **Final Action: Reject**
(100.Equipment)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
Equipment. A general term, including material, fittings, devices, appliances, luminaires, apparatus, machinery, service equipment, and the like used as part of, or in connection with, an electrical installation.
Substantiation: By adding the term "service equipment" we show that this is a category of equipment which needs to follow all of the general rules for equipment outlined in the code as well as the particular rules that we have for this special type of equipment.
Panel Meeting Action: Reject
Panel Statement: The use of the word "equipment" in the definition of "equipment" is not permitted by 2.2.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-76 Log #773 NEC-P01 **Final Action: Reject**
(100.Equipment)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
Equipment. A general term, including material, fittings, devices, appliances, luminaires, apparatus, machinery, power production equipment, and the like used as part of, or in connection with, an electrical installation.
Substantiation: By adding the term "power production equipment" (see my proposal for a new definition-power production equipment), we show that this is another category of equipment which needs to follow the general rules for equipment outlined in the code as well as the particular rules that we have for this special type of equipment.
Panel Meeting Action: Reject
Panel Statement: The use of the word "equipment" in the definition of "equipment" is not permitted by 2.2.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-77 Log #774 NEC-P01 **Final Action: Reject**
(100.Equipment)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
Equipment. A general term, including material, fittings, devices, appliances, luminaires, apparatus, machinery, distribution equipment, and the like used as part of, or in connection with, an electrical installation.
Substantiation: By adding the term "distribution equipment" (see my proposal for a new definition-distribution equipment), we show that this is another category of equipment which needs to follow the general rules for all equipment outlined in the code as well as the particular rules that we have for this special type of equipment.
Panel Meeting Action: Reject
Panel Statement: The use of the word "equipment" in the definition of "equipment" is not permitted by 2.2.2 of the NEC Style Manual. The current definition includes distribution equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: The panel should have accepted this proposal in principle. The NEC Style Manual Section 2.2.2 prohibits definitions from containing the term (equipment) being defined. The panel should have followed the submitter's lead by expanding the list of equipment to include the terms "switchboards, panelboards, motor control centers" in lieu of the words "distribution equipment." These equipment terms are clearly defined and understood by industry.

1-78 Log #775 NEC-P01 **Final Action: Reject**
(100.Equipment)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:

Equipment. A general term, including ~~material,~~ conductors, cables, raceways, boxes, fittings, devices, ~~appliances, luminaires, apparatus, machinery,~~ utilization equipment, distribution equipment, service equipment, power production equipment, and the like used as part of, or in connection with, an electrical installation.

Substantiation: Following my recommendations for 5 different changes relating to this definition, as well as 2 new definitions (please see my other proposals), we will end up with this one definition which will clarify what is defined as equipment and allow us to describe rules that relate to all equipment or just one particular category of equipment.
Panel Meeting Action: Reject
Panel Statement: Adding items to a list of examples in a definition does not improve the definition. Adding more examples only raises questions as to why other items that seem to be "equipment" are not included.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

MCMAHILL, L.: The panel should have accepted this proposal in principle by revising the definition to read: "Equipment. A general term, including ~~material,~~ conductors, cables, raceways, boxes, fittings, devices, appliances, luminaires, apparatus, machinery, switchboards, panelboards, motor control centers and the like used as a part of, or in connection with, an electrical installation."

5-8 Log #1720 NEC-P05 **Final Action: Reject**
(100.Equipotential Plane (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel's 17 and 19 for action to decide whether or not the definition should stay in the individual articles or be moved to Article 100.

This action will be considered by the panel as a public comment.
Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Move the existing definition of equipotential plane from 547.2 to Article 100.

Equipotential Plane. An area where wire mesh or other conductive elements are embedded in or placed under concrete, bonded to all metal structures and fixed nonelectrical equipment that may become energized, and connected to the electrical grounding system to prevent a difference in voltage from developing within the plane.

A companion proposal has been submitted to CMP-19 to move the definition in 547.2 to Article 100.
Substantiation: This term is used in Articles 547, 680, and 682 and should be located in Article 100 in accordance with the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: The proposed term is not used in Articles 200, 250, 280, and 285. The use of the term is in articles under the purview of CMPs 17 and 19. The panel recommends that this proposal be referred to those panels for action.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-9 Log #708 NEC-P05 **Final Action: Reject**
(100.Equipotential Plane (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel's 17 and 19 for action to decide whether or not the definition should stay in the individual articles or be moved to Article 100.

This action will be considered by the panel as a public comment.
Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Revise text to read as follows:

Equipotential Plane. An area where wire mesh or other conductive elements are on, embedded in, or placed under the walk surface within 75 mm (3 in.), bonded to all metal structures and fixed nonelectrical equipment that may become energized, and connected to the electrical grounding system to prevent a difference in voltage from developing within the plane.

Substantiation: There are currently two definitions of Equipotential Plane in the NEC that contain slightly different terminology. 547.2 allow wire mesh or other conductive elements to be embedded in or placed under concrete without any dimensions as to where the conductive elements are to be placed and is only applicable if concrete is present. How far below the concrete is still going to create a safe equipotential plane? Where 682.2 will allow wire mesh or other conductive elements to be on, embedded in, or placed under the walking surface within 3 in. This definition is not specific to concrete as a walking surface and provides a prescriptive depth that it is to be installed below the area requiring the equipotential plane.

A common definition would not effect the location where the equipotential plane is required to be installed, because 547.10 and 682.33 still identify the required locations. It would benefit the AHJ by creating one definition for a common term.

I have also submitted proposals to 547.2 (CMP-19) and 682.2 (CMP-17) to delete this definition in those sections.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-8.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

1-79 Log #3138 NEC-P01 **Final Action: Reject**
(100.Exclusive Control (New))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Add new definition of exclusive control to Article 100 as follows.
Exclusive Control. Generally covers installation, ownership, restricted access, operation, and maintenance by qualified and authorized persons.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Restricted Access (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is to add a new term to be used for both the NEC and the NESC intended to correlate the purpose and scope of both documents and clarify its meaning in 90.2(B)(4) and 90.2(B)(5).
Panel Meeting Action: Reject
Panel Statement: The proposed definition does not define the term. It indicates "generally" what is covered; however, is not a definition. The proposed definition does not add clarity or usability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:

LABRAKE, JR., N.: Proposal 1-79 should have been accepted. The panel statement that the definition is not used in two or more Articles is true, but as was discussed in the panel, there is no place in the NEC for the definition of terms used in Article 90 such as in other articles in the XXX.2 section. In addition, refer to my ballot statements on Proposals 1-17 and 1-29 and the substantiation in proposal 1-107 regarding the need for defining this term.

Alternatively, the Panel could consider the proposed term in a new informative Annex discussed in my ballot statement on Proposal 1-12 as follows:

Annex "TBD": "General Information Regarding Utility Electric Supply to Premises Wiring"
2. The following are terms for general understanding of where utility electric supply and premises wiring meet for what is covered and what is not covered by this Code as described in 90.2.

Exclusive Control. Generally covers installation, ownership, restricted access, operation, and maintenance by qualified and authorized persons.
Explanation of Abstention:

ANTHONY, M.: The use of the word "generally" seems to be a problem. The submitter is encouraged to re-craft the sentence so that it succeeds as a definition. "Exclusive control" is a condition of an installation characterized by its ownership, restricted access, and operation and maintenance by qualified and authorized persons.

1-80 Log #3447 NEC-P01 **Final Action: Reject**
(100.Exclusive Control of Utility (New))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Add the following definition of exclusive control of utility to Article 100:
Exclusive Control of Utility. Where energized facilities are separated from public access by a spatial or a physical barrier and accessible only to qualified personnel authorized by the serving utility and where the utility is responsible for connection/disconnection of such facilities to/from energized sources of energy or signals.
Substantiation: This is one action toward resolving the present conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007*.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.
Specifically, the rationale for this change is to add a definition to a term (exclusive control of utility) used in both the NEC and the NESC intended to correlate the purpose and scope of both documents and clarify its meaning in 90.2(B)(4) and 90.2(B)(5). Refer to a companion proposal to revise 90.2(B)(5).
Panel Meeting Action: Reject
Panel Statement: The proposed definition does not add clarity or usability. The submitter provided inadequate substantiation specific to this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: Adequate substantiation has been provided. The proposed definition adds clarity and usability.

1-81 Log #326 NEC-P01 **Final Action: Reject**
(100.Existing (New))

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.
Recommendation: Existing: An installation of cable(s), raceway(s) and/or equipment that has been previously documented as inspected and approved by the Authority Having Jurisdiction.
Substantiation: In an era where electrical installations may be performed by unskilled and unqualified contractors who may not secure the required inspections, there has been a misinterpretation in the term "existing". A property owner, often a new owner, may not be aware that the electrical work has not had the Final approval. Sometimes, even years later the excuse is explained as this work is existing. We need a clear definition of the term "existing" to show work requiring electrical inspections are only existing after it has been approved by the local authority having jurisdiction and not simply through the passing of time.
Panel Meeting Action: Reject
Panel Statement: The proposed definition contains a requirement, in contradiction to 2.2.2 of the NEC Style Manual.
In addition, the proposed new term contains unenforceable language; see 3.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: A definition of "Existing" currently exists in the NFPA Glossary of Terms. The responsible document is NFPA 101 and the definition has a preferred status. Since the term is used but not clearly defined in the NEC, the panel should have accepted this proposal in principle and used the definition from the Glossary of Terms to read: "Existing. That which is already in existence on the date this edition of the Code goes into effect."

14-5 Log #2823 NEC-P14 **Final Action: Accept**
(100.Explosionproof Apparatus)

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
Explosionproof Equipment ~~Apparatus~~. Equipment ~~Apparatus~~ enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.
FPN: For further information, see ANSI/UL 1203-2006~~1999~~, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*
Substantiation: Equipment is a defined term. Apparatus is included within the definition of equipment. Explosionproof equipment is a commonly used language to describe electrical equipment that is explosion protected by use of an explosionproof enclosure. Explosionproof apparatus is not commonly used. Both terms are found in various places within the Code. This proposal removes this inconsistency and is a companion to proposals in 500.2, and 500.7(A).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

1-82 Log #1969 NEC-P01 **Final Action: Reject**
(100.Externally Operable)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: ~~Capable of~~ Having identified permanent provisions for being manually operated without exposing the operator to contact with live parts.
Substantiation: Edit. Present definition designates equipment that can be operated by external remote control circuit as externally operable, which doesn't seem to be the intent.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation does not indicate how the proposal would solve the alleged problem. The proposal does not satisfy 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
The panel also disagrees that this is an editorial change.
The change from "capable" to the requirement of "identified permanent provisions" would contain a requirement which is not permitted per 2.2.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-17 Log #1553 NEC-P02 **Final Action: Reject**
(100.Feeder)

Submitter: Jennie Watkins, I.B.E.W. Local 176/Office Manager
Recommendation: Revise text as follows:
Feeder. All circuit conductors installed between an overcurrent device to an overcurrent device. ~~the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.~~
Substantiation: This would be a simple as well as an accurate definition of a feeder.
The way the definition read before, many installers had the misconception that a feeder had to originate in the service or at a separately derived system, when a feeder could be installed between a sub panel and a fused disconnect.
Panel Meeting Action: Reject
Panel Statement: The submitter's proposed text excludes feeders that originate from the source of a separately derived system. The present code text does include feeders originating at an overcurrent device other than in service equipment and does not need to be modified for further clarification.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-83 Log #3582 NEC-P01 **Final Action: Reject**
(100.Field Installed (Field Installation) (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels 3, 5, 7, 9, 10, 11, 15, 17, 18, and 19 for information.
Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Add new text as follows:
Field Installed (Field Installation). Conductors, devices or equipment intended to be assembled and installed at the final utilization site.
Substantiation: The term "Field Installed" is used in the NEC 13 times and the term "Field Installation" is used twice. Different parts of the electrical industry apply different meanings to the term "field installed" and this can lead to confusion when applying the NEC. From a manufacturer's standpoint, "field installed" can be considered as anything done once a product leaves their factory and could include any additional steps with additions at another manufacturer or distributor before the product actually reached the final point of installation. For example a luminaire manufacturer may consider the installation of flexible whips by a distributor before sale to the contractor as a "field installation". The perspective of a certification-testing laboratory is similar. In reviewing each application in the NEC and the context for each usage of these terms, it is clear that "field installed" or "field installation" is meant only for the actions by the installer at the final installation site. This definition is needed to ensure correct interpretation of this term from a Code perspective since the term has different meanings to different users of the Code.
Panel Meeting Action: Reject
Panel Statement: The proposed definition could have unintended consequences as the term is used in several articles throughout the code and, perhaps, not always intended to mean "assembled and installed" at the final utilization site as proposed.
This definition could also create confusion with the phrase "field-assembled", which is also used throughout the Code. At least one of these terms is used in articles under the purview of the following code-making panels: Panels 3, 5, 7, 9, 10, 11, 15, 17, 18, and 19.

The panel is unaware of any wide confusion in the industry with the general use of these terms and a need for a clear definition. Field-installed (Field installation) is applicable to installation regulated by the NEC.

The panel requests that the Technical Correlating Committee forward this proposal to the above-mentioned panels for information.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

BOYCE, K.: The proposal should be accepted. Adding the proposed definition will enhance the usability of the Code. This definition would provide practical information related to the use of the terms throughout the Code.

HICKMAN, P.: We support the recommendation in the proposal.

18-5 Log #2337 NEC-P18 **Final Action: Reject**

(100.Fixture (New))

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Add the new term "Fixture" to Article 100 for specific use in the NEC as follows: **Fixture.** A manufactured electrical product securely, and usually permanently, attached or appended to a structure or to another electrical product.

Substantiation: The terms "fixture" and "fixture wire(s)" are used in many places in the code, and yet are not defined anywhere in the code, nor is it included in the current definition of "equipment." With the removal of all reference to "fixture" in Article 410, and in consideration of the use that this term is given throughout Article 402 and also (inferentially) in 552.56(E), as two examples, it is now unclear what this term refers to. By accepting this new definition, the column in Table 402.3, with the heading "Application Provisions," as one example, it will be clear to code users where the wire types included in Article 402 may be utilized. And, that is only one clarification possibility of just one article. This proposed change also intends to enhance code enforceability.

Panel Meeting Action: Reject

Panel Statement: Although the submitter points out a problem in correlation, the solution is not in adding the term "fixture" back into the NEC.

CMP-18 requests the TCC forward this proposal and it be circulated to all panels that still have the term "fixture" in the text for which they are responsible.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

1-84 Log #653 NEC-P01 **Final Action: Reject**

(100.Garage)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 14 for information.

Submitter: Samuel J. Goble, Just Good Electrical Code Training

Recommendation: Revise text to read as follows:

Garage. A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, exhibition, ~~or~~, demonstration, or testing and forensic purposes.

Substantiation: Forensic laboratories have advanced to include investigations in vehicles. Government authorities are now building new laboratories to include vehicle bays to perform forensics on vehicles for investigations. In the past, this was done in police garages where this change was not warranted. These vehicles can be dismantled to the frame for investigations. These laboratories will have the same hazards as commercial garages with flammable fuels in the vehicles and should be included in the NEC. Including the word "laboratories" in the garage definition, will include all types of laboratories that do testing and investigations on vehicles.

Panel Meeting Action: Reject

Panel Statement: The submitter's substantiation does not justify including facilities for forensics testing in Article 511, which would be a consequence of this proposal.

The words "kept" and "repair" in the definition already meet the concerns of the submitter.

The panel requests that the Technical Correlating Committee refer this proposal to Code-Making Panel 14 for information.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: This proposal should have been accept in part. The panel should have accepted the addition of the word "testing." Where a garage is used for forensic purposes, and a hazardous (classified) location exists, NEC Chapter 5 - Special Occupancies is applicable. The definition to read: "Garage. A building or portion of a building in which one or more self-propelled vehicles can be kept for use, sale, storage, rental, repair, testing, exhibition, or demonstration purposes."

1-85 Log #1974 NEC-P01 **Final Action: Reject**

(100.General Purpose (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add: GENERAL PURPOSE. Not identified for a specific use or location, such as immersion, embedment, wet location, exposed to weather, hazardous (classified) locations, etc.

Substantiation: "General Purpose" is a phrase used many times in the Code, but undefined. Where this phrase is used, does it exclude a weather proof enclosure installed in a dry interior location.

Panel Meeting Action: Reject

Panel Statement: The recommendation does not enhance clarity or usability. The scope of Article 100 is under the purview of the Technical Correlating Committee, "general" and "purpose" are "commonly defined general terms" that do not need to be defined in Article 100, per the Scope of Article 100.

Published product listings accomplish the submitter's intent.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-86 Log #1476 NEC-P01 **Final Action: Reject**

(100.General Purpose Outlet and General Purpose Receptacle (New))

Submitter: William Q. Cellini, Jr., Ardmore, PA

Recommendation: Add new definitions for the following terms:

(●) General Purpose (GP) Outlet (GPO)

(●) General Purpose (GP) Receptacle (GPR).

Substantiation: These definitions would enhance, clarify and facilitate use of these terms in Articles 210 and 220.

Panel Meeting Action: Reject

Panel Statement: The proposal does not contain recommended text as required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-87 Log #172 NEC-P01 **Final Action: Reject**

(100.Governing Authority (New))

Submitter: Felix Giannini, Lexco, Inc.

Recommendation: Insert in Section 100:

Governing Authority. A duly elected legislative body empowered to enact legislation in behalf of the Local, State, Federal or National government to which it has been elected.

Substantiation: I believe that a definition should be included in the Definitions Section 100 too, so as to make the term clear and perhaps legally effective, this should be addressed in any and all other codes that use that term as well as similar terms.

Panel Meeting Action: Reject

Panel Statement: The governing authorities referred to are merely those who enact and apply the code. It is not within the purview of the code to define who those bodies are.

A governing authority is not necessarily elected.

The term "governing authority" is only used in Annex H, which is included for informational purposes. Inclusion of a definition for this term in Article 100 is unnecessary and not consistent with the intent of Article 100 as outlined in 2.2.2.1 of the NEC Style Manual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

5-10 Log #3040 NEC-P05 **Final Action: Accept**

(100.Ground Fault (New))

Submitter: Mike Holt, Leesburg, FL

Recommendation: Relocate the definition of ground fault to Article 100, from 250.2.

Ground Fault. An unintentional, electrically conducting connection between an ungrounded conductor of an electrical circuit and the normally non–current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

Substantiation: The term "ground fault" is used throughout the code, and therefore, should be defined in Article 100.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

2-18 Log #496 NEC-P02 **Final Action: Reject**

(100.Ground-Fault Circuit Interrupter (GFCI))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Add a hyphen between "Circuit" and "Interrupter" and revise the definition of Ground-Fault Circuit-Interrupter as shown:

Ground-Fault Circuit-Interrupter (GFCI). A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a fault current to ground exceeds ~~the values established for a Class A device~~ some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit. This device will not provide personnel protection from electrocution resulting from line-to-line contact since the nature of line-to-line loads cannot be distinguished.

Delete the FPN.

Substantiation: The revised definition complies with the following sections in the NFPA Manual of Style:

2.3.2.2 Definitions shall be in the format of a bold term followed by the definition phrase to form a single paragraph unit.

2.3.2.3 Definitions shall not contain requirements.

2.3.2.4 References to other documents or sections of a document, notes, lists, footnotes, cautions, warnings, or figures shall not be permitted in definitions.

The revised definition also complies with 2.2.2 of the NEC Style Manual which also states that "Definitions shall not contain requirements or recommendations." While the NEC Style Manual permits Fine Print Notes within the document, it does not specifically authorize their use in definitions so the NFPA Manual of Style governs and it does not authorize the use of FPNs nor multiple paragraphs in definitions.

If it is essential that a Class A GFCI be specified, then it should be done in the main body of the Code since there may be more than one class of GFCIs.

The addition of the hyphen provides consistency throughout the Code and correlates with the IEEE Standard Dictionary of Electrical and Electronics Terms. Additional proposals are being submitted to make similar corrections throughout the Code.

The addition of the last sentence is safety information to the user of the Standard.

This proposal is also intended to generate consistent definitions and minimize the number of duplicate definitions in the NFPA Glossary of Terms.

The proposed wording should meet the intent of 3 preferred and 2 secondary definitions used in 8 NFPA Standards.

Similar proposals are being submitted to NFPA 70B, 70E, 73, 99, 99B, 302, and 1901.

Panel Meeting Action: Reject

Panel Statement: The hyphenation of the term is in accordance with the NEC Style Manual. When the term is used as a noun, only the first pair of words are hyphenated. The panel rejects the deletion of class "A" because there are other classes of GFCI, and the class "A" reference must be maintained in the definition to ensure that a GFCI will function within the prescribed limits. The panel also rejects the addition of the word "fault" because a GFCI trips on any current to ground. The panel rejects the addition of the last sentence because it is explanatory and belongs in the form of an FPN. The panel rejects the deletion of the FPN because it adds clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-4 Log #3597 NEC-P03 **Final Action: Reject**

(100.Ground-Fault Circuit Interrupter (GFCI), Portable (as applied to grund-fault circuit interrupters) (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 2 for action.

This action will be considered by Code-Making Panel 2 as a public comment.

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add text to read as follows:

ARTICLE 100 Definitions

I. General

Ground-Fault Circuit Interrupter (GFCI). A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

FPN: Class A ground-fault circuit interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see *UL 943, Standard for Ground-Fault Circuit Interrupters*.

Portable (as applied to ground-fault circuit interrupters) A qualifying term indicating that the ground-fault circuit interrupter is intended to protect personnel from fault current to ground on circuits supplied by plug-and-cord-connections or by temporary wiring installations and additionally functions to de-energize a circuit or portion thereof when one or more of the following defects occurs:

the grounded conductor to the power supply is opened

the grounded conductor is transposed with an ungrounded conductor to the power supply

one of the ungrounded conductors to the power supply on a polyphase system or on a single-phase, 3-wire system is opened.

Substantiation: Correlation and enforcement issues regarding GFCI for portable use, and usability of the *Code*. Throughout the *Code*, requirements for GFCI protection of personnel are invoked for circuits supplied by plug-and-cord-connection (mandating GFCI protection integral to the attachment plug itself, built in-line into the power supply cord or into the cord set, or integral to the plug-and-cord-connected equipment or appliance) or for equipment in temporary installations, but it is inconsistent not only in designation but also in clarifying to the AHJ and to the installer alike what exactly is being required above and beyond conventional GFCI protection intended for hard wiring.

For instance, 382.6 (3) mandates a "Level of protection equivalent to a portable GFCI" but nothing in *NEC*® provides an explanation of what "portable GFCI" means. 590.6(A) states that "For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.", again with no indication of what attributes "portable use" encompasses. This absence of specificity will lead to field-made assemblies employing conventional GFCIs that inherently fail to provide GFCI protection of personnel when open or intermittent grounded (neutral) conductors or when transposed ungrounded and grounded conductors are unwittingly encountered.

By contrast, 680.33(B)(3) and 680.33(B)(4) are very specific in stating "A ground-fault circuit interrupter with open neutral conductor protection as an integral part of the assembly" and "The luminaire lamp permanently connected to the ground-fault circuit interrupter with open-neutral protection", respectively, but furnish no information as to how to identify GFCI protection that so complies, making installer compliance and AHJ enforcement difficult tasks.

"Portable GFCIs" are required by the trinational *Standard for Ground-Fault Circuit-Interrupters, NMX-J-520-ANCE-2006* 1, *CSA C22.2 No. 144.1-06* 2, *ANSI/UL943-2005* 3, Clause 6.7.2.1, additionally to de-energize the "load" output contacts and terminals when the defects noted in the proposed addition to the definition occur. When Underwriters Laboratories (in UL product category KCXS) and CSA International (in CSA product class 1451-81) list such products, both certifiers specifically identify these as "portable GFCIs" to differentiate them from other GFCIs. Listed portable GFCIs can be embodied not only as GFCI plugs and in-line GFCI cord sets but even some GFCIs for permanent wiring such as SOME faceless GFCI receptacles can be additionally Listed and identified as portable GFCIs. Listed construction-site portable power-distribution equipment is similarly required by standard *Portable Power-Distribution Equipment, UL1640* 3, Clauses 53.3 - 53.5 and 63.3 - 63.4, to de-energize the "load" output contacts and terminals when those same defects noted in the proposed addition to the definition occur.

1 Asociación de Normalización y Certificación (Association of Standardization and Certification),

2 Canadian Standards Association

3 Underwriters Laboratories Inc.

When conventional GFCIs intended for permanent, inspected hard-wiring are used in what should be portable GFCI applications, where the any of the indicated defect conditions occur, the ground-fault-detection circuitry is NOT powered and the GFCI protection cannot operate but power is nonetheless delivered UNinterrrupted EVEN IN THE PRESENCE OF A GROUND-FAULT. Any GFCI protection the user assumes is present is in fact UNAVAILABLE.

Amongst those NOT directly involved in GFCI manufacture who are nonetheless involved with this *Code*, there is a significant misperception that GFCI protection of personnel will provide a panacea against ALL causes of lethal electric shock. Due to their misunderstanding of the differences between GFCIs for permanent installation and portable GFCIs, a significant number of cord reel manufacturers unwittingly extrapolated their Listings for portable (cord-and-plug-connected) cord reels [having ordinary receptacles as outlet components] and their Listings for HARD-WIRED cord reels acceptably having GFCI receptacles as outlet components, without the overt knowledge of at least two major certifiers, to incorrectly encompass portable (cord-and-plug-connected) cord reels having GFCI receptacles (no open neutral protection) as outlet components where portable GFCI protection (with open neutral protection) was warranted.

It is also common to find cord-and-plug-connected field assemblies employing GFCI receptacles (no open neutral protection) as outlet components rather than portable GFCI protection (with open neutral protection) of the outlets. Some times, these are field repairs misperceived as safety upgrades where conventional receptacles in plug-and-cord-connected equipment are replaced with conventional GFCI receptacles. Furthermore, field repairs of plug-and-cord-connected equipment are occasionally encountered where portable GFCIs (faceless-receptacle-type) have been field-replaced with more-readily available, conventional GFCI receptacles under the mistaken belief that they are equivalent. In either situation, where the indicated defects occur, the user has a false sense of security because power is still delivered.

Companion proposals have been made to 210.8, to 215.9, to 518.3(B)*, and to 590.6.

* NOTE: That 518.3(B) proposal regarding portable GFCI protection is separate from another proposal I submitted for 518.3(B) involving GFCI protection required elsewhere in the *Code*.

Panel Meeting Action: Reject

Panel Statement: The NEC Technical Correlating Committee has assigned certain definitions to panels that have more technical expertise in the use of that term. This proposed change to the definition of GFCI is under the jurisdiction of Code-Making Panel 2, not Code-Making Panel 3.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

2-19 Log #1181 NEC-P02 **Final Action: Reject**

(100.Ground-Fault Circuit-Interrupter (GFCI))

Submitter: James M. Daly, General Cable

Recommendation: Revise text to read as follows:

Add a hyphen between "circuit" and "Interrupter" and revise the definition of Ground-Fault Circuit-Interrupter as follows:

Ground-Fault Circuit-Interruper (GFCI). A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a fault current to ground exceeds ~~the values established for a Class A device~~ some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit. This device will not provide personnel protection from electrocution resulting from line-to-line contact since the nature of line-to-line loads cannot be distinguished.

Delete the FPN.

Substantiation: The revised definition complies with the following sections in the NFPA Manual of Style:

2.3.2.2 Definitions shall be in the format of a bold term followed by the definition phrase to form a single paragraph unit.

2.3.2.3 Definitions shall not contain requirements.

2.3.2.4 References to other documents or sections of a document, notes, lists, footnotes, cautions, warnings, or figures shall not be permitted in definitions.

The revised definition also complies with 2.2.2 of the NEC Style Manual which also states that "Definitions shall not contain requirements or recommendations." While the NEC Style Manual permits Fine Print Notes within the document, it does not specifically authorize their use in definitions so the NFPA Manual of style governs and it does not authorize the use of FPNs nor multiple paragraphs in definitions.

If it is essential that a class A GFCI be specified, then it should be done in the main body of the Code since there may be more than one class of GFCIs.

The addition of the hyphen provides consistency throughout the Code and correlates with the IEEE Standard Dictionary of Electrical and Electronics Terms. Additional proposals are being submitted to make similar corrections throughout the Code.

The addition of the last sentence is safety information to the user of the Standard.

This proposal is also intended to generate consistent definitions and minimize the number of duplicate definitions in the NFPA Glossary of Terms.

The proposed wording should meet the intent of 3 preferred and 2 secondary definitions used in 8 NFPA Standards.

Similar proposals are being submitted to NFPA 70B, 70E, 73, 99, 99B, 302, and 1901.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-18.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-20 Log #3118 NEC-P02 **Final Action: Reject**

(100.Ground-Fault Circuit-Interrupter System, Three-Phase (GFCIS-3Ph) (New))

Submitter: Paul S. Hamer, Chevron Energy Technology Company

Recommendation: Add a new definition:

Ground-Fault Circuit-Interrupter System, Three-Phase (GFCIS-3Ph). A system intended to provide protection of personnel from line-to-ground fault currents on three-phase systems. The system operates to cause a disconnecting means to open all ungrounded conductors of the faulted feeder or branch circuit within an established period of time when a sensed fault current to ground exceeds a current of 6 mA. For secure operation during ground faults, the system: (1) simultaneously processes and discriminates the sensed currents (to ground) of all of the feeder or branch circuits of the service, or of the protected separately-derived system; (2) only initiates disconnection of the circuit that has the highest magnitude of sensed current to ground; and (3) inhibits disconnection of the "non-faulted" circuits at the same time the "faulted" circuit disconnecting means is opened.

FPN No. 1: On three-phase systems that exceeding 150 volts to ground, the capacitive-charging current of a non-faulted individual feeder or branch circuit (a current that is also sensed during a system ground fault) can exceed the 6 mA current threshold for a circuit of normal length. The GFCIS-3Ph discriminates between the capacitive charging current of the "healthy" three-phase feeder or branch circuits during a ground fault, and the genuine ground-fault current on the faulted feeder or branch circuit.

FPN No. 2: The GFCIS-3Ph may also be used to selectively detect and isolate incipient insulation failure of electrical equipment connected to three-phase feeder or branch circuits.

Substantiation: A new definition is required to accompany companion proposals also submitted by me for the GFCIS-3Ph in Articles 210.8(D) and 215.9 (copies attached). See those proposals for details of the system. There is no present NRTL standard for GFCI devices applied above 125 volts to ground; hence the pickup level of 6 mA is defined in the proposed definition. It is expected that a new NRTL (e.g., Underwriters Laboratories) standard will be developed for the GFCIS-3Ph that will establish the required opening time of the disconnecting means of the system, expected to be a inverse-time characteristic between 6 mA and approximately 30 mA, and a definite time (between 0.025 and 0.10 second, depending on the application) for sensed ground-fault currents that exceed 30 mA.

FPN No. 1 is proposed to provide information on how the system functions. FPN No. 2 is proposed to describe an alternate use of the system beyond the primary use for personnel protection.

The basis of this proposal and the associated proposals is "A ground-fault circuit-interrupter method and system for three-phase electrical power systems," for which a U.S. Patent No. 7,301,739 (copy attached) has been granted. Refer to my proposal for 210.8(D) for details of how the system operates and the problem it resolves. Chevron U.S.A., Inc. is the assignee of the patent. If this proposal is accepted for inclusion in the NEC, Chevron U.S.A., Inc. will comply with the NFPA and ANSI Patent Policy; specifically, one of the following:

a) A license will be made available without compensation to the applicants desiring to utilize the license for the purpose of implementing the standard; or

b) A license will be made available to applicants under reasonable terms and conditions that are demonstrably free of any unfair discrimination.

Panel Meeting Action: Reject

Panel Statement: The panel rejects the definition because the panel action on Proposal 2-131 precludes the need for a definition.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

5-11 Log #1868 NEC-P05 **Final Action: Reject**

(100.Grounded Conductor)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise definition: A system or circuit that is intentionally grounded and normally carries current.

Substantiation: Edit. Per definition of "grounded" a conductor connected to ground such as an EGC or GEC is a grounded conductor. Though "normally" is a term to be avoided per the Style Manual, it is used in the definition of "Grounding Conductor, Equipment. PROPOSAL WOULD CLARIFY The term Grounded conductor" used elsewhere in the Code.

Panel Meeting Action: Reject

Panel Statement: The words "and normally carries current" are not valid under all conditions. For example, they do not account for grounded conductors brought to service equipment per 250.24(C) where there are only line-to-line-connected loads supplied. The panel notes there was no technical substantiation provided for the deletion of the term "conductor" from the existing definition. It was also noted this deleted term was not identified in the proposal.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-12 Log #2681 NEC-P05 **Final Action: Reject**

(100.Grounding Conductor)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

A conductor used to connect equipment or ~~the grounded~~ a circuit conductor of a wiring system to a grounding electrode(s). ~~or electrodes~~

Substantiation: Edit. A grounded circuit is already connected to earth, per definition of grounded in Article 100.

Panel Meeting Action: Reject

Panel Statement: The panel action on Proposal 5-13 removes this definition.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-13 Log #2929 NEC-P05 **Final Action: Accept**

(100.Grounding Conductor)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Delete the following text:

~~**Grounding Conductor.** A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.~~

Substantiation: This proposal is to delete of the definition and use of the term "grounding conductor" where used in place of the more correct term, "grounding electrode conductor." Coordinating proposals have been made to replace the term "grounding conductor" with "grounding electrode conductor" in Articles 800, 810, 820 and 830. The general locations where "grounding conductor" is used include:

800.100 Cable and Primary Protector Grounding,

810.57 Antenna Discharge Units,

820.100 Cable Grounding, and

830.100 Cable, Network Interface Unit, and Primary Protector Grounding.

Panel Meeting Action: Accept

Panel Statement: Code-Making Panel 5 recommends to the Technical Correlating Committee that a task group consisting of members from CMP-5 and other CMPs impacted by this action be appointed to make recommendations on revising the use of this term where used in articles other than those under the purview of CMP-5. The work of this task group needs to be completed prior to the ROC meeting comment closing date. Based on its action on this proposal, CMP-5 has made proposed revisions where the term "grounding conductor" is used in its articles.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BOWMER, T.: Although the deletion of the term "grounding conductor" is appropriate for articles covered by Panel 5, the term is used over 120 times in Chapter 8 articles covering low power communications circuit and elsewhere in the code. The term "Grounding conductor" has proven a useful and well understood term within the communications articles and a definition should be retained in Article 100. Substitution of "grounding conductor" with "Grounding Electrode Conductor" is not appropriate for all uses in Chapter 8 articles. The definition of grounding conductor" could be modified to make it more specifically applied to communications circuits such as follows : " Grounding Conductor: A conductor used to connect or bond communications equipment or cable shield to a grounding electrode system, or grounding electrode(s). " would meet the needs of Chapter 8.

Comment on Affirmative:

HARDING, G.: Continue to accept the proposal to delete the term "grounding conductor". This deletion is further supported by the panel action at the ROP meeting on proposal 5-18 regarding "Grounding Electrode Conductors". A "grounding conductor", if left in the code, will become a defined conductor that has no practical application. Such an occurrence would create a usability problem for code users trying to find an application for this definition. For correlation with Panel 16, a task group could be selected to ensure there are no issues.

JOHNSTON, M.: Continue to accept the deletion of the defined term "grounding conductor." CMP-5 has responsibility for words and terms related to grounding and bonding as determined in the 2008 NEC cycle. Such words include bonding, grounding, and intersystem bonding termination, which are defined in Article 100 and used in Chapter 8. The term grounding conductor used in Chapter 8 should be revised to "grounding electrode conductor" as recommended in coordinated proposals. The revised definition of the term grounding electrode conductor (resulting from accepted Proposal 5-18) provides justification for changing the term "grounding conductor" to "grounding electrode conductor" where it is used throughout the Chapter 8 Articles. This Proposal is part of a broad effort to improve consistency in the use of defined terms related to grounding and bonding throughout the Code. Coordinated proposals have been provided to adjust rules within Chapter 8 where the term is used. The CMP-5 Chair report to the TCC includes the appropriate recommendation to form a specific Task Group (preferably made up of Panel 5 and Panel 16 members) to ensure that the work of CMP-5 regarding the deletion of the defined term "grounding conductor" and revision to the term "grounding electrode conductor" along with associated coordinated proposals to Chapter 8 Articles are accepted and upheld. Members of CMP-5 also serve on CMP-16 which makes this coordinated effort much more attainable and provides effective communication and coordination between the Panels. Note: Proposals 5-13, 5-15, and 5-18 were all accepted unanimously by CMP-5 during the Panel hearings at Hilton Head, SC in January demonstrating clear consensus relative to these proposed changes.

5-14 Log #2974 NEC-P05 **Final Action: Reject**
(100.Grounding Conductor)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise the definition for grounding conductor, as follows:

Grounding Conductor. A conductor used to connect communications equipment to a grounding electrode, or other equipment to an auxiliary electrode. ~~equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.~~

Substantiation: The terms "grounding conductor" and "grounding electrode conductor" are so similar that the definitions are not helpful.

Panel Meeting Action: Reject

Panel Statement: The panel action on Proposal 5-13 removes this definition.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

BOWMER, T.: Agree with rejection of this proposal but not for the stated Panel reason. The proposed new language is too vague "... other equipment to an auxiliary electrode..." and may lead to confusion. A revised definition is provided in my negative comment to proposal 5-13 above.

5-15 Log #4185 NEC-P05 **Final Action: Accept**
(100.Grounding Conductor)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Delete text as follows:

~~Grounding Conductor. A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.~~

Substantiation: This definition should be deleted because it is almost identical to the term "Grounding Electrode Conductor". The term Grounding Electrode Conductor should be used as a replacement term.

Panel Meeting Action: Accept

Panel Statement: See the panel statement on Proposal 5-13.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BOWMER, T.: Same negative comment as provided to proposal 5-13 applies to this proposal.

Comment on Affirmative:

HARDING, G.: See My Affirmative with Comment on 5-13.

JOHNSTON, M.: Continue to accept this proposal. See my ballot statement on Proposals 5-13 and 5-18. Note: Proposals 5-13, 5-15, and 5-18 were all accepted unanimously by CMP-5 during the Panel hearings at Hilton Head, SC in January demonstrating clear consensus relative to these proposed changes.

5-16 Log #1146 NEC-P05 **Final Action: Accept in Part**
(100.Grounding Conductor, Equipment (EGC))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise the definition of "Grounding Conductor, Equipment (EGC)" as follows:

The conductive path(s) installed to connect normally non-current carrying metal parts of an individual piece or an assembly of equipment together and to the system grounded conductor or to the grounding electrode conductor, or both.

Substantiation: The current definition, intended to describe a conductive path(s) from a given item of equipment, for instance, a motor frame, to the system grounded conductor or the grounding electrode, or both, is ambiguous in that it can be understood as either the separate conductive path(s) associated with each respective load or control station, or the complete equipment grounding network, i.e. the complete star configuration.

In moving from the former (2005 NEC) operative words "conductor used to connect" to the current operative words, "conductive path installed to connect (plural items) to the system grounded conductor...)", the idea of separate conductive path(s) has been lost. The allowable types of equipment grounding conductors listed in 250.118 are for the respective separate conductive path(s), not the entire equipment grounding network.

Panel Meeting Action: Accept in Part

The panel accepts only the recommendation to revise "path" to "path(s)". The remainder of the definition is to remain as presently used in the 2008 NEC.

Panel Statement: "Equipment" is defined in Article 100 and applies to individual pieces and assemblies. The recommended text "an individual piece or an assembly of" does not improve the understanding of application of this term.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-17 Log #2743 NEC-P05 **Final Action: Accept in Principle**
(100.Grounding Electrode Conductor)

Submitter: Timothy S. Owens, City of Santa Clara

Recommendation: Revise text to read as follows:

Grounding Electrode Conductor (GEC). A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

Substantiation: This proposal adds the acronym for the grounding electrode conductor to the title. This acronym is in common use on electrical plans for construction. It is also commonly used in articles and other publications discussing the grounding of electrical systems and equipment. This placement of an acronym is in keeping with the NEC Style Manual.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 5-18.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-18 Log #2930 NEC-P05 **Final Action: Accept in Principle**
(100.Grounding Electrode Conductor)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

Grounding Electrode Conductor. A conductor used to connect the system grounded conductor; communications system protectors, discharge units, cables, or network interface units; or ~~the~~ equipment to a grounding electrode or to a point on the grounding electrode system.

Substantiation: This proposal is intended to support the proposed deletion of the definition and use of the term "grounding conductor" where used in place of the more correct term, "grounding electrode conductor." Coordinating proposals have been made to replace the term "grounding conductor" with "grounding electrode conductor" in Articles 800, 810, 820 and 830. The general locations where "grounding conductor" is used include:

800.100 Cable and Primary Protector Grounding,

810.57 Antenna Discharge Units,

820.100 Cable Grounding, and

830.100 Cable, Network Interface Unit, and Primary Protector Grounding.

Panel Meeting Action: Accept in Principle

Revise the recommendation to read:

Grounding Electrode Conductor (GEC). A conductor used to connect the system grounded conductor, equipment, communications system protectors, antenna discharge units, communications cables, or network interface units to a grounding electrode or to a point on the grounding electrode system.

Panel Statement: The recommendation has been editorially revised for clarity. Adding the acronym to the definition title allows the acronym to be used in place of the full term.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal. See my ballot statement on Proposals 5-13 and 5-15. Note: Proposals 5-13, 5-15, and 5-18 were all accepted unanimously by CMP-5 during the Panel hearings at Hilton Head, SC in January demonstrating clear consensus relative to these proposed changes.

5-19 Log #2165 NEC-P05 **Final Action: Accept in Principle**
(100.Grounding Electrode Conductor (GEC))

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text to read as follows:

Grounding Electrode Conductor (GEC). A conductor used to connect the system grounded conductor or the equipment to a grounding electrode or to a point on the grounding electrode system.

Substantiation: This proposal adds the acronym for the grounding electrode conductor to the title. This acronym is in common use on electrical plans for construction. It is also commonly used in articles and other publications discussing the grounding of electrical systems and equipment. This placement of an acronym is in keeping with the NEC Style Manual.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 5-18.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

1-88 Log #2035 NEC-P01 **Final Action: Reject**
(100.Guarded)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: Covered, fenced, enclosed, or otherwise protected by means of ~~suitable~~ identified covers, casings, barriers, rails, screens, mats, or platforms, or other identified means to ~~remove~~ minimize the likelihood of close approach or contact by unqualified or unauthorized persons, animals, or objects, ~~to a point of danger~~.

Substantiation: Edit. Other identified means not covered should be permitted. Protection can minimize contact, but not always prevent it as witness electrocutions of persons who climb fences at high voltage installations. "To a point of danger", is superfluous and subjective and is not necessary to the provision.

Panel Meeting Action: Reject

Panel Statement: This proposal is not "editorial" and removing "point of danger" will cause the problems the submitter intends to correct regarding fences.

The panel agrees that guarding does not reduce the probability of contact to zero.

The NEC definition of "identified" is quite specific, and there are many effective means of guarding that would not meet the NEC definition of "identified".

Changing "remove" to "minimize" renders "unqualified or unauthorized" superfluous, as contact is controlled according to the risks involved.

The submitter has not substantiated removal of "to a point of danger", as required by 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-89 Log #4757 NEC-P01 **Final Action: Reject**
(100.Hallways (New))

Submitter: D. Jerry Flaherty, East Islip, NY

Recommendation: Add new text to read as follows:

Hallways. A walled corridor used exclusively to connect two or more rooms.

Substantiation: 1) Large entrance halls or foyers that are used for entertaining guests meet the definition on a hallway. Since only one receptacle is required in a hallway over 10 feet, usually one one receptacle is provided resulting in wide use of extension cords.

2) The end of habitable rooms with two or more doors at one end meets the definition of a hall and again usually only one receptacle is provided.

Panel Meeting Action: Reject

Panel Statement: "Hallway" is a common and well understood term. Not all hallways connect two or more rooms.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-90 Log #1474 NEC-P01 **Final Action: Reject**
(100.Identified (as applied to equipment))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Recognized as suitable for the specific purpose(s), function(s), use(s), environment(s), application(s), and so forth where specified in a particular Code ~~requirement~~ provision.

Substantiation: Edit. Equipment may, and usually is, suitable for multiple functions, uses, environments, applications, etc. Equipment may be specified in provisions that are not requirements (permitted).

Panel Meeting Action: Reject

Panel Statement: The preferred definition of "identified" is the same in the 2008 NEC and the NFPA Glossary of Terms.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-91 Log #1951 NEC-P01 **Final Action: Reject**
(100.Identified (as applied to equipment))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: Recognizable as ~~suitable~~ intended and made for the specific purpose(s), function(s), use(s), environment(s), application(s), and so forth, in compliance with this Code. ~~where described in a particular Code requirement~~.

Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. Equipment should also comply with Code provisions whether or not they are "requirements".

Panel Meeting Action: Reject

Panel Statement: The preferred definition of "identified" is the same in the 2008 NEC and the NFPA Glossary of Terms.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-92 Log #1715 NEC-P01 **Final Action: Reject**
(100.In Sight From (New))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add new text as follows:

FPN: See 525.21(A) for disconnect switch location for portable structures of rides, tents, and concessions.

Substantiation: Portable structures are required to have a disconnect switch located "within sight of" and within 1.8 m (6 ft.) of the operator's station instead of 15 m (50 ft.), as the definition normally indicates.

Panel Meeting Action: Reject

Panel Statement: The FPN is unnecessary. See 90.3 Code Arrangement. Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-93 Log #606 NEC-P01 **Final Action: Reject**
(100.Interrupting Capacity (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels 4, 10, and 11 for information.

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add new text to read as follows:

Interrupting Capacity. The highest current at rated voltage that an overcurrent or switching device can safely interrupt.

Substantiation: This definition is closely aligned with the IEEE Standard Dictionary of Electrical and Electronic Terms. Due to certain testing procedures (UL 489 and CSA 5), the interrupting capacity of a device may be less than the interrupting rating of the device. It is important that designers and installers be made aware of this difference.

Panel Meeting Action: Reject

Panel Statement: "Interrupting capacity" is used in Section 230.95(B). Inclusion of a definition for this term in Article 100 is unnecessary and not consistent with the intent of Article 100 as outlined in 2.2.2.1 of the NEC Style Manual.

The panel requests that the Technical Correlating Committee refers this proposal to Code-Making Panels 4, 10, and 11 for information relative to using the term "interrupting capacity" instead of "interrupting rating," which is

currently defined in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ANTHONY, M.: The proposal has merit but there is an important clarification to make regarding the use of "capacity" and "rating" that may extent the discussion beyond one code cycle. A definition like this belongs in the NEC but it needs to correlate as closely as possible with ANSI/IEEE/NEMA standards.

10-4 Log #2716 NEC-P10 **Final Action: Accept in Part**
(100.Interrupting Rating)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
The highest current at rated voltage that a device is ~~intended~~ identified as suitable to interrupt under standard test conditions.
Substantiation: "Intended" is not specific, "identified" per Article 100 is more comprehensive and includes other considerations.
Panel Meeting Action: Accept in Part
Revise text to read as follows:
The highest current at rated voltage that a device is ~~intended~~ identified ~~as suitable~~ to interrupt under standard test conditions.
Panel Statement: The panel notes that "as suitable" is redundant as it is part of the definition of "identified" in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MANCHE, A.: NEMA does not support changing the word "intended" to "identified as suitable" in the definition of Interrupting Rating. The present language matches exactly the definition in the UL product standards. The existing NEC words "intended to interrupt" also matches NEC language in 110.9.

5-20 Log #460 NEC-P05 **Final Action: Reject**
(100.Intersystem Bonding Termination)

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Revise text to read as follows:
Intersystem Bonding Termination. A ~~device~~ conducting object that provides a means for connecting communications system(s) grounding conductor(s) and bonding conductor(s) at the service equipment or at the disconnecting means for buildings or structures supplied by a feeder or branch circuit.
Substantiation: Device is defined as "A unit of an electrical system that carries or controls electric energy as its principal function." An intersystem bonding termination does not carry or control electric energy as its principal function. More appropriately, it is a conducting object or conductor. Although the word conductor may be a better fit in the definition, the words conducting object align with the use of these same words in "Grounding Electrode." A change is in order to eliminate any confusion in the use of the word device in this definition.
Panel Meeting Action: Reject
Panel Statement: The intersystem bonding termination is, in fact, a device in that it provides several points of termination (minimum of 3) to connect the grounding aspects of communications, broadband, or other such systems to the electrical system grounding electrode system.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-21 Log #3041 NEC-P05 **Final Action: Accept in Principle**
(100.Intersystem Bonding Termination)

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the submitter's proposed text that did not intend to delete "bonding" from the definition.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
Intersystem Bonding Termination. A device that provides a means for connecting communications system(s) grounding conductor(s) and bonding conductor(s) at or near the service equipment or metering equipment; or at the disconnecting means for buildings or structures supplied by a feeder or branch circuit.
Substantiation: This proposal is intended to address the location of the intersystem bonding termination. As currently written, the definition and the requirement in 250.94 don't comply agree with each other.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
Intersystem Bonding Termination. A device that provides a means for connecting communications system~~(s) grounding conductor(s) and bonding conductor(s) at or near the service equipment, or metering equipment, or at the disconnecting means for buildings or structures supplied by a feeder or branch circuit~~ to the grounding electrode system.
Panel Statement: The action by the panel simplifies the definition, and the panel action on Proposal 5-226 addresses the recommendation to include metering equipment as an acceptable location for the installation of the intersystem bonding termination. The words "or near" are discouraged from use by the NEC Style Manual.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

2-21 Log #1736 NEC-P02 **Final Action: Reject**
(100.Kitchen)

Submitter: Austin Towne, Wichita Electrical JATC
Recommendation: Revise text to read as follows:
Kitchen. An area with a sink and permanent facilities for food preparation and permanent means for cooking equipment.
FPN: Permanent means for cooking equipment would include a means for which a range, oven or counter-mounted cooking unit that may be connected to a supply of power or gas.
Substantiation: This proposal is the work of a task group formed by the 2nd Year Apprenticeship Class 2A of the 2008 year. Jarod Adams, Nathan Free, Scott Hengel, Michael Hilger, Brandon Kupper, Tyler Martin, Josh Riley, Aaron Smith, Austin Towne, and Darryl Hill. This task group has concluded the following substantiation:
Clarification of the kitchen area is needed to prevent confusion caused by the newly defined kitchen with other areas such as break rooms, wet bars or similar locations. We feel that if there is a receptacle installed for a range, counter-mounted cooking unit, or any other permanent type of cooking unit, then this area would be classified as a kitchen, whether or not the actual cooking unit was installed. If there is just a sink and a counter space with no provisions for permanent cooking equipment, then this would not be considered a kitchen and could be considered a break room, wet bar or similar area. A microwave, toaster, or similar appliance that is portable and can be moved form place to place and which may be located in these areas would not change a break room or wet bar into a kitchen. There is confusion when a break area can be classified as a break area or a kitchen and some of this confusion seems to stem from microwaves and similar appliances. The Fine Print Note was added to help clarify this by examples of what permanent means for cooking equipment may include.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the definition as presently written.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-22 Log #2248 NEC-P02 **Final Action: Reject**
(100.Kitchen)

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Add new and revise text to read as follows:
Kitchen. An area with a sink and permanent facilities for food preparation and/or cooking.
Substantiation: The intent of this revision is to specify whether a kitchen is an area where you prepare and cook food. Appears that the definition refers to both uses "food preparation" and "cooking" and not just "food preparation" or "cooking". Therefore, if the area is just for "food preparation" and "cooking", then the definition of kitchen does not apply.
Panel Meeting Action: Reject
Panel Statement: The addition of the word "or" allows for many areas that are not intended for kitchen spaces to be treated as such. The present definition is clear and accurately describes areas that are considered to constitute a kitchen by Panel 2.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-23 Log #2931 NEC-P02 **Final Action: Accept**
(100.Kitchen)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing definition in Article 100 of the 2008 NEC as follows:
Kitchen. An area with a sink and permanent provisions ~~facilities~~ for food preparation and cooking.
Substantiation: The proposed change will bring the definition into harmony with the definition of "Dwelling Unit" which includes "permanent provisions for cooking." The use of the word "provisions" in the definition recognizes that all kitchen appliances are not "permanent" such as electric ranges that are cord-and-plug connected but yet occupy a dedicated location in the kitchen.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-24 Log #3812 NEC-P02 **Final Action: Reject**
(100.Kitchen)

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Change the definition of "Kitchen" by changing the word "and" to "and/or"
Kitchen. An area with a sink or permanent provisions for food preparation and/or cooking.
Substantiation: The area behind the front counter in a coffee shop, ice cream shop, delicatessen, or similar store usually has a sink, stainless steel counters and working surfaces, tile (grounded) flooring, utilize cord and plug connected blenders, etc., and in all other ways meets the definition of a kitchen except that there are no provisions for *cooking* food. There is food preparation going on, but no actual cooking. Since the hazards associated with electrical installations in these areas do not seems to diminish with the removal of an oven, it makes sense to ensure that the employees of these areas are afforded equal protection as their counterparts in stores with ovens. It also makes enforcement easier for the inspector. Adding "or" does this.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the presence of only a sink constitutes a kitchen. See panel statement on Proposal 2-22.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-25 Log #4382 NEC-P02 **Final Action: Reject**
(100.Kitchen)

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Change the definition of a kitchen. Change the word "and" to "and/or"
Kitchen. An area with a sink and permanent provisions for food preparation and/or cooking.
Substantiation: The area behind the front counter in a coffee shop, ice cream shop, delicatessen, or similar store usually has a sink, stainless steel counters and working surfaces, tile (grounded) flooring, utilize cord and plug connected blenders, etc., and in all other ways meets the definition of a kitchen except that there are no provisions for *cooking* food. There is food preparation going on, but no actual cooking. Since the hazards associated with electrical installations in these areas do not seem to diminish with the removal of an oven, it makes sense to ensure that the employees of these areas are afforded equal protection as their counterparts in stores with ovens. It also makes enforcement easier for the inspector. Adding "or" does this.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-22.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-26 Log #2886 NEC-P02 **Final Action: Reject**
(100.Kitchen (Other than Dwelling Units) (New))

Submitter: Michael K. Anderson, City of Davenport, IA
Recommendation: Add new text to read as follows:
Kitchen (other than dwelling units). An area with a sink and permanent facilities for food preparation and cooking, including adjacent employee areas not partitioned as a separate room.
Substantiation: The definition would extend GFCI protection to receptacles accessible to employees which often are utilized for appliances that can be used throughout the entire kitchen space. Many commercial kitchen configurations have areas only defined by the grouping of specific equipment and not separated by walls or doors, such as an office.
Panel Meeting Action: Reject
Panel Statement: The term "adjacent" is vague and unenforceable.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-94 Log #1441 NEC-P01 **Final Action: Reject**
(100.Lighting Outlet)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete the word "direct".
Substantiation: Edit. "Direct" may be presumed to preclude a plug and cord connector or flanged inlet and indicates the connection permitted by 410.62 (C) is not a lighting outlet.
Panel Meeting Action: Reject
Panel Statement: This proposal would permit any switched receptacle outlet in a dwelling unit with a cord and plug connected luminaire connected to it to qualify as a lighting outlet.
The submitter has not provided substantiation for the presumption that "direct" excludes cord and plug connection. A luminaire can be directly connected to the wiring system via a wiring box or by a dedicated receptacle and cord.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, not all lampholders or luminaires directly connect to a lighting outlet. Some connect via a cord- and plug-connection to a receptacle outlet.

1-95 Log #1980 NEC-P01 **Final Action: Reject**
(100.Likely (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new definition as follows: Likely. Of such as nature or circumstance as to make something probable.
Substantiation: Edit. "Likely" is a term used in many sections but not Code-defined; a specific definition would be helpful to Code users.
Panel Meeting Action: Reject
Panel Statement: The panel concludes that the need for a definition of the term "likely" in Article 100 has not been substantiated and would not be consistent with the 3.1.2 of NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-96 Log #2323 NEC-P01 **Final Action: Reject**
(100.Listed)

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add to the beginning of the first sentence... An independent safety certification of ... (remainder unchanged).
Substantiation: While the term 'Third Party Listed' is well understood within the industry it represents industry jargon to outsiders. The first thing that comes to a business owner's mind when they hear the term 'third party' is in connection to third party checks which creates a negative association to begin with. Whenever you have to explain a term you're automatically on the defensive. Associating the word 'listed' with 'Independent Safety Certification' creates a positive association which needs no explanation and better represents the intent of the requirement. Adding this language to the NEC will help the industry as a whole move away from jargon and toward more easily understood terms.
Panel Meeting Action: Reject
Panel Statement: The term "listed" is an approved definition. See 3.3.6.1 of the NFPA Regulations Governing Committee Projects that states that official definitions shall not be altered unless approved by the Standards Council.
Such altered definitions shall be clear and unambiguous in the context in which it is used. In addition, see the NFPA Glossary of Terms for the official definition of "listed."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-97 Log #2327 NEC-P01 **Final Action: Reject**
(100.Location, Wet)

Submitter: Carl Whitten, University of New Hampshire
Recommendation: Revise text as follows:
Installations underground or in concrete slabs or in masonry that is in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected areas exposed to weather.
Substantiation: It would be a better distinction between concrete slabs and masonry to the reader. In reading the definition the interpretation is that concrete slabs in direct contact with the earth. it is not clear as to a concrete slab on the upper floors of a building being considered a wet location.
Panel Meeting Action: Reject
Panel Statement: The present language is grammatically correct. "Concrete slabs" is combined with "masonry" in direct contact with earth.
The proposed revision does not add clarity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: It may have been more appropriate to accept this proposal in principle. The panel could have clarified the definition by adding a semicolon after the word "underground" and deleting the word "or", or simply add a comma after the word underground. Either change would have addressed the submitter's concern and added clarification as to the intent of the definition.

(Note: Sequence 1-98 was not used)

18-6 Log #2301a NEC-P18 **Final Action: Reject**
(100.Luminaire, Light Emmiting diode (LED) Type and Light-emitting Diode (LED) (New))

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Add the following 2 new definitions:
(New) Luminaire, light emitting diode (LED) type – A complete lighting unit consisting of an LED light source and power source together with parts to distribute light, to position and protect the light source, and to connect the light source to a branch circuit. The LED light source may be an LED array, an LED module or an LED lamp.

(New) Light-emitting diode (LED) – A solid-state device embodying a p-n junction, emitting optical radiation when excited by an electric current.

A companion proposal for a revision to the definition of Nonlinear Load was forwarded to CMP-1.

Substantiation: The new terms are introduced as they are or will be used in various places in the Code; The definitions are extracted from UL 8750 (Standard for Light Emitting Diode (LED) Light Sources for Use in Lighting Products (proposed)) and they represent terms that have been in industry use.

For the nonlinear load footnote, conventional ballasts, electronic ballasts and electronic LED power drivers are also nonlinear loads. Examples can be given here and removed from other places where the term is used, for example, footnote to Table 520.44, covered in a companion proposal.

Lamps, Self-ballasted, Light-emitting Diode Type, are covered under UL CCN: OOLV.

Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: OOQA2.

"LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.

LED luminaires are covered under several UL CCNs: IFAM, IFAQ, IFDR, and others.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

No definitive substantiation has been provided that a definition is required or necessary.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

11-3 Log #1274 NEC-P11 **Final Action: Reject**
(100.Motor Controller (New))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW

Recommendation: Revise text to read as follows:

Article 100

<u>Motor Controller. A switch or device used to disconnect the electric power to a motor and provide the motor with protection from an overload condition.</u>

<u>FPN: See Part III of Article 430 for alternative methods of overload protection.</u>

Substantiation: The term "motor controller" is used many times throughout the NEC. A very few examples are 424.19, 424.19(A)(1) & (2), 610.43(A), 620.13(B), etc. We believe for proper application of the NEC this terminology needs a concise definition and per the NEC style manual Section 2.2.2.1 needs to be in Article 100.

Panel Meeting Action: Reject

Panel Statement: The definitions of controller as they exist in section 430.2 and Article 100 are adequate when modified by "motor" and substantiation for the change has not been provided. Additionally, not all motor controllers provide motor overload protection.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

18-7 Log #2975 NEC-P18 **Final Action: Reject**
(100.Multioutlet Assembly)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Delete the following text:

~~Multioutlet Assembly. A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.~~

Substantiation: This definition should be in Article 380.2, for consistency with the other chapter three wiring method articles. A correlating proposal to Article 380 has been made.

Panel Meeting Action: Reject

Panel Statement: "Multioutlet assembly" is not used in any articles under the purview of CMP-18.

CMP-18 requests the TCC to forward this proposal to CMP-8.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

5-21a Log #4576 NEC-P05 **Final Action: Reject**
(100.Neutral)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Revise as follows:

"The conductor (where one exists) of a polyphase circuit or single-phase three-wire circuit that is intended to have a voltage such that the nominal voltage between it and each of the other conductors are equal, and less than the nominal voltage between any two of the other conductors."

Substantiation: The current NEC definition has one, and only one virtue: it rationalizes trade slang, but only to a point. It does not describe a neutral, because in a two-wire circuit there can be no neutral, regardless of whether the grounded conductor is connected to a neutral point. Further, although most white wires are now neutrals, some are not. A white wire correctly applied as a phase conductor in a corner-grounded system is not a neutral even under the 2008 wording. CMP 5 should go back to what every trade text explained about neutrals prior to 2008, instead of reinforcing the erroneous view that every white wire is a neutral. Just when we were starting to turn the tide in terms of trade education on this point, the 2008 NEC set this educational effort back decades.

Panel Meeting Action: Reject

Panel Statement: The Task Group assigned by the Technical Correlating Committee and CMP-5 reached consensus on the two new definitions "neutral conductor" and "neutral point" in the 2008 NEC cycle resulting from the original efforts to define the term "neutral". No substantiation has been provided that demonstrates an inaccuracy exists or that an improvement is needed to improve application of the current definitions of these terms.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-22 Log #1145 NEC-P05 **Final Action: Reject**
(100.Neutral Conductor)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add text to read as follows:

See 250.186(C) for information on the system neutral conductor for impedance grounded neutral systems.

Substantiation: This conductor, which references the system neutral point to the neutral grounding impedance, is not the neutral conductor that is defined in Article 100, Part I.

Panel Meeting Action: Reject

Panel Statement: This proposed text adds no clarity to an Article 100 definition. Impedance grounded systems are also covered in 250.36 so the proposed reference would only apply to systems over 1000 volts and lead to confusion about systems 1000 volts and less.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-23 Log #2551 NEC-P05 **Final Action: Reject**
(100.Neutral Conductor)

Submitter: John Stuckwisch, Barth Electric / Rep. IEJATC Local 481 IBEW

Recommendation: Revise text as follows:

Article 100 Definitions

Neutral Conductor...Intended to carry <u>the unbalanced current</u>...".

Substantiation: The definition as stands, does not define the difference between the grounded conductor and a neutral. 220.61(A) states the neutral carries to unbalanced load. Also see: 310.15(B)(4).

Panel Meeting Action: Reject

Panel Statement: The Task Group assigned by the Technical Correlating Committee and CMP-5 reached consensus on the two new definitions "neutral conductor" and "neutral point" in the 2008 NEC cycle resulting from the original efforts to define the term "neutral". No substantiation has been provided that demonstrates an inaccuracy exists or that an improvement is needed to improve application of the current definitions of these terms.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-24 Log #2952 NEC-P05 **Final Action: Reject**
(100.Neutral Conductor)

Submitter: Fred W. Brown, HI Electron

Recommendation: Change the definition of Neutral Conductor to read:

Neutral Conductor. The <u>grounded</u> conductor connected to the neutral point of a system that is intended to carry current under normal conditions <u>and carries the vectorial summation currents of the ungrounded to grounded conductor loads in multiwire branch circuit, feeder, and service entrance conductors</u>.

Substantiation: The use of the terms "grounded conductor" and "neutral conductor" are problematic in nature in the electrical industry. It is a concept that needs to be distinguishing between the two principles in order to properly apply the National Electrical Code. In a single branch circuit which contains an ungrounded conductor (black in color) and a grounded conductor (white in color) the grounded conductor is frequently called a "neutral". In this application, the grounded conductor is not a neutral and leads to miss applications by electricians.

In the past, the electrical industry has envisioned the "neutral" as neutralizing voltages or neutralizing currents. I have seen multiwire branch circuits installations that were installed with six three-phase conductors (two A-phase, two B-phase, and two C-phase conductors) and one grounded conductor all the same size. The electricians were convinced that the grounded conductor would neutralize all the currents.

It is important for the National Electrical Code (NEC) to be technically correct. The current excepted definition of Neutral Conductor (Proposal 5-36 Log #1554) may lend itself to miss application of some of the NEC. By the present accepted definition, when looking at the application of 310.15(B)(4) a neutral conductor may never be counted as a current-carrying conductor.

NEC Panel 2 has found it important to require the grouping and identification of the grouping for ungrounded and grounded conductors of each multiwire branch circuit (Proposal 2-17 Log #3378). The importance of this is found in my definition of neutral conductor, not in fact that the conductor is grounded.

I would encourage the committee to accept this comment.

Panel Meeting Action: Reject

Panel Statement: The Task Group assigned by the Technical Correlating Committee and CMP-5 reached consensus on the two new definitions "neutral conductor" and "neutral point" in the 2008 NEC cycle resulting from the original efforts to define the term "neutral". No substantiation has been provided that demonstrates an inaccuracy exists or that an improvement is needed to improve application of the current definitions of these terms. The submitter's recommended additions are already covered by the existing definition (i.e., normal conditions).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-25 Log #754 NEC-P05 **Final Action: Reject**

(100.Neutral Point)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Revise text to read as follows:

The common point on a wye-connection in a polyphase system or midpoint on a single-phase, 3-wire system, ~~or midpoint on a single-phase portion of a 3-phase delta system,~~ or a midpoint of a 3-wire, direct-current system.

Substantiation: The neutral point of a system is that point where voltages from all other connection points are equal. This is certainly not applicable to 3-phase, 4-wire delta systems.

Panel Meeting Action: Reject

Panel Statement: The interpretation of what a neutral point is in the proposer's substantiation is contrary to the existing NEC definition. The winding of the 3-phase transformer that is midpoint grounded is treated identically to a midpoint grounded single phase transformer and is an appropriate part of the definition. In the single-phase portion of the three-phase, four-wire midpoint grounded delta system the sum of the voltages to neutral is zero as is explained in the existing fine print note.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

1-99 Log #2301 NEC-P01 **Final Action: Accept**

(100.Nonlinear Load)

Submitter: John Marshall, Underwriters Laboratories Inc.

Recommendation: Revise as follows:

(Revised) Nonlinear Load –

"FPN: Electronic equipment, electronic/electric discharge electric-discharge ballasts both inductive and electronic, and light-emitting diode (LED) drivers for lighting,…".

A companion proposal for NEW definitions for "Luminaire, light emitting diode (LED) Type" and "Light-emiting diode (LED)" were forwarded to CMP-18.

Substantiation: The new terms are introduced as they are or will be used in various places in the Code; The definitions are extracted from UL 8750 (Standard for Light Emitting Diode (LED) Light Sources for Use in Lighting Products (proposed)) and they represent terms that have been in industry use.

For the nonlinear load footnote, conventional ballasts, electronic ballasts and electronic LED power drivers are also nonlinear loads. Examples can be given here and removed from other places where the term is used, for example, footnote to Table 520.44, covered in a companion proposal.

Lamps, Self-ballasted, Light-emitting Diode Type, are covered under UL CCN: OOLV.

Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: OOQA2.

"LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.

LED luminaires are covered under several UL CCNs: IFAM, IFAQ, IFDR, and others.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

BARRIOS, L.: Adding additional lighting examples are not necessary to improve the understanding of the term "nonlinear loads". The present FPN includes "electronic equipment, electronic/electric-discharge lighting, adjustable-speed drive systems, and similar equipment" as examples of non-linear loads. The panel action on this proposal establishes a precedence that the development of any new type of lighting or other non-linear load in the future needs to be added to this list. Panel 1 tends to do a good job rejecting the addition of lists when they do not add additional clarity to the Code. The panel's action on this proposal is an exception.

5-26 Log #4506 NEC-P05 **Final Action: Reject**

(100.Objectionable Current (New))

Submitter: Steven F. Wydeveld, Village of Homer Glen / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

<u>**Objectionable Current.** Any level of electrical current in any electrical installation that poses an electrical shock or fire hazard and/or impede the ability of the grounding system to perform its intended function in accordance with Section 250.4.</u>

Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.

The term "objectionable current" used in 250.6 is not defined in the NEC. While there is a list of possibilities that may cause objectionable current, this list may not address all the potential causes. This definition intends to define the term and by doing so will more likely address conditions that may cause objectionable currents. Without this definition, it remains unclear what an objectionable current is.

The question was raised on the NEC Plus website in "Cracking the Code" 9/29/07. The question was: "Section 250.6 covers objectionable current over grounding conductors. However, it does not quantify objectionable or guide the user in judging what level of current is objectionable in a given situation. How is an inspector, designer, or facility manager to make the judgment as to whether or not a measured ground conductor current is objectionable?"

The Answer from "Cracking the Code" 9/29/07 was: "Although the Code does not establish a specific level at which current on a grounding conductor is deemed "objectionable," it is clear through the definitions associated with grounding in Article 100 and in 250.2, and by reviewing the requirements of Article 250, that grounding conductors are not intended to be used as a circuit conductor for other than the functions specifically identified in 250.4. Current induced through capacitive coupling is inherent to some electrical installation arrangements, and it is then a function of understanding any associated shock or fire initiation hazards for a given installation that helps define the level of current that becomes objectionable. Therefore, in accordance with 250.6, an "objectionable current" is simply any level of current for a given electrical installation that would pose an electric shock or fire hazard and/or impede the ability of the grounding system to perform its intended functions as specified in 250.4. Some examples of objectionable current are a rise in potential on exposed metal parts not intended to be energized, a situation that poses an electric shock or fire hazard, or a current that interferes with the proper operation of electrical or electronic equipment."

Panel Meeting Action: Reject

Panel Statement: The recommendation does not improve the understanding or application of 250.6. Several elements of the proposed definition such as electric shock or fire hazard are themselves undefined and subject to widely differing interpretation and variation depending on the application. See the panel action and statement on Proposal 5-56.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

4-3 Log #3502 NEC-P04 **Final Action: Accept in Principle**

(100.Overhead Service Conductors (New))

Submitter: James J. Rogers, Bay State Inspectional Agency

Recommendation: Add text to read as follows:

<u>(Overhead Service conductors.) The overhead service conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure.</u>

Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to Code-Making Panel 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.

Panel Meeting Action: Accept in Principle

Add new definition as follows: Service Conductors, Overhead: <u>The overhead conductors between the service point and the first point of connection to the service-entrance conductors at the building or other structure.</u>

Panel Statement: The panel defined the overhead conductors provided between the service point and the service entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

1-100 Log #3261 NEC-P01 **Final Action: Reject**

(100.Physical Damage (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add definition as follows:

An occurrence that impairs the intended function(s) of equipment or wiring systems.

Substantiation: Physical damage can vary inconsequential such as a nick, scratch, or slight dent or the like. Damage to be concerned with is that which affects safety or functions of equipment such as conductivity, grounding, installation and protection of conductors and equipment, proper operation, waterproof or watertight qualities, and all other intended functions.

Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any evidence that a problem exists with the term as it is currently used in the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

15-3 Log #767 NEC-P15 **Final Action: Reject**
(100.Power Production Equipment (New))

TCC Action: The Technical Correlating Committee directs that this proposal be forwarded to Code-Making Panel 4 for action in Article 705. This action shall be considered by the panel as a public comment.
Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Add text to read as follows:
Power Production Equipment. The generating source, and all distribution equipment associated with it, that generates electricity from another source such as chemical, wind, solar, or fuel. Examples include such items as generators, solar photovoltaic, and fuel cell systems.
Substantiation: By adding this definition, we show that this is another category of equipment. As such, it will need to follow the general rules for all equipment outlined in the code as well as the particular rules that we have for this special type of equipment.
Panel Meeting Action: Reject
Panel Statement: This is a blanket proposal to introduce a new technical term. As a blanket proposal to Article 100, this proposal does not appear to have been submitted to panel 1. Panel 15 does not have any proposals dealing with the use of this new term.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

2-27 Log #2421 NEC-P02 **Final Action: Reject**
(100.Power Safe Protector (PSP) (New))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: The definition of Power Safe Protector is needed in Article 100 due to several proposals made throughout the code to require Power Safe Protectors. Power Safe Protector devices reduce and/or eliminate electrical hazards not otherwise provided for in the current version of the code.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-101 Log #3580 NEC-P01 **Final Action: Reject**
(100.Premises (New))

Submitter: Michael Hyland, American Public Power Association
Recommendation: Add new text as follows:
Premises. The land and buildings of a user located on the user side of the ***service point*** (sometimes called the *utility-user network point of demarcation* for communication wiring) to electric supply, communication or signal premises wiring.
Substantiation: This proposal is developed based upon meetings of a Task Group of the NESC and NEC Committees on July 10th and Sep. 30th, 2008. Subsequently, NESC members of the Task Group provided input to this proposal. Another companion proposal is submitted to Article 100 Definitions for Area Lighting (new) and Premises Wiring (Systems).

This is an action to harmonize the purpose and scope sections of two ANSI standards, the NEC and the NESC, to mitigate conflicts between documents as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007*. Also, this action resolves the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words “or by other agreements”.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is necessary to appropriately revise the scope and coverage of the NEC to clearly delineate facilities covered by the NEC versus those covered by the NESC. The new definition of premises support the definition of service point that is currently in both the NEC and the NESC. Emphasis was added in several places by **bolding** or *italicizing* text.

This term is taken primarily from the definition in 800.2 presently in the 2008 NEC. Acceptance of this proposal will necessitate correlation with Article 800’s definition of premises. This definition is also being proposed in the NESC at this time.
Panel Meeting Action: Reject
Panel Statement: The proposed definition does not add clarity or usability. The submitter provided inadequate substantiation specific to this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
LABRAKE, JR., N.: Proposal 1-101 should have been accepted-in-principle. The panel statement that the definition does not add clarity or usability nor was there adequate substantiation is incorrect. Further background to support this proposal’s substantiation is referred to my ballot statements on Proposals 1-17 and 1-29 and the substantiation in proposal 1-107 regarding the need for defining “premises”. To address clarity, the proposed definition can be changed to relocate the parenthetical text to an Advisory Note and would read as follows:
Premises. The land and buildings of a user located on the user side of the service point to electric supply, communication or signal premises wiring.
Advisory Note: For communication wiring, service point is sometimes called the utility-user network point of demarcation.
Alternatively, the Panel could consider the proposed term in a new informative Annex discussed in my ballot statement on Proposal 1-12 as follows:
Annex “TBD”: “General Information Regarding Utility Electric Supply to Premises Wiring”
2. The following are terms for general understanding of where utility electric supply and premises wiring meet for what is covered and what is not covered by this Code as described in 90.2.
Premises. The land and buildings of a user located on the user side of the service point to electric supply, communication or signal premises wiring.
Advisory Note: For communication wiring, service point is sometimes called the utility-user network point of demarcation.
Explanation of Abstention:
ANTHONY, M.: This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want. Therefore the explanation of how we hope to help the harmonization process, refer to our comment on Proposal 1-17.

1-102 Log #3579 NEC-P01 **Final Action: Reject**
(100.Premises Wiring (System))

Submitter: Michael Hyland, American Public Power Association
Recommendation: Revise text to read as follows:
Premises Wiring (System). Interior and exterior wiring, including power, lighting, control, communication and other signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed~~. This includes~~ either (a) ~~wiring~~ from the service point or premises power source to the outlets or (b) where there is no service point, ~~wiring~~ from and including the power source to the outlets ~~where there is no service point~~.
Such wiring does not include wiring internal to appliances, luminaires, motors, controllers, motor control centers, and similar equipment, nor does it include utility equipment and wiring on the utility side of the service point.
Substantiation: This proposal is developed based upon meetings of a Task Group of the NESC and NEC Committees on July 10th and Sep. 30th, 2008. Subsequently, NESC members of the Task Group provided input to this proposal. Other companion proposals are submitted to Article 100 Definitions for Area Lighting (new) and Premises (new).

This is an action to harmonize the purpose and scope sections of two ANSI standards, the NEC and the NESC, to mitigate conflicts between documents as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007*. Also, this action resolves the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words “or by other agreements”.

*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change to revise the definition of Premises Wiring (System) is to support the present definition of service point and help differentiate application of the NESC from that of the NEC. Refer to the companion proposal to add new definition “premises” that is needed with this definition of Premises Wiring. This revised definition is necessary to appropriately revise the scope and coverage of the NEC to clearly delineate facilities covered by the NEC versus those covered by the NESC. The revised definition of premises wiring and new definition of premises support the definition of service point that is currently in both the NESC and the NEC. Emphasis was added in several places by **bolding** or *italicizing* text.

A new definition of Premises Wiring (Systems) is also being proposed in the NESC at this time.
Panel Meeting Action: Reject
Panel Statement: The proposed definition does not add clarity or usability. The submitter provided inadequate substantiation specific to this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
LABRAKE, JR., N.: Proposal 1-102 should have been accepted. The proposal does provide clarity and usability for the Code relative to premises wiring beginning where the utility supply ends at the service point. Refer to my ballot statements on Proposals 1-17 and 1-29.
Explanation of Abstention:
ANTHONY, M.: This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want. Therefore the explanation of how we hope to help the harmonization process, refer to our comment on Proposal 1-17.

1-103 Log #469 NEC-P01 **Final Action: Reject**
(100.Qualified Person)

Submitter: Joseph A. Tedesco, Tedesco Electrical Code Consultants, Inc.
Recommendation: Revise text to read as follows:
"Qualified Person. One who has been trained in the skills, and has knowledge related to the construction and operation of electrical equipment and installations, and has received formal documented and certified safety training to recognize and avoid the hazards involved. In addition, one who is certified and authorized to test, energize, clear, ground, tag, and lockout circuits and equipment in accordance with established safety practices and who is trained in first aid and in the proper care and use of protective equipment, such as rubber gloves, hard hat, safety glasses or face shields, and flash resistant clothing, in accordance with established safety practices."
Substantiation: The definition is inadequate and should be revised to make sure that everyone knows what their responsibilities are when working on electrical systems. NFPA 70E is not adopted by many and parts of it should be an Annex in the NEC.
Panel Meeting Action: Reject
Panel Statement: The proposed definition contains requirements and is, therefore, in conflict with 2.2.2 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-7 Log #220 NEC-P08 **Final Action: Reject**
(100.Raceway)

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise as follows:
Raceway. An enclosed channel ~~of metal or nonmetallic materials~~ designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this *Code*. Raceways include, but are not limited to, rigid metal conduit, rigid ~~nonmetallic~~ polyvinyl chloride conduit, intermediate metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit, high density polyethylene conduit, reinforced thermosetting resin conduit, flexible metallic tubing, flexible metal conduit, electrical nonmetallic tubing, electrical metallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, wireways, and busways, plenum signaling raceway, riser signaling raceway, general-purpose signaling raceway, plenum optical fiber raceway, riser optical fiber raceway, general-purpose optical fiber cable raceway, plenum communications raceway, riser communications raceway, general-purpose communications raceway, plenum CATV raceway, riser CATV raceway and general-purpose CATV raceway.
Substantiation: The proposed changes updates the list of raceways to include many that were not in existence when the definition of raceway was last revised. Most of these raceways are plastic raceways. The Society of the Plastics Industry would like to see the various types plastic raceways mentioned along with metallic raceways. In the first sentence we propose deleting "of metal or nonmetallic materials" because it adds nothing to the definition. The second sentence of the definition clearly informs the reader what materials are used to manufacture raceways.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-8 Log #1995 NEC-P08 **Final Action: Reject**
(100.Raceway)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: A pole enclosing conductors is not a raceway.
Substantiation: Present definition includes poles which then applies all applicable provisions for raceways.
Panel Meeting Action: Reject
Panel Statement: Some lighting poles can be a raceway. See 410.30(B).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-9 Log #2219 NEC-P08 **Final Action: Reject**
(100.Raceway)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Add the auxiliary gutters wiring method to the list of recognized raceways in the second sentence of this definition. "**Raceway.** An enclosed channel of metal or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this code. Raceways include, but are not limited to, rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible conduit, flexible metallic tubing, flexible metal conduit, electrical nonmetallic tubing, electrical metallic tubing, underfloor raceway, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, auxiliary gutters, wireways, and busways."
Substantiation: Clearly, an "auxiliary gutter" is a raceway as defined in the first sentence of "raceway" in Article 100. By **NOT** including this wiring method in the long list of other wiring methods, four of which actually include the word "raceway" as the named wiring method, the question is raised as to why it is NOT considered a raceway. Auxiliary gutters find more frequent use in the electrical industry than some of the other wiring methods included in the list, and its absence from the list potentially creates confusion. Adding it to the list increases code consistency and usability.
Panel Meeting Action: Reject
Panel Statement: While auxiliary gutters are used in some ways like raceways, their restriction of use prevents them from automatically being grouped with raceways. Auxiliary gutters shall be permitted to supplement wiring spaces at meter centers, distribution centers, switchboards, and similar points of wiring systems.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-10 Log #2715 NEC-P08 **Final Action: Reject**
(100.Raceway)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "cablebus" and "auxiliary gutters" or alternatively "cablebus and auxiliary gutters are not raceways".
Substantiation: Since the definitions are not limited to the raceways listed, it leaves cable bus and auxiliary gutters in limbo; they may or may not be considered raceways. They conform to the definition of raceway. If not raceways they are not covered by raceway rules that may apply, e.g., 230.7. Auxiliary gutters are usually listed as wireways, which are raceways. They are, or are not raceways, which should be clearly established. Though cablebus is not totally (solidly) enclosed neither is lighting busway or strut type channel raceway. Panel statement (proposal 8-1 in the 2007 ROP) that cable bus is ordinarily assembled at point of installation is irrelevant since this also applies to conduit, EMT, busways, channel raceway, wireway, surface raceway, underfloor raceway.
Panel Meeting Action: Reject
Panel Statement: While cablebus and auxiliary gutters are used in some ways like raceways, their restriction of use prevents them from automatically being grouped with raceways. Cablebus is ordinarily assembled at the point of installation from the components furnished or specified by the manufacturer, and auxiliary gutters shall be permitted to supplement wiring spaces at meter centers, distribution centers, switchboards, and similar points of wiring systems.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-11 Log #2976 NEC-P08 **Final Action: Reject**
(100.Raceway)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
Raceway. An enclosed channel of metal or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this Code. Raceways include, but are not limited to, rigid metal conduit, reinforced thermosetting resin conduit, rigid polyvinyl chloride conduit ~~rigid nonmetallic conduit~~, intermediate metal conduit, liquidtight flexible conduit, flexible metallic tubing, flexible metal conduit, electrical nonmetallic tubing, electrical metallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways,

wireways, and busways.
Substantiation: This proposal is intended simply to help CMP1 address the changes made in Chapter three of the 2005 cycle.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-7.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-104 Log #3139 NEC-P01 **Final Action: Reject**
(100.Restricted Access (New))

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Add new definition of restricted access to Article 100 as follows.
Restricted Access. Areas where exclusive control is maintained.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Service Drop, Service Lateral, Service Point, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is to add a new term to be used for both the NEC and the NESC intended to correlate the purpose and scope of both documents and to clarify the intent of exclusive control in the example of a utility supply in vaults within buildings.
Panel Meeting Action: Reject
Panel Statement: The proposed definition of "restricted access" does not fit the use of the term used elsewhere in the Code such as 240.6(C) and 708.5, which implies physical measures to prevent access. The submitter provided inadequate substantiation specific for this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

ANTHONY, M.: This proposal is one of a group of proposals which, if taken as a whole and accepted, would get us closer to harmonization of the NEC and the NESC – a shared goal that is in the interest of both groups and in the interest of the industry at large. Unfortunately, the NEC development process does not make it easy to make the simultaneous and coordinated changes necessary for the harmonization we all want. Therefore the explanation of how we hope to help the harmonization process, refer to our comment on Proposal 1-17.

LABRAKE, JR., N.: Proposal 1-104 should have been accepted. The panel statement that the definition is not used in two or more Articles is true, but as was discussed in the panel, there is no place in the NEC for the definition of terms used in Article 90 such as in other articles in the XXX.2 section. In addition, refer to my ballot statements on Proposals 1-17 and 1-29 and the substantiation in proposal 1-107 regarding the need for defining this term.

Alternatively, the Panel could consider the proposed term in a new informative Annex discussed in my ballot statement on Proposal 1-12 as follows:

Annex "TBD": "General Information Regarding Utility Electric Supply to Premises Wiring"
2. The following are terms for general understanding of where utility electric supply and premises wiring meet for what is covered and what is not covered by this Code as described in 90.2.

Restricted Access. Areas that are separated from public access by a spatial or physical barrier, such as an equipment enclosure, and that are accessible only under exclusive control.

1-105 Log #3510 NEC-P01 **Final Action: Reject**
(100.Reverse Logic Systems)

Submitter: Chad Gummere, Westminster, CO
Recommendation: Properly identify reverse logic systems that state the system is energized when the disconnecting means represent the system is deenergized.
Substantiation: None given.
Panel Meeting Action: Reject
Panel Statement: The proposal does not contain recommended text to be added or substantiation of the proposal as required by 4.3.3 of the NFPA Regulations Governing Committee Projects.

There is no need for this definition as the term is not used in NFPA 70.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-12 Log #2076 NEC-P08 **Final Action: Reject**
(100.Rigid Nonmetallic Conduit (New))

Submitter: Jim Davis, Eugene, OR
Recommendation: Insert a new definition for "Rigid Nonmetallic Conduit: "A rigid nonmetallic raceway of circular cross section constructed to include applications both aboveground and underground where specific characteristics are met which includes Types PVC and RTRC."
Substantiation: With the new title to Article 352 in the 2008 NEC, and with the addition of new Article 355, the exact meaning of "rigid nonmetallic conduit" and what is referred to by these words is no longer clear. The words "rigid nonmetallic conduit" are used no less than 20 times between Articles 100 and 430 of the 2008 NEC, and it is not clear about which raceway is covered by those references. A word search count was not performed beyond Article 430, but it is certain to appear many times elsewhere in the NEC. This proposed new definition would clarify which wiring methods are discussed in many places in the NEC and would help designers, installers, and inspectors understand the code intent where this reference is made.
Panel Meeting Action: Reject
Panel Statement: CMP-8 identifies each raceway type in the scope of its respective article. A generic definition to more than one article may confuse the users and will not serve any purpose. The definitions and uses permitted for PVC and RTRC belong in Articles 352 and 355 respectively.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

5-27 Log #2339 NEC-P05 **Final Action: Reject**
(100.Separately Derived System)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise the definition for Separately Derived System as follows: "A premises wiring system ~~whose~~ of which power is derived indirectly from a service or from a source of electric energy or equipment other than a service. Such systems have no direct electrical interconnection of normally current-carrying conductors, including a solidly connected grounded circuit conductor~~, to supply conductors originating in another system~~. Interconnection of bonding conductors is acceptable."
Substantiation: The text revisions of the definition for "Separately Derived System" aligns with the variety of systems intended to be included by this description and clarifies how those systems are to be configured to meet the conditions of this definition. The existing definition seems to suggest that the power consumption for all loads connected to transformers will NOT show up on the utility's billing (service supplied) statement! By adding "indirectly from a service," transformers can legitimately be classified as "separately derived systems." Photovoltaic systems and battery powered systems DO indeed derive their power "from a source of electric energy or equipment other than a service" as the current definition points out. The rewording in the second sentence, attempts to clarify that bonding conductors DO NOT disqualify a system as being "separately derived."
Panel Meeting Action: Reject
Panel Statement: The word "equipment" in the first sentence is intended to incorporate transformers that are connected as separately derived systems. Other changes related to bonding conductors are not considered system conductors so long as a direct connection to the electrical system is not made.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16 Negative: 0

5-28 Log #3260 NEC-P05 **Final Action: Reject**
(100.Separately Derived System)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence as follows:

Such systems shall have no direct circuit conductor connection, including a ~~solidly~~ directly connected grounded circuit conductor, to supply circuit conductors originating inanother system.
Substantiation: Editorial. Direct electrical connection should apply to circuit conductors since a metal raceway or cable between a generator or transformer and another system provides a connection between grounded conductors connected to enclosures of each system, as does grounding electrode conductors connected to the same grounding electrode system.
Panel Meeting Action: Reject
Panel Statement: Connections related to equipment grounding conductors do not violate the definition of a separately derived system so long they do not connect directly to system components. The connection of a grounding electrode conductor is required at the same point as the system bonding jumper and does not create a conflict with the definition.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

4-4 Log #2006 NEC-P04 **Final Action: Reject**
(100.Service Cable)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows: Service conductors made up in multiconductor ~~the~~ form ~~of multiconductor cable~~ or individual conductors.
Substantiation: Edit. "Cable" (not defined) may be single conductor or multiconductor. Service conductors by definition include service laterals and service –entrance conductors which may be individual conductors. Proposal clarifies that "cable" is not intended to be limited to multiconductor types as may be inferred by "form of a cable". Present definition uses the term being defined (cable) in the definition.
Panel Meeting Action: Reject
Panel Statement: The submitter is not correct in the assumption that the current definition does not include all cable types, even those made up of individual single conductors the current definition covers all conductors that are placed together to be used as service cables whether they are single conductors, preformed unjacketed cable assemblies, or jacketed cable assemblies.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: In addition to the Panel Statement the submitter should reference the existing definition of Service-Entrance Cable that is located in Section 338.2 of the NEC.

4-5 Log #447 NEC-P04 **Final Action: Accept in Principle**
(100.Service Drop)

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
Service Drop. The overhead ~~service~~ conductors from the last pole or other aerial support to and including the splices, if any, connecting to the service-entrance conductors at the building or other structure.
Substantiation: The current definition of Service Drop refers to overhead "*service conductors*". Because "*service conductors*" is also a defined term, ("*The conductors from the service point to the service disconnecting means*"), there can be no NEC defined service drop conductors on the utility side of the service point. This creates a conflict when applying the definitions to the requirements of various code sections that refer to service drops. 230.40 states: "*Each service drop or lateral shall supply only one set of service-entrance conductors*". With the current definition, for example, there is no "service drop" on an overhead service where the service point is at the point of connection to the service entrance conductors at the weather head, and therefore, the requirements of 230.40 do not apply. The same problem exists when trying to enforce the point of attachment and support requirements of 230.26 thru 29. The current definition is also in conflict with 90.2(B)(5)a. This section refers to a service drop that is under the exclusive control of an electric utility. Removing the word "*service*" from the definition of service drop would include the conductors on the utility side of the service point in the definition of service drop, thus allowing us to recognize these conductors as service drop conductors for application of other code requirements. This change would not affect the scope of enforcement of these conductors because 90.2 is very clear that conductors under the exclusive control of an electric utility are not covered by the NEC.
A similar change is being proposed to the definition of "service lateral".
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 4-8.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See my Explanation of Negative on Proposal 4-8 (Log #3503).

4-6 Log #2556 NEC-P04 **Final Action: Accept in Principle**
(100.Service Drop)

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise as follows:
Service Drop: The overhead ~~service~~ conductors from the last pole...
Substantiation: The use of the phrase "service conductors" in the definition of "service drop" is misleading because service conductors, by definition, are on the customer side of the service point. The conductors that extend from the last pole to the weatherhead on a building may or may not be on customer side of the service point.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 4-8.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See my Explanation of Negative on Proposal 4-8 (Log #3503).

4-7 Log #3140 NEC-P04 **Final Action: Accept in Principle**
(100.Service Drop)

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Revise the definition of service drop and add the following new fine print note in Article 100 as follows.
Service Drop. The overhead ~~service~~ conductors between the electric supply or communication line and the building or structure being served ~~from the last pole or other aerial support to and including the splices, if any, connecting to the service-entrance conductors at the building or other structure~~.
FPN: Service drops are typically on the line side of the service point provided by the serving utility's conditions of service. See Figure 90.2 for a general illustration of where utility electric supply and premises wiring meet for what is covered by this Code and what is not covered.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Lateral, Service Point, and Utilization Equipment.
This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" *.
*Refer to the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 in Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf).
Specifically, the rationale for this change is to provide clarity where the NEC applies to premises wiring meeting the supply facilities under exclusive control of utilities at the service point and to separately derived systems that are not connected to a service point. This proposal correlates the definition of "service drop" with the 2007 NESC same defined term. The service drop is overhead conductors provided by the governmental or regulated serving utility's local requirements or those of a private utility under conditions of service (e.g. tariffs with service applications). As such, premises wiring attaches to a service drop at a service point.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 4-8. The FPN is not necessary.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See my Explanation of Negative on Proposal 4-8 (Log #3503).

4-8 Log #3503 NEC-P04 **Final Action: Accept in Part**
(100.Service Drop)

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Revise text to read as follows:
Service Drop. (The overhead service conductors between the utility distribution system and the service point for the premises wiring system).
Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to Code-Making Panel 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept in Part
Delete the word "service" between overhead and conductors and omit "for the premises wiring system".
Panel Statement: The definition of service drop is being revised to clearly identify these overhead conductors as being under the exclusive control of a serving utility. The word "service" was removed to harmonize with the definition of service conductors. The remainder of the words after service point were removed for clarity.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
MCDANIEL, R.: I am balloting affirmative with comment on this proposal, however the panel action should have been "Accept in Part and in Principle", to change "utility distribution" system to "utility electric supply" system. The proposed definition of Service Drop should read as follows::
100 Service Drop. The overhead conductors between the utility ~~distribution~~ electric supply system and the service point.

The term "distribution" restricts application of this definition to overhead services supplied from utility distribution systems, which typically operate at voltages up to and including 34.5 kV. The term "distribution" excludes services operating at voltages above 34.5 kV. The term "electric supply" is more general, and will include utility overhead services supplied from both distribution and transmission systems.

4-9 Log #3525 NEC-P04 **Final Action: Accept in Principle**
(100.Service Drop)

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise the existing text of the 2008 NEC as follows:
Service Drop. The overhead service conductors from the service point ~~last pole or other aerial support to and including the splices, if any, connecting~~ to the point of connection to service-entrance conductors at the building or other structure.
FPN: If the service point is at the weatherhead or other point of connection to service-entrance conductors, there may not be a service drop that is covered by the NEC.
Substantiation: This proposed change recognizes that the definition of Service Conductors in Article 100 states "The conductors from the service point to the service disconnecting means." Thus, service drops, if provided, controlled, and maintained by the electric utility, are on the supply side of the "service point" as defined in Article 100 and are not covered by the Code as stated in 90.2(B)(5).
The proposed Fine Print Note will assist the user of the NEC to understand the concepts included in the definition of "service drop."
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 4-8. The FPN is not necessary.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See my Explanation of Negative on Proposal 4-8 (Log #3503).

4-10 Log #3365 NEC-P04 **Final Action: Reject**
(100.Service Equipment)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main control and cutoff of the supply.
Substantiation: The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." This revised definition, as well as a corresponding proposed change to the definitions of "Service Cable" to "Service-Entrance Cable" and "Service Conductors" to "Service-Entrance Conductors" (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing this definition (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: There are always service conductors but there may not always be service entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: The Panel made several changes in the various definitions and requirements for the installation of conductors involved with bringing power to a building. Most of these changes were made in response to multiple requests to clarify what is utility installed and what is privately installed. These changes should address the concerns of the submitter and add the requested clarification. The submitter is incorrect when stating that under existing code requirements that all service drops and service laterals are installed by utility companies that really depends on which side of the service point they are on. The new definitions clarify that and it is intended that there be plenty of public comment on what the panel has done in an effort to clarify this, some may truly feel that if it ain't broke don't fix it and some may not. Although even under the new definition scheme there will always be service-entrance conductors the definition presented by the submitter does not reflect the new definition scheme.

4-11 Log #4705 NEC-P04 **Final Action: Reject**
(100.Service Equipment, Suitable for (New))

Submitter: Clyde V. Carl, North Carolina Dept. of Administration/State Construction Office
Recommendation: Add new text as follows:
Service Equipment, Suitable for. Equipment that can accommodate not more than six main disconnection devices, each provided with overcurrent protection, and that has a neutral conductor termination point that is insulated from the enclosure.
Substantiation: Common misunderstandings are that service entrance equipment is manufactured with special bracing and that breakers for service entrance equipment are especially listed for use in service entrance equipment. In UL 869A, *Reference Standard for Service Equipment,* fourth edition, one learns in Section 14.2, Insulated neutral, Paragraph 14.2.1, that, "Equipment having a neutral insulated from the enclosure, intended for use as service equipment, and that can accommodate not more than six main disconnecting means shall be marked "Suitable for use as service equipment."
Panel Meeting Action: Reject
Panel Statement: The requirements for equipment to be marked and identified as suitable for use as service equipment are in the product standards. If the equipment is listed and marked then it can be used as service equipment, which is defined.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-12 Log #448 NEC-P04 **Final Action: Accept in Principle**
(100.Service Lateral)

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
Service Lateral. The underground ~~service~~ conductors between the street main, including any risers at a pole or other structure or from transformers, and the first point of connection to the service-entrance conductors in a terminal box or meter or other enclosure, inside or outside the building wall. Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.
Substantiation: The current definition of Service Lateral refers to underground "*service conductors*". Because "*service conductors*" is also a defined term, ("*The conductors from the service point to the service disconnecting means*"), there can be no NEC defined service lateral conductors on the utility side of the service point. This creates a conflict when applying the definitions to the requirements of other code sections that refer to service laterals. 230.40 states: "*Each service drop or lateral shall supply only one set of service-entrance conductors*". With the current definition, for example, there is no "*service lateral*" on an underground service where the service point is at the point of connection to the service entrance conductors in a terminal box or meter or other enclosure, and therefore, the requirements of 230.40 do not apply. The current definition is also in conflict with 90.2(B)(5)a. This section refers to a service lateral that is under the exclusive control of an electric utility. Removing the word "*service*" from the definition of service lateral would include the conductors on the utility side of the service point in the definition of service lateral, thus allowing us to recognize these conductors as service lateral conductors for application of other code requirements. This change would not affect the scope of enforcement of these conductors because 90.2 is very clear that conductors under the exclusive control of an electric utility are not covered by the NEC.
A similar change is being proposed to the definition of "service drop".
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 4-15 and 4-16.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comments on 4-15 and 4-16.

4-13 Log #2224 NEC-P04 **Final Action: Accept in Principle**
(100.Service Lateral)

Submitter: Allen Forbes, L & A Electric, Inc.
Recommendation: Revise text to read as follows:
Service Lateral. The underground service conductors between the street main, including any risers at a pole or other structure or from transformers, and the ~~first~~ point of connection to the service entrance-conductors in a terminal box or meter or other enclosure, ~~inside or outside~~ at the building wall. Where there is no terminal box, meter or other enclosure, the point of connection is considered

to be the point of entrance of the service conductors into the building.
Substantiation: The existing definition has been misinterpreted when a remote meter or terminal box has been installed. It implies that at the remote meter or terminal box the service lateral ends because this is the "first" point of connection. This change would clarify that the service lateral ends at the building or structure where the service equipment is located.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on proposal 4-15 and 4-16.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comments on 4-15 and 4-16.
Comment on Affirmative:
ROGERS, J.: The submitter is referenced to the definition of "Service-Entrance Conductors Underground System" and "Service Lateral" once the service lateral is terminated in any way it ends and the conductors from that point into the service equipment are service-entrance conductors.

4-14 Log #3141 NEC-P04 **Final Action: Accept in Principle**
(100.Service Lateral)

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Revise the definition of service lateral and add the following new fine print note in Article 100 as follows.
Service Lateral. The underground ~~service~~ conductors between the utility source of supply~~street main~~, including any risers at a pole or other structure ~~or from transformers~~, and the first point of connection to the service-entrance conductors in a terminal box or meter socket or other enclosure, inside or outside the building wall. Where there is no terminal box, meter socket, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.
FPN: Service laterals are typically on the line side of the service point provided by the serving utility's conditions of service. See Figure 90.2 for a general illustration of where utility electric supply and premises wiring meet for what is covered by this Code and what is not covered.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Point, and Utilization Equipment.
This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" *.
*Refer to the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 in Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf).
Specifically, the rationale for this change is to provide clarity where the NEC applies to premises wiring meeting the supply facilities under exclusive control of utilities at the service point and to separately derived systems that are not connected to a service point. The service lateral consists of underground conductors provided by the governmental or regulated serving utility's local requirements or those of a private utility under conditions of service (e.g. tariffs with service applications). As such, premises wiring attaches to a service lateral at a service point.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposals 4-15 and 4-16. The FPN is not necessary.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comments on 4-15 and 4-16.

4-15 Log #3504 NEC-P04 **Final Action: Accept in Principle**
(100.Service Lateral)

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Revise text to read as follows:
~~Service Lateral.~~ (Underground Service Conductors.) The underground service conductors between the (service point) ~~street main, including any risers at a pole or other structure or from transformers,~~ and the first point of connection to the service-entrance conductors in a terminal box or meter or other enclosure, inside or outside the building wall. Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.
Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to CMP 4 by the TCC as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". This proposal is intended to clarify where the underground service conductors begin and end in reference to the NEC as installed by other than electric utility companies. If these conductors are installed by electric service utility companies by established agreements or easements, then the NEC does not apply and the utility can define these conductors as they see fit. The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept in Principle
New Definition: Service Conductors, Underground. The underground conductors between the service point and the first point of connection to the service-entrance conductors in a terminal box, meter or other enclosure, inside or outside the building wall. Where there is no terminal box, meter, or other enclosure, the point of connection is considered to be the point of entrance of the service conductors into the building.
Panel Statement: To define the conductors provided between the service point and the service entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-16 Log #3505 NEC-P04 **Final Action: Accept**
(100.Service Lateral)

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Add text to read as follows:
Service Lateral. The underground conductors between the utility distribution system and the service point.
Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to CMP 4 by the TCC as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". This proposal is intended to clarify where service lateral conductors begin and end in reference to the NEC as installed by electric utility companies. If these conductors are installed by electric service utility companies by established agreements or easements, then the NEC does not apply and the utility can define these conductors as they see fit. The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
MCDANIEL, R.: I am balloting affirmative with comment on this proposal, however the panel action should have been "Accept in Principle", to change "utility distribution" system to "utility electric supply" system. The proposed definition of Service Lateral should read as follows:
100 Service Lateral. The underground conductors between the utility ~~distribution~~ electric supply system and the service point
The term "distribution" restricts application of this definition to underground services supplied from utility distribution systems, which typically operate at voltages up to and including 34.5 kV. The term "distribution" excludes services operating at voltages above 34.5 kV. The term "electric supply" is more general, and will include utility underground services supplied from both distribution and transmission systems.

4-17 Log #3526 NEC-P04 **Final Action: Accept in Principle**
(100.Service Lateral)

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise the existing text of the 2008 NEC as follows:
Service Lateral. The underground service conductors, on the load side of the service point, between the utility supply ~~street main, including any risers at a pole or other structure or from transformers,~~ and the first point of connection to the service-entrance conductors in a terminal box or meter or other enclosure, inside or outside the building wall. This includes conductors from the street main, any risers at a pole or other structure, or from transformers. If ~~Where~~ there is no terminal box, meter, or other enclosure at the load end of the conductors, the point of connection is considered to be the point of entrance of the service conductors into the building.
Substantiation: Since the service lateral is a subset of service conductors, the definition needs to make reference to being on the load side of the "service point." The definition of "Service Conductors" clearly points out the conductors extend from the service point to the service disconnecting means. So, a service lateral that is covered by the Code extends from the service point to the service-entrance conductors, if they exist.
Relocating the phrase on risers at a pole, etc., is for simplicity and clarity.

Other changes are for clarity.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle

Panel Statement: The definition of service lateral has been clarified See panel action and statement on Proposals 4-15 and 4-16.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: See comments on 4-15 and 4-16.

4-18 Log #3142 NEC-P04 **Final Action: Accept in Part**
(100.Service Point)

Submitter: Neil F. LaBrake, Jr., National Grid USA

Recommendation: Add the following new text for line and load sides of the service point and fine print notes to the definition of service point in Article 100 as follows. The defined term is reprinted for clarity.

Service Point. The point of connection between the facilities of the serving utility and the premises wiring.

<u>*FPN*: The service point can be described as the point of demarcation between where the serving utility ends and the premises wiring begins. The serving utility generally specifies the location of the service point based on their conditions of service. See Figure 90.2 for a general illustration of where utility electric supply and premises wiring meet for what is covered by this Code and what is not covered.</u>

<u>**Line Side of Service Point.** See definition for "service".</u>

<u>*FPN*: See ANSI C2-2007, *National Electrical Safety Code* for definitions of "lines", "electric supply station", and "electric supply equipment" that further describe a utility supply.</u>

<u>**Load Side of Service Point.** See definitions of "premises wiring (systems)" and "utilization equipment".</u>

Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, and Utilization Equipment.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.

* Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is to provide clarity where the NEC applies to premises wiring meeting the supply facilities under exclusive control of utilities at the service point and to separately derived systems that are not connected to a service point. The location of the service point and utility equipment to provide electric service to premises wiring is dependent upon the governmental or regulated serving utility's local requirements or those of a private utility under conditions of service (e.g. tariffs with service applications). This revised term is also proposed in the NESC at this time and intended to correlate the purpose and scope of both documents.

Panel Meeting Action: Accept in Part

Accept the first two sentences of the FPN. Reject the remainder of the proposal.

Panel Statement: The first two lines of the proposed FPN adds sufficient clarity. The remainder of the proposal is not needed.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-19 Log #3362 NEC-P04 **Final Action: Reject**
(100.Service-Entrance Cable)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.

Substantiation: The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." This revised definition, as well as a corresponding proposed change to the definition of "Service Conductors" to "Service<u>-Entrance</u> Conductors" (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing this definition (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Not all service cables are service-entrance cables.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-20 Log #3363 NEC-P04 **Final Action: Reject**
(100.Service-Entrance Conductors)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.

Substantiation: The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." This revised definition, as well as a corresponding proposed change to the definition of "Service Cable" to "Service<u>-Entrance</u> Cable" (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing this definition (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: The existing definition for service-entrance conductors is correct.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action. The submitter is incorrect in the assertion that under current code requirements "service laterals" and "service drop conductors" are always installed by utility companies.

4-20a Log #CP401 NEC-P04 **Final Action: Accept**
(100 Service-Entrance Conductors, Overhead System)

Submitter: Code-Making Panel 4,

Recommendation: Change the definition of Service-Entrance Conductors, Overhead System to read as follows:

The service conductors between the terminals of the service equipment and a point usually outside the building, clear of building walls, where joined by tap or splice to the service drop <u>or overhead service conductors</u>.

Substantiation: The panel is submitting this proposal to harmonize these definitions with the remainder of the changes made to the terms service drop and service lateral.

Panel Meeting Action: Accept

Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-20b Log #CP402 NEC-P04 **Final Action: Accept**
(100.Service-Entrance Conductors, Underground System)

Submitter: Code-Making Panel 4,
Recommendation: Change the definition of Service-Entrance Conductors, Underground System to read as follows:
The service conductors between the terminals of the service equipment and the point of connection to the service lateral <u>or underground service conductors</u>.
Substantiation: The panel is submitting this proposal to harmonize these definitions with the remainder of the changes made to the terms service drop and service lateral.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

10-5 Log #2932 NEC-P10 **Final Action: Reject**
(100.Short-Circuit Current Rating)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
Short-Circuit Current Rating. The prospective symmetrical fault current at a nominal voltage <u>the</u> ~~to which an~~ apparatus or system is <u>rated</u> ~~able~~ to be connected <u>or interrupt</u> without sustaining damage exceeding defined acceptance criteria.
Substantiation: This is intended to be an editorial rather than substantive proposal. It seems the present definition is flawed as it refers to the apparatus or system being "able to be connected" rather than being suitable to interrupt or being rated for the short-circuit current. The fact the equipment can be physically connected to a source of some capacity does not include a requirement that the equipment be rated for the voltage and current it is connected to.
Panel Meeting Action: Reject
Panel Statement: A branch circuit overcurrent protective device has an interrupting rating. A component, such as a contactor, or a system, such as an industrial control panel, has a short-circuit current rating. An overcurrent protective device within a system, such as a circuit breaker in an industrial control panel, has an interrupting rating.
The remaining proposed editorial changes, including the replacement of "able" with "rated", do not improve the clarity or usabliity of this definition as the title of the definition is "Short-Circuit Current Rating".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
COOK, D.: Article 100 includes a separate definition for "interrupting rating". Therefore the proposed text "or interrupt" is not applicable to the definition of short-circuit current rating. However, I believe the other proposed revisions improve clarity. I believe the action should be to accept in part.
HIDAKA, J.: The panel action should have been, "Accept in Principle in Part," and revised the text to delete the word "able" and replace with the word "identified" so the definition would read:
"Short-Circuit Current Rating. The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is ~~able~~ <u>identified</u> to be connected without sustaining damage exceeding defined acceptance criteria."
This is similar to what the panel agreed to do in proposal 10-4 for a substitute of the word "intended" as the word "identified" is already defined in the NEC.
In the same context, "able" should be replaced as it suggests <u>any</u> application where a connection can be made which ignores the rating of the device.
"Identified" is defined as "Recognizable as suitable for the purpose...".

3-5 Log #1002 NEC-P03 **Final Action: Reject**
(100.Signalling Circuit)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~A~~ <u>An</u> electrical circuit ~~that energizes~~ <u>whose sole function is to energize</u> signaling equipment.
Substantiation: Edit. Service and feeder conductors also supply current that energizes signaling equipment.
Panel Meeting Action: Reject
Panel Statement: The proposed change is incorrect that the sole function of a "signaling circuit" is to energize signaling equipment. The primary function may be to energize the equipment but the circuit may also provide secondary functions, such as low or high frequency signals with frequency modulation provided on the power circuit.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-6 Log #4699a NEC-P14 **Final Action: Reject**
(100.Supervised Installation (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: Define "supervised installation" as follows:
<u>A facility, or portion of a facility where each of the following conditions are met:</u>
<u>(1) Conditions of design and installation are provided under engineering supervision.</u>
<u>(2) Qualified persons with documented training and experience provide maintenance, monitoring, and servicing of the system.</u>
<u>(3) Where electric service and electrical maintenance is continuously provided by a single building management.</u>
A copy of this proposal has also been sent to Code-Making Panel 6.
Substantiation: 1. This definition has been derived from other appearances of the term elsewhere in the NEC. (It is to be distinguished from the technical characteristics of some life safety systems such as supervised sprinkler systems.)
2. Many organizations are reducing first costs by installing less expensive equipment (or systems that require fewer overcurrent devices, for example) so if the first cost has been thrifted, the O and M budget may increase.
3. A single building management may be the Owner, or an Owner's agent, and have an interest in all aspects of electrical safety if the scope of that responsibility can be described in the National Electrical Code.
Panel Meeting Action: Reject
Panel Statement: The term "supervised installation" is not used in Chapter 5 and a definition is, therefore, not necessary. The term is only found in 210.19(B)(2) and 215.2(B)(3). Both of these sections define the term.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

6-7 Log #4699 NEC-P06 **Final Action: Reject**
(100.Supervised Installation (New))

TCC Action: The Technical Correlating Committee understands that this issue was acted on by Code-Making Panel 1 in Proposal 1-105a.
Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: Define "supervised installation" as follows:
<u>A facility, or portion of a facility where each of the following conditions are met:</u>
<u>(1) Conditions of design and installation are provided under engineering supervision.</u>
<u>(2) Qualified persons with documented training and experience provide maintenance, monitoring, and servicing of the system.</u>
<u>(3) Where electric service and electrical maintenance is continuously provided by a single building management.</u>
A copy of this proposal has also been sent to Code-Making Panel 14.
Substantiation: 1. This definition has been derived from other appearances of the term elsewhere in the NEC. (It is to be distinguished from the technical characteristics of some life safety systems such as supervised sprinkler systems.)
2. Many organizations are reducing first costs by installing less expensive equipment (or systems that require fewer overcurrent devices, for example) so if the first cost has been thrifted, the O and M budget may increase.
3. A single building management may be the Owner, or an Owner's agent, and have an interest in all aspects of electrical safety if the scope of that responsibility can be described in the National Electrical Code.
Panel Meeting Action: Reject
Panel Statement: This issue is not within the scope of Panel 6.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

1-105a Log #4699b NEC-P01 **Final Action: Reject**
(100.Supervised Installation (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: Define "supervised installation" as follows:
<u>A facility, or portion of a facility where each of the following conditions are met:</u>
<u>(1) Conditions of design and installation are provided under engineering supervision.</u>
<u>(2) Qualified persons with documented training and experience provide maintenance, monitoring, and servicing of the system.</u>
<u>(3) Where electric service and electrical maintenance is continuously provided by a single building management.</u>
A copy of this proposal has also been sent to Code-Making Panels 6 and 14.
Substantiation: 1. This definition has been derived from other appearances of the term elsewhere in the NEC. (It is to be distinguished from the technical characteristics of some life safety systems such as supervised sprinkler systems.)

2. Many organizations are reducing first costs by installing less expensive equipment (or systems that require fewer overcurrent devices, for example) so if the first cost has been thrifted, the O and M budget may increase.

3. A single building management may be the Owner, or an Owner's agent, and have an interest in all aspects of electrical safety if the scope of that responsibility can be described in the National Electrical Code.

Panel Meeting Action: Reject

Panel Statement: The proposed definition contains requirements or recommendations that violate the NEC Style Manual Section 2.2.2.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: Many Article 100 definitions contain implicit requirements. In this case, the requirements are essentially bulleted, thereby putting the requirements in greater relief. The rhetorical structure of this concept should not take away from its merit, however. The concept of a supervised installation is embedded in many NFPA documents and needs to be integrated into the NEC in order for it to stay in step with the times. This proposal will be revised and resubmitted in the ROC stage.

LABRAKE, JR., N.: Proposal 1-105a should have been accepted-in-principle-in-part. The last part "continuously provided by a single building management" could be accepted and the remainder of the proposal in principle. See my ballot statement for proposal 1-106. In addition, refer to my ballot statements on proposals 1-17 and 1-29 and the substantiation in proposal 1-107 regarding the need for defining "supervised installations".

1-106 Log #3445 NEC-P01 **Final Action: Reject**
(100.Supervised Installation (New))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Add the following definition of supervised installation to Article 100:

Supervised Installation. Conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system.

Substantiation: Edison Electric Institute bases this proposal on Code Making Panel 1's statement to reject Proposal 1-4 in the A2007 NEC ROP on page 70-3 and Mr. LaBrake's Explanation of Negative to accept Comment 1-1 in the A2007 NEC ROC *.

* Refer to the NFPA 2007 Annual Meeting Transcript (http://www.nfpa.org/assets/files/PDF/CodesStandards/A07TranscriptFinal.pdf) pertaining to this issue in Code Making Panel 1 of NFPA 70.

EEI recognizes the need for the term "supervised installation" to clarify its meaning in a companion proposal to revise 90.2(C) with a new second paragraph. Providing a reference in the NEC such as to the NESC for more information to cover special systems such as those 1000 volts and greater will be helpful to the AHJ to use the NESC that can cover industrial complexes and utility interactive systems (such as lightly regulated generation plants). See 2007 NESC Rule 011A, second sentence.

Panel Meeting Action: Reject

Panel Statement: The proposed definition is not consistent with how the term "supervised installation" is used elsewhere in the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: The term "supervised installation" does not appear in the NEC yet. It is being proposed because a common understanding of it will build the foundation for harmonization between the NEC and NESC.

LABRAKE, JR., N.: Proposal 1-106 should have been accepted-in-principle. This proposal should include the last part "continuously provided by a single building management" from proposal 1-105a to the proposed definition as follows:

Supervised Installation. Conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system continuously provided by a single building management.

In addition, refer to my ballot statements on proposals 1-17 and 1-29 and the substantiation in proposal 1-107 regarding the need for defining "supervised installations".

Alternatively, the Panel could consider the proposed term in a new informative Annex discussed in my ballot statement on Proposal 1-12 as follows:

Annex "TBD": "General Information Regarding Utility Electric Supply to Premises Wiring"

2. The following are terms for general understanding of where utility electric supply and premises wiring meet for what is covered and what is not covered by this Code as described in 90.2.

Supervised Installation. Conditions of maintenance and engineering supervision ensure that only qualified persons monitor and service the system continuously provided by a single building management.

10-6 Log #2166 NEC-P10 **Final Action: Accept**
(100.Supplementary Overcurrent Protective Device)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

~~Supplementary~~ Overcurrent Protective Device, Supplementary. A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch circuit overcurrent protective device.

Substantiation: The change to the title of this definition will allow for the grouping of all overcurrent devices within the definitions. This provides for increased clarity for the NEC user.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-7 Log #2733 NEC-P10 **Final Action: Accept**
(100.Supplementary Overcurrent Protective Device)

Submitter: Timothy S. Owens, City of Santa Clara

Recommendation: Revise text to read as follows:

~~Supplementary~~ Overcurrent Protective Device, Supplementary. A device intended to provide limited overcurrent protection for specific applications and utilization equipment such as luminaires and appliances. This limited protection is in addition to the protection provided in the required branch circuit by the branch circuit overcurrent protective device.

Substantiation: The change to the title of this definition will allow for the grouping of all overcurrent device definitions. This provides for increased clarity for the NEC user.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-8 Log #2557 NEC-P10 **Final Action: Reject**
(100.Tap Conductor (New))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute

Recommendation: Add a new definition to Article 100 as follows:

Tap Conductor. A conductor, other than a service conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described in 240.4.

Substantiation: The term "tap conductor", as defined in Section 240.2, is used in more than one code article and should, therefore, be defined in Article 100.

Panel Meeting Action: Reject

Panel Statement: The definition of the term "tap conductor" must remain in Article 240. As used in Article 240 the term "tap conductor" is "…a conductor, other than a service conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described elsewhere in 240.4."

However the global use of this term does not always address a current carrying conductor. See 250.64(D)(1).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-3 Log #4102 NEC-P12 **Final Action: Accept in Principle**
(100.Uninterruptible Power Supply (New))

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with 2.2.2 of the NEC Style Manual.

This action will be considered by the panel as a public comment.

Submitter: Ray Stanko, Underwriters Laboratories, Inc.

Recommendation: Add the following new definition.

Uninterruptible Power Supply. A power supply used to provide alternating current power to a load for some period of time in the event of a utility power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of utility voltage and frequency variations.

Substantiation: The proposed definition is consistent with National Standards for uninterruptible power supply equipment.

Panel Meeting Action: Accept in Principle

Add new definition to Article 100 in alphabetical order to read as follows:

Uninterruptible Power Supply. A power supply used to provide power to a load for some period of time in the event of a power failure. In addition, it may provide a more constant voltage and frequency supply to the load, reducing the effects of voltage and frequency variations.

Panel Statement: CMP-12 edited the submitter's text and deleted "alternating current" and "utility" to not limit the definition to AC or denote that the UPS applies strictly to power loss from the utility.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

1-107 Log #3143 NEC-P01 **Final Action: Reject**
(100.Utilization Equipment)

Submitter: Neil F. LaBrake, Jr., National Grid USA
Recommendation: Revise the definition of utilization equipment in Article 100 as follows.
Utilization Equipment. An electrical installation~~Equipment~~ that uses~~utilizes~~ electric or light energy for electronic, electromechanical, chemical, heating, lighting, testing, communication, signaling, or similar purposes on the premises wiring side of the service point.
Substantiation: As the Edison Electric Institute NESC & NEC representative in meetings of the NESC and NEC Committees' Ad Hoc Task Group on July 10th and Sep. 30th, 2008, I am submitting this proposal based upon discussions in those meetings to mitigate conflicts between the NESC and NEC documents primarily with the location of utility facilities on private property under "other agreements". I facilitated sub-task group teleconference sessions on July 29th, 2008 and September 9th & 15th, 2008 that included Messrs. J. Dollard, IBEW (member of the NESC-NEC Ad Hoc Task Group); P. Hickman, IBEW; and T. Adams, EEI. Subsequently, NESC members of the NESC-NEC Ad Hoc Task Group provided input to this proposal. Several companion proposals regarding this subject are submitted to 90.1(C), 90.2, 90.2(A), 90.2(A)(3), 90.2(A)FPN new, 90.2(B)FPN new, 90.2(B)(5), 90.2(B)FPN to (4) & (5), and Article 100 Definitions for Exclusive Control (new), Restricted Access (new), Service Drop, Service Lateral, and Service Point.

This is one action along with the companion proposals to resolve the ongoing conflict in 90.2(B)(5)b contained in the 2008 NEC caused by the removal of the words "or by other agreements" as encountered in the NFPA Standards Council Appeals Hearings on the 2008 NEC adoption in July 2007 *.
*Refer to Final Decision on Appeal numbers #07-24 (SC# 07-7-39) and #07-7 (SC# 07-7-5-m) in the NFPA archives (http://www.nfpa.org/itemDetail.asp?categoryID=837&itemID=35006 and http://www.nfpa.org/assets/files/PDF/Standards%20Council/TranscriptSCMeetingJuly07.pdf) pertaining to this issue.

Specifically, the rationale for this change is to revise the term to be used for both the NEC and the NESC intended to correlate the purpose and scope of both documents. This clarifies the demarcation point as described in both the NEC and NESC. This revised term is also proposed in the NESC at this time.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposed changes do not add clarity to the existing definition.

While changing "equipment" to "an electrical installation" removes the term "equipment' so that the term isn't used to define itself, an "installation" cannot utilize electric power.

The phrase "or similar purposes" already covers a wide range of applications without having to list more examples.

The NESC/NEC task group did not reach consensus.

The submitter did not provide adequate substantiation specific to this issue.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

LABRAKE, JR., N.: Proposal 1-107 should have been accepted. The panel statement is incorrect and the Submitter's substantiation is in fact contained in the supporting article attached to proposal 1-107, refer to my ballot statements on Proposals 1-17 and 1-29.

1-108 Log #2958 NEC-P01 **Final Action: Reject**
(100.Voltage Drop (New))

Submitter: Paul A. Keleher, Paul Keleher Electrical Services
Recommendation: Add new text as follows:

I. General
Voltage Drop. Voltage-drop is the reduction in circuit voltage created by the connection of an impedance in series with the source. When the added impedance is a known constant, the change in circuit voltage reflects the resistance of the circuit itself between the source of the voltage and the point of the measurement.
Substantiation: Voltage-drop is a concept that is already referenced in this Code, but whose value may be widely misunderstood. The submitter asserts that inclusion of a definition of this concept would benefit users of the Code to design and install circuits whose impedance is suitable for the installation.
Panel Meeting Action: Reject
Panel Statement: The inclusion of common electrical terms is not needed in the NEC. The scope of Article 100 states "it is not intended to include commonly defined terms".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-109 Log #613 NEC-P01 **Final Action: Reject**
(100.Voltage, Low; Voltage, Medium; Voltage, High (New))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new definitions to Article 100 as follows:
Voltage, Low. A class of nominal system voltages less than 1,000 V.
Voltage, Medium. A class of nominal system voltages equal to or greater than 1,000 V and less than 100,000 V.
Voltage, High. A class of nominal system voltages equal to or greater than 100,000 V.
Substantiation: These voltages and their associated tolerance limits are listed in ANSI C84.1-1989 for voltages from 120-230,000V and in ANSI C92.2-1987 for voltages above 230 kV, nominal. These classifications are also in accordance with the IEEE Std. 141 (Red Book). Since the NEC is expanding the scope of medium and high voltages, these voltage classifications need to be defined.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-2.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-110 Log #4504 NEC-P01 **Final Action: Reject**
(100.Working Space (New))

Submitter: Steven F. Wydeveld, Village of Homer Glen / Rep. Building Code Development Committee (BCDC)
Recommendation: Add new text as follows:
Working Space. An area that provides for clear, unobstructed and safe working conditions about electrical equipment.
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.

Currently there is no definition for "working space", which is a term that is used extensively. It is the goal of this definition to define the purpose of this working space because the dimensions are already addressed in the code. This definition is important because it indicates that the working space needs to be clear, unobstructed and safe. While the use of the term within the NEC does provide dimensions, it does not require the working space to be clear, unobstructed and safe. This allows the code official flexibility in determining appropriate working space regardless of the dimensions. There may be instances where other equipment, including electrical equipment, impedes the "working space".
Panel Meeting Action: Reject
Panel Statement: Working space is currently described by the requirements included in Article 110 and elsewhere in the coode.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

MCMAHILL, L.: This proposal should have been accept in principle by revising the proposed definition as follows: "Working Space. A clear and unobstructed area that provides for safe working conditions." A definition is needed and the submitter's proposal could have been revised for clarity.

1-110a Log #CP101 NEC-P01 **Final Action: Accept**
(100.Nonautomatic)

Submitter: Code-Making Panel 1,
Recommendation: Change the definition of "Nonautomatic" in Article 100 to read as follows:

Requiring human intervention to perform a function.

Substantiation: This action is being taken in concert with action taken on Proposal 1-54 to correlate the definitions of "automatic" and "non-automatic".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

MCMAHILL, L.: The panel should have accepted the definition to read as follows: "Performing a function with the necessity of human intervention." This would have allowed for parallel structure with the definition of "automatic" and would have eliminated the use of the word "requiring" in the definition.

ARTICLE 110 — REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

1-111 Log #1691 NEC-P01 **Final Action: Accept in Principle**
(110.(3)(A)(1), FPN No. 2 (New))

Submitter: William Fiske, Intertek
Recommendation: Change existing FPN to FPN No. 1.

Add new:

FPN No. 2: Special conditions of use and other pertinent information may be marked on the equipment or on an accompanying certificate. A certificate may be issued by the equipment manufacturer or by a listing organization.
Substantiation: The existing FPN addresses suitability of use,but does not alert the user to any special conditions of use that may be essential to safe use or proper functioning of the equipment. Examples of special conditions of use include: elevated or reduced ambient temperatures; stringent power quality requirements; specific types of overcurrent protective devices.

Reference to a certificate is included as US-based standards-developing organizations continue to harmonize IEC standards, which often specify an indication of special conditions of use "on the certificate." CMP-14 has recognized this situation with a Fine Print Note to 500.8(A)(3), new in NEC 2008. Since 60079-series standards are not the only harmonized standards in which such references exist, the proposed FPN is intended to alert all users of the NEC, whether they apply Chapter 5 or not.

It should be noted that the existence of a certificate does not necessarily indicate third-party certification (*i.e.* listing), although some listing agencies do issue certificates.
Panel Meeting Action: Accept in Principle
The panel accepts in principle the proposed FPN by revising and incorporating the text into the existing FPN to read as follows:
FPN: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use and other pertinent information may be marked on the equipment or on an accompanying certificate. Suitability of equipment may be evidenced by listing or labeling.
Panel Statement: The revised wording incorporates the proposed FPN into the existing FPN and meets the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BOYCE, K.: The proposal should be rejected. The addition of new text in the FPN to address "certificates" is not needed based on the existing text in the FPN and/or 110.3(B). Further, the substantiation for the proposal is flawed. The substantiation is based on the use of certificates for US-harmonized versions of IEC standards, including the US harmonized standard for Electrical Apparatus for Explosive Gas Atmospheres; however, the American National Standard for this equipment, ANSI/UL 60079-1, specifically does not permit the use of certificates.

1-112 Log #765 NEC-P01 **Final Action: Reject**
(110.1)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.1 Scope. This article covers the general requirements for the examination, ~~and~~ approval, installation and use of all equipment; access to and spaces about electrical conductors and ~~equipment~~ power production, service, and distribution equipment; enclosures intended for personnel entry; and tunnel installations.
Substantiation: We begin with the rules for all equipment. Then we discuss access to and spaces about specific types of equipment. Obviously, we do not need clearances around fittings and other general items found in the definition of equipment.
Panel Meeting Action: Reject
Panel Statement: The scope statement indicates that the article covers general requirements for electrical installation. Limiting the scope statement to other than general, such as to "power production, service, and distribution equipment", limits the application of the Article. It should also be noted that in accordance with the NEC Style Manual, Section 2.2.1, Article Scope Statements are the responsibility of the Technical Correlating Committee.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-113 Log #2046 NEC-P01 **Final Action: Reject**
(110.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The conductors and other equipment required or permitted by this Code, and the installation thereof shall be acceptable only if approved.
Substantiation: Edit. Installation is an important part that requires approval.
Panel Meeting Action: Reject
Panel Statement: The proposed changes have not been substantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects. The code only applies to equipment that is installed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-114 Log #490 NEC-P01 **Final Action: Reject**
(110.3)

Submitter: Joe Tedesco, Tedesco Electrical Code Consultants, Inc.
Recommendation: Add new text as follows:
110.3. Unused Electrical Systems and Equipment. Unused electrical equipment left abandoned in place shall be removed or tagged and identified at all termination and junction points as a potential hazard.
FPN: See www.niosh.gov
Substantiation: This problem is worthy of some consideration, because it can lead to an accident! It is time to address this issue without any flimsy excuses!
Panel Meeting Action: Reject
Panel Statement: The proposal has not been substantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Electrical systems that have been abandoned and are not energized pose no electrical hazard. Abandoned conductors are required to be removed because of their fuel loading. This is not the case with most other "equipment".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-115 Log #2324 NEC-P01 **Final Action: Reject**
(110.3(A))

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Delete the last sentence of the fine print note in item 1 and add a new item (8) An independent safety certification as evidenced by listing and labeling by an organization acceptable to the authority having jurisdiction.
Substantiation: Adding this item will help clarify the purpose of listing and labeling to those outside of the industry. The origins of the term 'listed' are obscure and this language is needed to support inspectors when listing is required.
Panel Meeting Action: Reject
Panel Statement: The FPN directs the reader to the definitions of "Approved", "Listed "and "Labeled". The meaning is clear.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-116 Log #1539 NEC-P01 **Final Action: Reject**
(110.3(B))

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
(B) Installation and Use. Listed or labeled equipment shall be installed, and used in accordance with any instructions included in the listing or labeling.
Substantiation: This is a grammatical change to add the comma to clarify the sentence.
Panel Meeting Action: Reject
Panel Statement: The proposed changes are unsubstantiated. The panel contends that the sentence is correct as written.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-117 Log #3154 NEC-P01 **Final Action: Reject**
(110.3(B))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise as follows:
~~Listed or labeled e~~ Equipment shall be installed and used in accordance with any instructions included ~~in the listing or labeling~~.
Substantiation: It is not logical to require manufacturers' instructions to be followed only for equipment approved by a third party. To ensure a proper and safe installation, manufacturers' instructions must be followed for all equipment that includes them.
Panel Meeting Action: Reject
Panel Statement: 110.3(B) specifically applies to listed and labeled equipment, which generally require instructions that have been reviewed and addressed as part of the listing or labeling process. For other equipment, the authority having jurisdiction has the authority to require particular installations through the approval process addressed in 110.2.
110.3(A)(1), regarding suitability of equipment, satisfies the concern of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, all equipment should be installed in accordance with the manufacturer's instructions to ensure a proper and safe installation.

1-118 Log #3262 NEC-P01 **Final Action: Reject**
(110.3(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~Listed or labeled~~ Equipment shall be installed and used in accordance with ~~any~~ the manufacturers instructions, if any, if compatible with this Code, or included in the listing or labeling.
Substantiation: Editorial. The provision should also apply to equipment that is not listed or labeled and only where such instructions do not constitute a Code violation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-117. The panel does not agree that the proposed change is editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-119 Log #600 NEC-P01 **Final Action: Reject**
(110.3(C))

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Add new text as follows:
(C) Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the authority having jurisdiction shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be by recognized test standards. In the absence of recognize test methods, the authority having jurisdiction shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be provided to the authority having jurisdiction as proof of equivalency to the requirements of this code.
Substantiation: There currently is no language in the NEC that specifically permits the AHJ to require testing where they may not have the expertise to evaluate equipment to all of the requirements of 110.3(A) and other applicable sections of the NEC. With this type of language which is consistent with language found in both NFPA 5000 and the International Building Code, this provides the AHJ with the tools necessary to require testing of equipment that either is not listed or has been modified after it was listed and the AHJ does not have the expertise to ensure that the minimum requirements of the NEC are complied with. This language would provide the AHJ the ability to require testing at no cost to the AHJ and provide documentation on which the AHJ could base approval or denial of the questioned equipment.
Panel Meeting Action: Reject
Panel Statement: 90.4, 90.7 and 110.3(A)(1) address the concern of the submitter. 90.4 states: "By special permission, the authority having jurisdiction may waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety." 110.3(A)(1) states: "Suitability for installation and use in conformity with the provisions of this Code."
These sections allow the Authority Having Jurisdiction to request testing of a product or equipment as deemed necessary. Placing a code requirement for "Tests" in the NEC is unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-120 Log #1540 NEC-P01 **Final Action: Reject**
(110.3(C))

Submitter: Richard Hollander, City of Tucson
Recommendation: Add new text as follows:
(C) Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the authority having jurisdiction shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be by recognized test standards. In the absence of recognize test methods, the authority having jurisdiction shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be provided to the authority having jurisdiction as proof of equivalency to the requirements of this code.
Substantiation: There currently is no language in the NEC that specifically permits the AHJ to require testing where they may not have the expertise to evaluate equipment to all of the requirements of 110.3(A) and other applicable sections of the NEC. With this type of language which is consistent with language found in both NFPA 5000 and the International Building Code, this provides the AHJ with the tools necessary to require testing of equipment that either is not listed or has been modified after it was listed and the AHJ does not have the expertise to ensure that the minimum requirements of the NEC are complied with. This language would provide the AHJ the ability to require testing at no cost to the AHJ and provide documentation on which the AHJ could base approval or denial of the questioned equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-119.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-121 Log #2750 NEC-P01 **Final Action: Reject**
(110.3(C))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels, 2, 3, 15 and the Technical Correlating Committee on Safety to Life (SAF-AAC) for information.
Submitter: Travis Lindsey, Travis Lindsey Consulting Services
Recommendation: Add new text to read as follows:
110.3(C). Life Safety Equipment.
Equipment intended to protect building occupants shall be supplied with conductors sized to limit voltage drop to a maximum of 3 percent measured from the source of supply to the equipment and the supplied voltage shall be within the range specified by the equipment manufacturer.
FPN: The equipment covered by this section includes but is not limited to required exit illumination, exit signs, ventilation equipment. alarm systems, generators and elevators.
Substantiation: This proposal includes a new section to applying specifically to electrically supplied life safety equipment. NEC does not presently contain voltage drop maximums for required building life safety equipment although these items of equipment are often required for the protection of life safety. Survey results and other written documentation are included with this proposal.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Article 110 covers general requirements for the examination and approval, installation and use, access to and spaces about electrical conductors and equipment; enclosures intended for personnel entry; and tunnel installations. Voltage drop requirements should not be a general installation requirement in the NEC. If it is important that voltage drop requirements apply to life safety equipment, then those requirements should be addressed in the applicable Articles such as 517, 695, and 700.
There is no definition of what "life safety equipment" the proposal applies to, and the authority having jurisdiction may not be able to approve the proposed requirements in the process of approving the code requirements as "life safety equipment" may be installed at a later time.
The wording "source of supply" is vague.
The panel requests that the Technical Correlating Committee forward this proposal to the appropriate Code-Making Panels, such as 2,13, and 15, and the appropriate NFPA 101 Technical Committee for information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-122 Log #3042 NEC-P01 **Final Action: Reject**
(110.4)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
110.4 Voltages.
Throughout this Code, the voltage considered shall be that at which the circuit operates. The voltage rating of electrical equipment shall not be less than, or greater than, the nominal voltage of a circuit to which it is connected.
Substantiation: Right now, there appears to be no code rule, other than perhaps 110.3(B), that prohibits installing 240V equipment to a 208V circuit.
Panel Meeting Action: Reject
Panel Statement: The code provides the minimum requirements for the safe installation and use of electricity. If the rating of installed equipment exceeds minimum code requirements, that does not necessarily make it a code violation. Section 110.3(B) does not prohibit installing 240V equipment to a 208V circuit; the same as it does not prohibit installing 480V equipment to a 240V circuit.
The proposed text would prohibit an electrical installation from exceeding minimum code requirements. The proposal would conflict with some product standards, such as fuses that may be used at voltages below their ratings.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: There are two broad categories of 250V and 600V class wiring and equipment that seem to address the submitter's concerns.

1-123 Log #923 NEC-P01 **Final Action: Reject**
(110.8)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence as follows: The ~~recognized methods of~~ wiring methods ~~shall be~~ identified for the use shall be permitted to be installed ~~in~~ on any type of ~~building~~ premises or occupancy except as otherwise provided in this Code.
Substantiation: Edit. This code covers wiring that is not in buildings, such as overhead wiring, on poles, other structures such as piers, and underground.
Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 1-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-124 Log #1324 NEC-P01 **Final Action: Reject**
(110.8)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence:
The recognized methods of wiring shall be ~~permitted~~ employed in accordance with applicable provisions of this Code ~~in any type of building or occupancy except as otherwise provided in this Code~~.
Substantiation: "Permitted" per 90.5(B) does not entail any requirement. "In any type of building" implies structures that are not buildings are not included, nor is underground wiring or outside wiring on poles or buildings. Many recognized wiring methods are not suitable for all installations.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-125 Log #1992 NEC-P01 **Final Action: Reject**
(110.8)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Only wiring methods recognized as suitable are included in this Code. Recognized methods of wiring identified for the use shall be permitted in or on any type of building or structure or premises.
Substantiation: Edit. Many wiring methods are permitted but not all are suitable for all applications. Proposal correlates with "uses permitted" and "uses not permitted".
Panel Meeting Action: Reject
Panel Statement: It would be virtually impossible to identify wiring methods as suitable for the use. The NEC states the use(s) for which a given wiring method is suitable, and there are many wiring methods.
The panel does not agree that the proposed wording is editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted in principle. The submitter is correct in that clarification of this section is need. The NEC covers wiring methods that are not in buildings, such as overhead wiring, wiring on other structures, underground wiring and premises wiring. And not all wiring methods are suitable for the application. The panel should have revised the second sentence of the paragraph to read: "The recognized wiring methods ~~of wiring~~ shall be permitted to be installed in or on any ~~type of~~ building, structure, ~~or~~ occupancy or premises, except as otherwise provided in this *Code*. The revised text would have clarified the code section and met the intent of the submitter.

1-126 Log #2933 NEC-P01 **Final Action: Reject**
(110.9)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise existing text of the 2008 NEC as follows:
110.9 Interrupting Rating.
Except as provided in 240.86, equipment ~~Equipment~~ intended to interrupt current at fault levels shall have an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment.
Substantiation: The provisions for series-combination equipment in 240.86 act as an exception to the general rules in 110.9 so this section needs to be revised to make that accommodation. Section 240.86 recognizes that the short-circuit current available exceeds the interrupting rating of the lower rated circuit breaker of the series-combination.
Panel Meeting Action: Reject
Panel Statement: The situation described by the submitter is adequately addressed by the current provisions of 110.9. New installations are addressed by tested combinations and not a violation of 110.9 because the series rated combination is listed for the AIC. Where an issue occurs after the initial installation (engineered) series ratings such as a larger transformer, this is an issue outside of the control of the initial installation and 240.86 deals with an upgrade (engineered ratings).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: We think the submitter's more specific reference to series-rated breakers in Article 110 is an improvement in the NEC. However, how stating this reference in positive language – rather than as an exception – would also be an improvement on the proposal.

1-127 Log #3279 NEC-P01 **Final Action: Accept**
(110.9)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "sufficient for" to "not less than"
Substantiation: Edit. "Sufficient" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Accept
Panel Statement: The panel understands that both occurrences of the phrase "sufficient for" are to be replaced with "not less than."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-128 Log #651 NEC-P01 **Final Action: Reject**
(110.9, FPN (New))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
FPN: Providing devices that are capable of interrupting current at fault levels does not assure conductor and equipment protection.
Substantiation: In order to achieve proper conductor and equipment protection, a detailed system analysis must be done to include fault current calculations, determining the operating characteristics of the protective device or system, and then providing conductors and equipment that have suitable short-circuit withstand ratings. The ability to interrupt fault current is important, but the protection scheme goes far beyond this concept.
Panel Meeting Action: Reject
Panel Statement: A FPN is unnecessary as the code requirement is clearly spelled out in 110.10 – Circuit Impedance and Other Characteristics.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-129 Log #617 NEC-P01 **Final Action: Accept in Part**
(110.10)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 5 for comment.
Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission, & Monti Bitker
Recommendation: Revise text to read as follows:
This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the equipment grounding conductor, enclosing metal raceway or metal cable tray.
Substantiation: Metallic cable tray is permitted to be used as an equipment grounding conductor in accordance with 392.3(C) and 392.7. Cable tray, whether metallic or nonmetallic is considered to be a wiring or raceway support system and not a raceway. Therefore, this reference should be included in this section.
Panel Meeting Action: Accept in Part
The panel accepts the addition of the word "equipment".
The panel rejects the insertion of the words "or metal cable tray".
Panel Statement: The words "metal cable tray" are unnecessary as cable trays are included in 250.118 as types of equipment grounding conductors - "Cable trays as permitted in 392.3 and 392.7".
The panel requests that the Technical Correlating Committee refer this proposal to Code-Making Panel 5 for comment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-130 Log #4403 NEC-P01 **Final Action: Accept in Part**
(110.10)

Submitter: Jay Tamblingson, Rockwell Automation
Recommendation: Revise text as follows:
110.10 Circuit Impedance, Short-Circuit Current Ratings, and Other Characteristics. The branch circuit protective devices, the total impedance, the component and equipment short-circuit current ratings, and other characteristics of the circuit to be protected shall be selected and coordinated to permit the branch circuit protective devices used to clear a fault to do so without extensive damage to the electrical components of the circuit. This fault shall be assumed to be either between two or more of the circuit conductors or between any circuit conductor and the grounding conductor or enclosing metal raceway. Listed products applied in accordance with their listing shall be considered to meet the requirements of this section.
FPN: A component or equipment short-circuit current rating can restrict the specific types and/or sizes of branch circuit protective devices that would be otherwise permitted under this Code.
Substantiation: The 2005 and 2008 NEC added increased requirements for providing marked short-circuit current ratings on both components and equipment (e.g. assemblies of components, panels, machines, etc). The proposed changes provide increased awareness of these ratings to ensure that they are included in the scope of evaluation of an installation.

In addition, many component and equipment short circuit current ratings are contingent on use of specific branch circuit protective devices. The proposed fine print note provides awareness that the size and/or types of branch circuit protective devices may be further restricted from what otherwise may be permitted under other Articles.

Panel Meeting Action: Accept in Part

The panel accepts the addition of "Short -Circuit Current Ratings" in the title.

The panel rejects the addition of the words "and equipment" and the Fine Print Note.

Panel Statement: The portion of the proposal that the panel Rejected does not enhance clarity or the usability of the code.

The proposed Fine print note is covered by the mandatory language in 110.3(A)(1) and 110.3(B).

The components of the circuit includes the equipment used to construct the circuit.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-131 Log #2684 NEC-P01 **Final Action: Accept in Part**
(110.11)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Unless identified for use in the operating environment no conductor or other equipment shall be located in damp or wet locations, where likely to be exposed to gases, fumes, vapors, liquids, solids, temperatures, or other agents ~~that have a deteriorating effect on the conductors or equipment or exposed to excessive temperatures~~ that are likely to cause damage.

FPN No. 1 and 2 no change.

Equipment identified only for indoor use such as "dry" locations Type 1, 2, 5, 12, 12K and/or 13, shall be protected against ~~permanent~~ damage from the weather where exposed to the weather during ~~building~~ construction.

Substantiation: "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections. "Excessive" is not defined and difficult to determine. Damage is damage; are there permanent and temporary types? Equipment not suitable for outdoor use or wet locations only need to be protected if exposed to the weather during construction. The provision should apply where the construction does not involve buildings.

Panel Meeting Action: Accept in Part

The panel Accepts the deletion or the words "building" and "permanent".

The panel Rejects the remainder of the proposed text.

Panel Statement: It is the intent of the NEC that equipment be exposed to harmful agents virtually never in its economic life, unless suitable for such exposure. "Likely" means more probable than not. "Likely to be exposed" is far too frequent exposure for ordinary electric equipment.

It is the intent that indoor use equipment be protected from damage during construction, be it temporary or permanent. Ingress of water may be a temporary condition, but it can cause electric shock.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-132 Log #954 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete the first sentence and the fine print note.

Substantiation: Edit. "Neat" and "workmanlike" are subjective and terms to be avoided per the Style Manual and are considered differently in various areas, and do not necessarily have any relationship to safety of installations that comply with applicable provisions of this Code. See 90.1.

Panel Meeting Action: Reject

Panel Statement: The panel concludes that the recommendation does not enhance clarity or usability, that the submitter did not provide adequate technical substantiation, and that the term is not unenforceable or vague after reviewing its use in context as provided for in 3.2.1 of the NEC Style Manual.

The proposed change is not editorial.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-133 Log #2072 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Mark T. Rochon, Peabody, MA

Recommendation: Revise text to read as follows:

Electrical equipment shall be installed in a neat and workmanlike manner, with the installation completed and energized with the proper voltage.

Substantiation: This section needs to be updated for siting uncompleted and improper installations.

Panel Meeting Action: Reject

Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects. Voltage is already addressed in 110.4, and a complete installation is already addressed in 110.7.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-134 Log #2134 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Kenneth Dale Bristow, Stellar Technologies

Recommendation: Revise text as follows:

110.12 Mechanical Execution of Work, Electrical equipment shall be installed in a safe, neat and workmanlike manner.

Substantiation: This word will augment the purpose of the National Electric Code in the installation of electrical equipment.

Panel Meeting Action: Reject

Panel Statement: Installed in a "safe" manner is a work practice issue and should not be included in an installation code. Safe work practices are addressed in NFPA 70E. In addition, the title of the section is "Mechanical Execution of Work." As such, the addition of the word "safe" does not augment the purpose of the NEC in the installation of electrical equipment.

The concerns of the submitter are adequately addressed by 90.1(B).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-135 Log #3240 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete subsection.

Substantiation: "Neat and workmanlike" is subjective and installations in compliance with this Code relate to safety per 90.1 not appearance. Workmanlike is a term to be avoided per the Style Manual.

Panel Meeting Action: Reject

Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: This proposal should have been accept in principle. As the submitter has noted, use of the words "neat" and "workmanlike" should be avoided and are generally subjective. To better clarify and perhaps more appropriately, the panel should have replaced these words with "skillful" (accomplished with skill) and "competent" (having requisite or adequate ability or qualities). These words are better understood and more clearly defined. They also reflect the actual intent of the section.

1-136 Log #3879 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Jared Steiner, E Light Electric Services

Recommendation: Revise text as follows:

Electrical equipment shall be installed in a ~~neat~~ orderly and ~~workmanlike~~ professional manner

Substantiation: The words neat and workman like are listed in the Manual of Style as words that are not to be used in the NEC.

Panel Meeting Action: Reject

Panel Statement: The panel concludes that the terms are not unenforceable or vague after reviewing their use in context as provided for in 3.2.1 of the NEC Style Manual.

See the panel statement on Proposal 1-132.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

SASSAMAN, H.: NECA position is to reject any attempt to damage this requirement since it is the basis for the NECA ANSI NEIS family of standards.

1-137 Log #3891 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Ted "Smitty" Smith, Electrical Experts Consulting

Recommendation: Revise text as follows:

Electrical equipment shall be installed in ~~a neat and workman like manner~~ accordance with accepted industry practices and in a manner acceptable to the authority having jurisdiction.

Substantiation: The NEC style manual lists "workman like" and "neat" as words that are not to be used in the NEC. This revision is more in line with the FPN added to the section in previous code cycles and also expands the accepted practices beyond those in the referenced ANSI standard.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 1-136.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

SASSAMAN, H.: NECA position is to reject any attempt to damage this requirement since it is the basis for the NECA ANSI NEIS family of standards.

1-138 Log #3901 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Tedros Habteslassie, E Light Electric Services
Recommendation: Revise text as follows:
Electrical equipment shall be installed in a neat ~~and workman like~~ manner.
Substantiation: The NEC style manual list workmanlike as a word that is not to be used in the NEC due to enforceability issues.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-136.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
SASSAMAN, H.: NECA position is to reject any attempt to damage this requirement since it is the basis for the NECA ANSI NEIS family of standards.

1-139 Log #4567 NEC-P01 **Final Action: Reject**
(110.12)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner. <u>Removal of abandoned cables and electrical equipment shall also be performed in a neat and workmanlike manner.</u>
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Substantiation: This proposal recommends added wording to ensure that abandoned cables and electrical equipment are removed appropriately. The section only addresses installation but many sections in the code require removal of cables and equipment and this change is made to point out that similar care must be taken when removing cables. A proposal with alternate language is also being submitted for consideration of CMP 1.
Removal of cables or equipment is required in various sections, including 372.13, 374.7, 390.7, 590.3, 640.6, 645.5, 725.25, 760.3, 760.25, 770.25, 800.25, 820.25, 830.25.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated that a problem exists, or that the problem would be alleviated by removing abandoned cables and equipment neatly. Rather, the panel concludes, that in some cases, abandoned cables and equipment are best left abandoned.
The proposed text is unnecessary as the section more appropriately applies to “Requirements for Electrical Installations” and “Mechanical Execution of Work.”
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: This concept is important and is obviously important because the word abandoned cable shows up 19 times in the NEC. Still, we have no definition for it. The submitter is encouraged to consider proposing a new section of the NEC that deals with demolition hazards, workmanlike electrical demolition with emphasis on abandoned cables, and coordination of technical issues with other articles. We are accustomed to thinking of this section as one dedicated to installations; out-of-box-thinking might require us to think of demolition as a type of “constructive” installation.

1-140 Log #3278 NEC-P01 **Final Action: Reject**
(110.12(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Unused openings other than intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed <u>by identified means</u> ~~to afford protection substantially equivalent to the wall of the equipment.~~
Substantiation: Edit. “Substantially” and “equivalent” are subjective and terms to be avoided per the Style Manual. The purpose of the requirement is irrelevant to the rule and normally not indicated in Code rules unless necessary.
Panel Meeting Action: Reject
Panel Statement: This proposal is not “editorial.” No technical substantiation has been provided to demonstrate that 110.12(A) is being misinterpreted or misunderstood.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted in principle and in part. The panel should have accepted in part the addition of the words “by identified means” and in principle the deletion of the word “substantially. The sentence would then read: “(A) Unused Openings. Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection ~~substantially~~ equivalent to the wall of the equipment <u>or closed by identified means</u>.” This change would have better clarified the intent of the section and eliminated a subjective word.

1-141 Log #3759 NEC-P01 **Final Action: Accept**
(110.12(A))

Submitter: Jebediah J. Novak, Cedar Rapids Electrical JATC / Rep. Int’l Brotherhood of Electrical Workers
Recommendation: Delete the last sentence to this section:
110.12(A) Unused Openings. Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection equivalent to the wall of the equipment. ~~Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (1/4 in.) from the outer surface of the enclosure.~~
Substantiation: This language is an outdated requirement that should be deleted from the NEC. I have found this requirement as far back as 1965 with no substantiation as to why the requirement exists.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:
HICKMAN, P.: We do not believe that adequate substantiation has been submitted to justify the removal of this text.
HITTINGER, D.: This proposal should be rejected. Adequate substantiation was not provided to remove this language from the Code. My research indicates that this requirement first appeared in the 1940 edition of the NEC as a safety issue. A metal plug or plate cannot bond to the non-metallic enclosure and may inadvertently become energized by internal wiring creating a shock hazard. The submitter’s statement that “this language is an outdated requirement with no substantiation as to why the requirement exists” is not justification to remove the requirement.
LABRAKE, JR., N.: Proposal 1-141 should have been <u>rejected</u>. The Submitter’s statement that he was unable to find substantiation for the requirement “as far back as 1965” does not constitute sufficient substantiation for the removal of the requirement. We suggest that a Fact Finding Report be performed to research this requirement. It is also noted that the substantiation for Proposal 9-33 from the A98 NEC ROP revised this requirement with the substantiation that “the rule is to help reduce ‘touch potential’ due to energized conductors contacting the surface plug or cover.”

1-142 Log #4577 NEC-P01 **Final Action: Reject**
(110.12(A))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the words “or drainage” after “those intended for mounting purposes”.
Substantiation: The list of acceptable openings contains a glaring omission: weep holes, such as those drilled in the heel of an LB to accomplish compliance with the “arranged to drain” mandate in 230.53, as well as numerous other applications. This is particularly urgent where provided in the field and therefore not “part of the design for listed equipment.
Panel Meeting Action: Reject
Panel Statement: This proposal is too restrictive for a wiring method that is covered in only 230.53 to be broadly applied for all electrical installations.
Drainage is typically part of the design of equipment, and are, therefore, covered by 110.12(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-143 Log #4816 NEC-P01 **Final Action: Reject**
(110.12(B))

Submitter: George Ferguson, Technical Education & Safety Institute
Recommendation: Add text to read as follows:
Any person or agent causing a violation of this section shall be responsible for the correction.
FPN: Also see 110.3(B).
Substantiation: Frequently, when an electrical contractor works on a project, violation of 110.12(B) has occurred. The electrical contractor is then expected to absorb the cost of making the correction without compensation.
Panel Meeting Action: Reject
Panel Statement: The NEC is an installation code and does not address contractual or financial issues, or who is responsible for the work.
The panel refers the submitter to the purpose of the NEC as stated in 90.1.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ANTHONY, M.: All living documents must visit and revisit their scope in order to retain the status as a consensus document. This is a proposal that challenges our conception of the NEC and, as such, poses particular problems (as we have seen in the scope conflict between the NEC and NESC in Article 90).

Some version of this proposal might find a place in the Administrative Annex in the ROC stage and the submitter is encouraged to try again.

1-144 Log #316 NEC-P01 **Final Action: Reject**
(110.12(C) (New))

Submitter: Sean Staggs, George's Millwright Inc.
Recommendation: Add text to read as follows:
Fasteners for covers and electrical equipment that can only be accessible by people of the electrical trade.
Substantiation: To help prevent unqualified people from gaining access to equipment.
Panel Meeting Action: Reject
Panel Statement: The proposal is unclear as to what specific uses or requirements are being proposed for fasteners and the recommendation is not substantiated. In addition, the proposal is not written in accordance with 3.3.1.2 of the NEC Style Manual.
The NEC is an electrical installation standard and contains no authority within itself. It is the responsibility of the designated authority that adopts the NEC to determine who performs the installation. The NEC itself cannot usurp the authority of these jurisdictions to determine the enforcement and/or administration of the Code.
It is impractical to limit such access.
The proposal would prohibit other than electrical trade people from having access to the equipment, such as a homeowner's panelboard. In addition, the section is addressing mechanical execution of work.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-145 Log #694 NEC-P01 **Final Action: Reject**
(110.12(C) (New))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, *Standard Practices for Good Workmanship in Electrical Contracting*, and other ANSI-approved installation standards.
(A) Unused Openings. *[unchanged by this Proposal]*
(B) Integrity of Electrical Equipment and Connections. *[unchanged by this Proposal]*
(C) Knockouts. Unless prohibited elsewhere in this *Code*, knockouts fabricated in a portion of the wall of an enclosure to provide a hole for the attachment of raceway, a fitting, a cable or an auxiliary device shall resist removal by unaided hand pressure but shall permit removal with tools such as a hammer, screwdriver and pliers at the time of installation. Knockouts for field assembly of standard-size conduits, tubing, and fittings shall be in accordance with Table 110.12(C), exclusive of any residual projections of breakout tabs into the removed knockout hole. Concentric and eccentric knockouts within a simple knockout shall not be larger than metric designator 27 (trade size 1).
Exception: Field-fabricated knockouts shall be permitted to be oversized (larger than the maximum factory-fabricated knockout diameters of Table 110.12(C)). Metallic conduit, metallic tubing or fittings assembled to oversized knockouts in metallic enclosures and boxes shall be bonded in accordance with 250.92(B)(4).
FPN: See 250.97 Exception, 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C).

See Table 110.12(C) on Page 78

Substantiation: Correlation issue. Requirements in existing 250.97 *Exception* and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the field-fabricated knockout opening is oversized or not. (Factory-fabricated knockouts in Listed products are enforced by product standards. Factory-fabricated knockout diameters of unlisted products are enforced only by the manufacturer's quality practices and by the AHJ with defined requirements, provided with this Proposal.) "Oversized knockouts", however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards. AHJs and installers are provided no guidance in how to differentiate "oversized knockouts" from knockouts that are not and therefore no guidance as to where the requirements of 250.97 *Exception*, requirements 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) apply to nonconcentric and noneccentric knockouts.
The values for minimum and maximum knockout diameters appear in a number of US, Canadian, and Mexican standards for Metric Designator 16 through 155 (Trade Size 1/2 through 6) and were directly extracted from the trinational standard *Enclosures for Electrical Equipment, Non-Environmental Considerations, NMX-J-023/1-ANCE-2007* 1, *CSA C22.2 No. 94.1-07* 2, *ANSI/UL50-2007* 3, Table D.1.

[1] Asociación de Normalización y Certificación (Association of Standardization and Certification),
[2] Canadian Standards Association
[3] Underwriters Laboratories Inc.

Both the maximum and minimum knockout diameter values are needed to define when knockout diameters are "oversized". An "oversized" knockout sufficiently larger than one Metric Designator/Trade Size's maximum might encroach upon the next size's minimum diameter.
The nominal value for the knockout diameter for Metric Designator 12 (Trade Size 3/8) was directly extracted from standard *Canadian Electrical Code, Part II, General Requirements, CAN/CSA C22.2 No. 0-M91(R2006)* 4, Table 1. The same tolerance as applied to the tabulated nominal knockout diameters in the above reference to arrive at the minimum (-1/64 inch in the lower range) and maximum (+1/32 inch in the lower range) knockout diameters to calculate the for minimum and maximum knockout diameters Metric Designator 12 (Trade Size 3/8). [NOTE: Underwriters Laboratories, CSA International, and other certifiers have long Listed conduit and fittings in this size. This size of conduit and fitting will become more significant with the addition to *NEC*® Tables 310.16 and 310.17 of conductors of 18 AWG and 16 AWG for Article 409 applications and other uses.]
[4] Canadian Standards Association
The minimum values for the diameter of flat area surrounding knockouts for Metric Designator 12 through 155 (Trade Size 3/8 through 6) were also directly extracted from standard *Canadian Electrical Code, Part II, General Requirements, CAN/CSA C22.2 No. 0-M91(R2006)* 4, Table 1. This flat area allows field assembly of the locknut or bushing, inclusive of tool access. For the Code Panel's reference in consideration of these minimum diameters for flat areas for seating of locknuts and bushings, the maximum diameters for locknuts and bushings themselves for Metric Designator 12 through 155 (Trade Size 3/8 through 6) can be found in either trinational standard *Conduit, Tubing, and Cable Fittings, NMX-J-017-ANCE-2004* 5, *CSA C22.2 No. 18.3-04* 6, *ANSI/UL514B-2004* 7, Table 1, or in standard *Fittings, Cast Metal Boxes, and Conduit bodies for Conduit, Electrical Metallic Tubing, and Cable, ANSI/NEMA FB1-2003* 8, Figure 3-4.
[5] Asociación de Normalización y Certificación (Association of Standardization and Certification),
[6] Canadian Standards Association
[7] Underwriters Laboratories Inc.
[8] National Electrical Manufacturers Association

See Table 1 on Page 78

Underwriters Laboratories has previously evaluated concentric and eccentric knockouts (within a larger simple knockout) for the integrity of bonding. Based on that evaluation, concentric and eccentric knockouts are limited in size to Metric Designators less than 35 (Trade Size less than 1-1/4) in UL standard *Metallic Outlet Boxes, UL514A*. Concentric and eccentric knockouts for enclosed distribution equipment Listed by Underwriters Laboratories have that same limitation. The UL testing at those concentric and eccentric knockout sizes also evaluates the resulting surface surrounding the knockout for application of an ordinary (non-bonding type) conduit fitting when the smallest and intermediate size knockouts are removed.
Panel Meeting Action: Reject
Panel Statement: The information being proposed is a product standard concern.
The proposed requirements are unenforceable. To enforce the proposed requirements in Article 110 would require the use of tools to remove unused knockouts from installed equipment, inconsistent enforcement based on individual "hand pressure", and measurement of the dimensions of unused knockouts.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-146 Log #4566 NEC-P01 **Final Action: Reject**
(110.12(C) (New))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Add the following new text:
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
(A) Unused Openings. Unused openings, other than those intended for the operation of equipment, those intended for mounting purposes, or those permitted as part of the design for listed equipment, shall be closed to afford protection substantially equivalent to the wall of the equipment. Where metallic plugs or plates are used with nonmetallic enclosures, they shall be recessed at least 6 mm (¼ in.) from the outer surface of the enclosure.
(B) Integrity of Electrical Equipment and Connections. Internal parts of electrical equipment, including busbars, wiring terminals, insulators, and other surfaces, shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation or mechanical strength

Table 110.12(C) Knockout Dimensions

Conduit, Tubing, or Fitting		Knockout Diameter				Diameter of Flat Surface Surrounding Knockouts for Field Assembly of Conduit, Tubing, and Fittings	
		Minimum		Maximum		Minimum	
Metric Designator	Trade Size	mm	in.	mm	in.	mm	in.
12	3/8	17.83	0.702	19.02	0.750	25.0	0.98
16	1/2	21.82	0.859	23.01	0.906	30.0	1.18
21	3/4	27.79	1.094	28.98	1.141	38.0	1.50
27	1	34.52	1.359	35.71	1.406	48.0	1.89
35	1-1/4	43.66	1.719	44.86	1.766	60.0	2.36
41	1-1/2	49.73	1.958	51.21	2.016	67.0	2.64
53	2	61.80	2.433	63.50	2.500	83.0	3.27
63	2-1/2	74.12	2.918	76.20	3.000	95.0	3.74
78	3	90.50	3.563	93.00	3.661	113.0	4.45
91	3-1/2	103.20	4.063	106.00	4.173	125.0	4.92
103	4	115.90	4.563	119.00	4.685	138.0	5.43
129	5	142.88	5.625	147.00	5.787	162.0	6.38
155	6	170.18	6.700	175.00	6.890	203.0	7.99

Table 1

Metric Designator	Trade Size	Maximum Diameter of Locknut or Bushing	
		mm	in.
12	3/8	24.64	0.970
16	1/2	28.96	1.140
21	3/4	36.07	1.420
27	1	44.96	1.770
35	1-1/4	57.94	2.281
41	1-1/2	65.99	2.598
53	2	80.65	3.175
63	2-1/2	90.47	3.562
78	3	107.95	4.250
91	3-1/2	122.00	4.803
103	4	137.21	5.402
129	5	169.52	6.674
155	6	201.52	7.934

of the equipment such as parts that are broken; bent; cut; or deteriorated by corrosion, chemical action, or overheating.
(C) Removal. Removal of abandoned cables and electrical equipment shall also be performed in a neat and workmanlike manner.
Substantiation: This proposal recommends added wording to ensure that abandoned cables and electrical equipment are removed appropriately. The section only addresses installation but many sections in the code require removal of cables and equipment and this change is made to point out that similar care must be taken when removing cables. This is an alternate approach to this new recommendation, which retains the wording of the covering section.
Removal of cables or equipment is required in various sections, including 372.13, 374.7, 390.7, 590.3, 640.6, 645.5, 725.25, 760.3, 760.25, 770.25, 800.25, 820.25, 830.25.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-139.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ANTHONY, M.: See comment on 1-139.

1-147 Log #2713 NEC-P01 **Final Action: Reject**
(110.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Electrical equipment shall be firmly secured and supported ~~to the surface on which it is mounted~~ except as otherwise required or permitted in this Code. (remainder unchanged)
Substantiation: Edit. Proposal provides for equipment not surface-mounted, such as suspended luminaries, suspended control stations, suspended busway and cable tray, fished cables and raceways, etc. Equipment should be firmly supported in addition to being firmly attached, which is not necessarily the same.
Panel Meeting Action: Reject
Panel Statement: Securement may be direct or indirect. The proposed change does not improve clarity.
This panel does not agree that the proposal is editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-148 Log #4578 NEC-P01 **Final Action: Accept in Principle**
(110.14)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following text at the end, prior to (A):
"Connectors and terminals for conductors more finely stranded than Class B for aluminum and Class C concentric for copper shall be listed for the specific stranding employed."
Substantiation: This is a companion proposal to one submitted to delete 690.31(F). This issue is far from unique to solar photovoltaic systems, and should reside in Chapter One. The proposed text tracks the UL Guide Card information at "Wire Connectors and Soldering Lugs (ZMVV)." The proposed location, as part of the parent text, reflects the fact that the issue applies to both (A) on terminals and (B) on splices.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 1-149.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MONIZ, G.: See NEMA's statement on Proposal 1-149.

1-149 Log #1739 NEC-P01 **Final Action: Accept in Principle**
(110.14(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 4 for information.
Submitter: Robert A. McCullough, Ocean County Construction Insp. Dept.,
Recommendation: Add new last paragraph as follows: Terminals used for flexible, fine-stranded conductors and cables shall be listed and marked for such use.
Substantiation: Provisions for terminating fine-stranded cables were added to Article 690 in the 2008 cycle. There are fine-stranded conductors that are now listed as 310.13 conductors. Fine-stranded conductors are used in applications other than PV, i.e., battery rooms and dock wiring, thus provisions for properly terminating these conductors should be added to the general provisions of the Code.
Panel Meeting Action: Accept in Principle
In the recommended text, change the words "listed and marked" to the word "identified".
Panel Statement: The panel agrees that fine-stranded cable must be connected using proper terminals,\; however, the panel concludes that the submitter has not substantiated the need for terminals that are listed for the purpose.
Review of the Article 100 definitions of "identified" and "listed" makes it clear that identified is the correct term in this section.
The panel does not necessarily agree with all of the submitter's substantiation.
The panel requests that the Technical Correlating Committee refer this proposal to Code-Making Panel 4 for information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MONIZ, G.: A further definition of what is meant by "fine stranded" must be made for the proposal to be viable.

1-150 Log #3641 NEC-P01 **Final Action: Reject**
(110.14(A))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
110.14(A) Terminals. Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall not be permitted for conductors larger than 10 AWG. ~~or smaller conductors.~~
Substantiation: There is no reasonable reading of the words "shall be permitted" that can lead the code user to the conclusion that these words actually prohibit the use of these types of connections for conductors larger than #10. The act of specifically permitting something in no way prohibits something else. Section 3.1.2 in the NEC Style Manual says that the words "shall be permitted" are to be used to permit an alternate installation method. The words "shall not" are required to be used to prohibit an installation method per 3.1.1 of the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The general requirement is contained in the first sentence: pressure connectors, solder lugs or splices to flexible leads. The language in the existing second sentence is clear that 10 AWG or smaller is the only exception to the general requirement. Wire-binding screws or studs and nuts with upturned lugs shall be permitted for 10 AWG or smaller conductors.
The existing language is both clear and correct.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-151 Log #2864 NEC-P01 **Final Action: Accept in Principle**
(110.14(A))

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
110.14 Electrical Connections.
Because of different characteristics of dissimilar metals, devices such as pressure terminal or pressure splicing connectors and soldering lugs shall be identified for the material of the conductor and shall be properly installed and used. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors (such as copper and aluminum, copper and copper-clad aluminum, or aluminum and copper-clad aluminum), unless the device is identified for the purpose and conditions of use. Materials such as solder, fluxes, inhibitors, and compounds, where employed, shall be suitable for the use and shall be of a type that will not adversely affect the conductors, installation, or equipment.
FPN: Many terminations and equipment are marked with a tightening torque.
(A) Terminals. Connection of conductors to terminal parts shall ensure a thoroughly good connection without damaging the conductors and shall be made by means of pressure connectors (including set-screw type), solder lugs, or splices to flexible leads. Connection by means of wire-binding screws or studs and nuts that have upturned lugs or the equivalent shall be permitted for 10 AWG or smaller conductors.
(1) **Flexible, Fine-Stranded Cables**. Flexible, fine-stranded cables shall be terminated only with terminals, lugs, devices, or connectors that are identified and listed for such use.
Substantiation: This was a new item that was added in article 690.31 (F) in the 2008 NEC. The issue is that fine-stranded conductors and jacketed cables are being installed for other installation types where a wide range of flexibility is desired. With the expanded use of fine-stranded cables and conductors being used for welders, cranes, elevators, battery bank connections, computer data cables, UPS cables and many other installations, this requirements needs to be relocated to requirements for electrical installations. As this rule is applied currently within the NEC, only specific applications can require terminations to use devices and equipment rated for these conductor types. This relocated requirement will provide a procedure for identified lugs and terminations providing a safer installation without possible hot spots or cable overheating due to bad or loose lug connections when terminated with acceptable identified crimping tools.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 1-149.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:
MONIZ, G.: See NEMA's statement on Proposal 1-149.

1-152 Log #2217 NEC-P01 **Final Action: Reject**
(110.14(C))

Submitter: Paul Guidry, Fluor Enterprises, Inc
Recommendation: Add new text for Over 600 Volt terminations.
110.14(C)(3) Over 600 Volts up to 35,000 Volts. Unless equipment is listed and marked otherwise, conductor ampacities used in determining equipment termination provisions shall be based on Table 310.81, 90°C, (One circuit, three conductors). Insulated connectors shall not be used.
FPN: Uninsulated wire connectors are rated for general use in circuits up through 2000 V. Uninsulated wire connectors may be used in circuits over 2000 V up through 35,000 V where the effects of corona have been investigated in the end-use application. Uninsulated wire connectors are not marked with a voltage rating.
Substantiation: There are no provisions for temperature ratings as of the 2008 NEC for medium voltage connectors as exists for 600V connectors. Some engineers try to use the 105°C ampacity of medium voltage cables, yet the terminals are only rated 90°C, which brings up the next point. There isn't a reference to which Table ampacity should be used to determine the connector ampacity. I've selected Table 310.88 since this is the highest rated table ampacity and the connectors should be rated for this, otherwise this table cannot be used. I would like to suggest that the panel consult with the testing laboratory representative or appoint a task group on the panel to confirm that this ampacity is acceptable before accepting this proposal.
The information in the proposed FPN is from the 2008 UL White Book, WIRE CONNECTORS AND SOLDERING LUGS (ZMVV), under Voltage Rating.
Panel Meeting Action: Reject
Panel Statement: The submitter's concerns are already addressed in 110.40 covered by Part III for over 600 volt installations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-153 Log #1611 NEC-P01 **Final Action: Reject**
(110.14(C)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Table 310.16" to "Table 310.15(B)(1)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: Code-Making Panel 1 understands that Code-Making Panel 6 has purview over Article 310.
The panel requests that the Technical Correlating Committee forward this proposal to Code-Making Panel 6 for comment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-154 Log #4793 NEC-P01 **Final Action: Reject**
(110.14(C)(1)(a))

Submitter: David Drennan, Thyssen Krupp Krause, Inc.
Recommendation: Revise 110.14(C)(1)(a) to read:
(a) Termination provisions of equipment for circuits rated 100 amperes or less, or marked for ~~14~~ 18 AWG through 1 AWG conductors, shall be used only for one of the following:
The remainder of 110.14 remains the same.
Substantiation: There are 39 references to the use of 18 AWG conductors and 29 references to the use of 16 AWG conductors in the NEC, but there is a lack of direction in 110.14(C)(1)(a) as to the proper application of these smaller conductors. This proposed change rectifies this problem and provides the user with the needed direction.
Panel Meeting Action: Reject
Panel Statement: Except as permitted elsewhere in the NEC, the minimum size conductor for installation is 14 AWG copper (see Table 310.5), and the equipment termination provisions noted in 110.14(C)(1)(a) address the minimum size. In addition, Table 310.16 does not provide an allowable ampacity or temperature rating (termination ampacity) for 60°C (140°F) or 75°C (167°F) 18 and 16 AWG conductors.
Therefore, the proposed change is unnecessary. See 240.4(D) as this section restricts the overcurrent protection for small conductors without regard to equipment termination provisions. Generally, where 18 and 16 AWG conductors are allowed in the NEC, temperature rating and equipment termination provisions are not a concern.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-155 Log #608 NEC-P01 **Final Action: Reject**
(110.14(C)(1)(b)(3))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
Conductors extended between devices that have terminals rated at different temperatures shall have an ampacity based on the lowest temperature rated terminal.
Substantiation: Devices with different temperature rated terminals are a distinct possibility and conductor ampacity would be affected by making connections to these terminals.
Panel Meeting Action: Reject
Panel Statement: The proposed requirement is currently addressed in 110.14(C) that reads as follows:
"The temperature rating associated with the ampacity of a conductor shall be selected and coordinated so as not to exceed the lowest temperature rating of any connected termination, conductor, or device."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: The submitter's language is clearer and more direct than the existing NEC language. We encourage the submitter to revise and re-submit. Some sentences of the NEC have been group-edited so much over the years that a silver bullet like this is welcome.

1-156 Log #766 NEC-P01 **Final Action: Reject**
(110.15)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.15 High-Leg Marking. On a 4-wire, delta-connected system where the midpoint of one phase winding is grounded, only the conductor or busbar having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is both orange and red in color or by other effective means. Such identification shall be placed at each point on the system where a connection is made if the grounded conductor is also present.
Substantiation: Both red and orange are commonly used and have been used to identify this conductor. It is easy to apply both orange and red tape to a larger wire as well as use an orange wire with a red tracer, or a red wire with an orange tracer on it. This change will allow easy adaptation to any existing projects being remodeled as well as result in conductors that are unique to this particular application.
Panel Meeting Action: Reject
Panel Statement: The color orange is specified for delta-connected 3-phase, 4-wire, high-leg systems. Only the conductor or busbar with the higher voltage to ground is required to be marked by an outer finish that is orange in color.
The color red is not a required marking for ungrounded conductors. See 210.5(C) and 215.12(C) for ungrounded conductor identification requirements.
In addition, the submitter did not provide sufficient substantiation as required by 4.3.3.(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-157 Log #586 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Joe Tedesco, Boston, MA
Recommendation: Delete the following words: "that are in other than dwelling occupancies," so that the text in the 2011 NEC will read as follows:
110.16 Flash Protection. Electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.
Substantiation: I live in a nine story building that is supplied by a 1000 amp, 208Y/120 volt, 3 phase 4 wire service, that includes electrical switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that often require examination, adjustment, servicing, or maintenance while energized.
Each dwelling unit is supplied by a 125 amp feeder, and has a panelboard installed in a **clothes closet.**
The building was built before the code added the rule in 240.24(D).
Adding a field marking to warn qualified persons of potential electric arc flash hazards where it will be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment **will enhance safety.**
See this video and audio of the equipment room in my building:
http://www.youtube.com/watch?v=HKjAmaH6xxk#
http://www.youtube.com/user/electsafeman

Panel Meeting Action: Reject
Panel Statement: Deleting the dwelling occupancies exemption, as proposed, has not been substantiated.
See the panel action on Proposal 1-162.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HICKMAN, P.: We agree with the recommendation but do not believe that adequate substantiation has been submitted.

1-158 Log #776 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.16 Flash Protection. Power production, service, and distribution equipment ~~Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers,~~ that are in other than dwelling occupancies, and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electrical arc flash hazards.
Substantiation: If we define these items in Article 100, we do not have to have this list here. (Please see my proposed new definitions for "power production equipment" and "distribution equipment".
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation for the proposed change, as required by 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-159 Log #777 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.16 Flash Protection. Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers~~, that are in other than dwelling occupancies, and~~ that are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn ~~qualified persons~~ everyone of potential electrical arc flash hazards.
Substantiation: Where the equipment is located does not diminish the power contained inside of that equipment. It is especially true that in dwelling units, unqualified people might consider doing the work themselves in an attempt to save some money. It is more important to warn unqualified people about the dangers than qualified people. Clearly, the general public is probably less aware of the dangers involved and should be warned.
Panel Meeting Action: Reject
Panel Statement: The field marking requirement is for qualified persons working where exposed to electrical hazards.
See the definition of "Qualified Persons" in Article 100 and the panel action on Proposal 1-157.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HITTINGER, D.: I would support an accept in part. Accept only the deletion of "qualified persons" and insert the word "everyone" so the label warns everyone of a potential hazard. The hazard exists whether the person is qualified or not therefore, the warning would benefit anyone that reads the label. Reject the remainder of the proposed changes.
Comment on Affirmative:
HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-160 Log #778 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.16 Flash Protection. Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling occupancies, and are likely to require examination, adjustment, servicing, or maintenance ~~while energized~~ shall be field marked to warn qualified persons of potential electric arc flash hazards.
Substantiation: We need to update this to our current understanding of NFPA 70E. Hopefully, people will find very few things that they must do while the equipment is energized. This warning should always be in place even if it is company policy to never work on equipment that is energized.
Panel Meeting Action: Reject
Panel Statement: Removing the words "while energized" would expand the requirement to de-energized equipment without sufficient substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-161 Log #779 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
1**10.16 Flash Protection.** Power production, service, and distribution equipment ~~Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling occupancies, and~~ that are likely to require examination, adjustment, servicing, or maintenance ~~while energized~~ shall be field marked to warn ~~qualified persons~~ everyone of potential electrical arc flash hazards.
Substantiation: By adopting all three of the changes that I have submitted for 110.16, we will end up with a very simple, effective statement that clearly warns everyone everywhere that you must be dressed in personal protective equipment around these types of equipment. In the related document, 70E, you have a requirement of having at least a long sleeve cotton shirt on just to turn a breaker off or on even though everything is still closed up.
Panel Meeting Action: Reject
Panel Statement: See the panel statements on Proposals 1-64, 1-158, 1-159, and 1-160.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HITTINGER, D.: I would support an accept in part related to "while energized" and "qualified person" and inserting the word "everyone." Reject the remainder of the proposal.
Comment on Affirmative:
HICKMAN, P.: We would support an accept in part related to "while energized" and "qualified person."

1-162 Log #1591 NEC-P01 **Final Action: Accept**
(110.16)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Change the words (~~dwelling occupancies~~) to the words (dwelling units).
Substantiation: A dwelling occupancy includes multifamily dwellings. A large multifamily dwelling could have the same or bigger electric service as a commercial office building. The equipment in the office building would require Arc Flash warning labels, while the equipment in the multifamily dwelling would not be required to have the Arc Flash warning labels to be installed. The lack of this additional reminder and warning label, could lead to a catastrophe for the electrical worker in the multifamily dwelling, while the electrician in the office building has the benefit of seeing the warning sign and being reminded of the danger before they work on any equipment. This glaring gap in safety was very evident yesterday when I needed to work on the switchboard of a 480 volt 3 phase 1000KVA 5.89% impedance transformer fed multifamily dwelling! Not one Arc Flash warning label was to be found in this 2 year old building. None were required. That is simply NOT safe enough for this massive amount of energy.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-163 Log #2236 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Revise text to read as follows:
Electrical equipment such as switchboards, panelboards, industrial control panels, meter socket enclosures, motor control centers and multi-meter enclosures at multifamily dwellings.
Substantiation: Including multi-meter enclosures at multi -family dwellings, makes sense, many multi-family dwellings are supplied by services that are 600 amps and more and definitely have potential arc flash hazard and should require the same field applied warning.
Panel Meeting Action: Reject
Panel Statement: The proposal is redundant. 110.16 currently includes meter socket enclosures, without distinguishing between one socket and many.
Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-164 Log #2878 NEC-P01 **Final Action: Accept in Principle**
(110.16)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal.
This action will be considered by the panel as a public comment.
Submitter: William Gross, Electric Service of Clinton
Recommendation: Revise text to read as follows:
Electrical equipment, such as switchboards, panelboards, industrial control panels, meter sockets enclosures and motor control centers, that are in other than single family dwelling occupancies, and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of the potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment servicing, or maintenance of the equipment.
Substantiation: Large multifamily dwelling buildings have service equipment large enough to warrant field marking this equipment with arc flash warning. The addition of the term "single family" will result in the marking of large multifamily dwelling services and recognition of the potential arc flash hazard of these services and equipment.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel does not intend that the exemption for dwelling units be limited to single family.
See the panel action on Proposal 1-162.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HICKMAN, P.: We support the recommendation in the proposal.

1-165 Log #2934 NEC-P01 **Final Action: Accept in Principle**
(110.16)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
110.16 Flash Protection. For other than one and two-family dwellings, electrical ~~Electrical~~ equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that ~~are in other than dwelling occupancies, and~~ are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked to warn qualified persons of potential electric arc flash hazards. The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.
FPN No. 1: NFPA 70E-2004, Standard for Electrical Safety in the Workplace, provides assistance in determining severity of potential exposure, planning safe work practices, and selecting personal protective equipment.
FPN No. 2: ANSI Z535.4-1998, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.
Substantiation: The present language can be interpreted to exclude multifamily dwellings such as apartment buildings from the marking requirements. Many of these structures are supplied by large services having substantial available short-circuit current.
This proposal also deletes the term "dwelling occupancies" which is not defined in Article 100 and thus is subject to varying interpretations. The terms "one-family dwelling," and "two-family dwelling" are defined in Article 100. The use of these defined terms in the section will result is correct application of the rule.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 1-162 that addresses the submitter's concerns.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HICKMAN, P.: We support the recommendation in the proposal.

1-166 Log #4790 NEC-P01 **Final Action: Reject**
(110.16)

Submitter: Jason Sisk, Lebanon, IN
Recommendation: Revise text as follows:
110.16 Flash Protection. Electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that are in other than dwelling occupancies, and are likely to require examination, adjustment, servicing, or maintenance while energized shall be field marked in accordance with 110.16(A) and 110.16(B). The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.
(A) Arc-Flash Hazard Warning. To warn qualified persons of potential electric arc flash hazards
(B) Overcurrent Protective Device. With the size, setting(s), type, model number, and location of the upstream overcurrent protective device
There is no change to either Fine Print Note.
Substantiation: A worker that approaches electrical equipment needs to know the particular attributes of the upstream overcurrent protective device so that he or she can determine the arc-flash energy and arc-flash boundary. Even if the worker is able to turn off the power, he or she must dress in appropriate PPE until he or she can prove there is an absence of voltage. It is impossible to use the "NFPA 70E Tables" or to calculate the arc-flash energy without knowing the attributes of the overcurrent device. This proposal provides that necessary information for the worker. This information is easily determined (and easily marked on the equipment) during the construction phase, but it is often very difficult and time-consuming to determine at a later time, especially at 2:00 AM in the morning with the plant manager standing over your shoulder, screaming that the line is "down". Finally, by additionally providing the location of the upstream overcurrent protective device, the worker is more likely to go and shut it off, especially if he or she is under pressure to get a line up and running again.
Panel Meeting Action: Reject
Panel Statement: The panel agrees that it is important to know the particular attributes of the upstream overcurrent protective device to determine the arc-flash energy and arc-flash boundary, however; the submitter has not provided justification for expanding the marking requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HICKMAN, P.: We support the recommendation in the proposal.

1-167 Log #2646 NEC-P01 **Final Action: Reject**
(110.17 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 110.XX Continuous Covering. The sheath, armor, and jackets of cables shall be continuous between boxes, other enclosures, and other terminations.
Substantiation: A similar rule is in 352.48(F); location in this article would provide for general application.
Panel Meeting Action: Reject
Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects, and the need for the proposed requirements in Article 110 has not been substantiated. The referenced rule is nonexistent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-168 Log #4826 NEC-P01 **Final Action: Reject**
(110.17)

Submitter: John Whitney, Newtown Square, PA
Recommendation: Add new section:
Identification of Cables and Conductors. Cables and conductors within enclosures intended for personnel entry shall be permanently and legibly tagged or labeled to indicate the owner, application, and the line or circuit number such as "METRO Electric Co. Circuit #123 15KV". Tags, labels and their attachments shall be durable and of materials suitable to withstand the environment in which they are installed.
Substantiation: Manholes and interconnecting duct systems are often shared by facility owners, serving utilities, and Municipal entities. Manholes may contain assortments of fiber optic and copper cables including communications, power, and data cables. Cables and conductors may be provided with physical protection such as inner duct or arc proofing. It is often difficult to determine the cable or conductor type or application through visual inspection of the jacket or insulation. To perform a hazard assessment of facilities installed within enclosures intended for personnel entry requires information regarding the facilities installed. When cables and conductors are identified with legible tags or labels, the process of determining the application and owner is much simpler than searching through outdated records stored at a remote location. On site cable identification through field applied tags and labels expedites owner notification and the hazard assessment process when quick repair is a consideration. Identifying cables and conductors at the time of installation is relatively inexpensive and simple to achieve and could hardly be considered restrictive. Cost relative to benefit analysis of applying identification to cables and conductors will prove this proposal to be one of the most cost effective methods to significantly increase the level of safety for personnel required to enter manholes and other electric enclosures intended for personnel entry. One incident of unintended interruption of service, damage to electrical facilities, or injury to personnel would immediately demonstrate how insignificant the cost or difficulty of identifying cables and conductors is when compared to costs associated with the unintended event. Certainly anyone experiencing such an event would testify that given the opportunity they would have marked the cables and conductors to prevent the incident. Although there are certainly other opportunities for cable identification in other sections of the NEC, this proposal specifically addresses a need to mitigate electrical hazard exposure to personnel working within enclosures intended for personnel entry and as such, belongs in Article 110, paragraph V.
Panel Meeting Action: Reject
Panel Statement: The submitter has not supplied sufficient technical substantiation to justify the change, and the subject matter of this proposal may be more appropriately addressed in Article 300.
Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

ANTHONY, M.: The submitter has provided sufficient substantiation in our view. (Refer to our comment on Proposal 1-49 regarding the criterion for "technical substantiation") The submitter is encouraged to submit this concept to other NEC panels or to other related NFPA documents.

Comment on Affirmative:

HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-169 Log #719 NEC-P01 **Final Action: Reject**
(110.20)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add text and a new Fine Print Note to read as follows:

110.20 Enclosure Types.

Enclosures (other than surrounding fences or walls) of switchboards, panelboards, industrial control panels, motor control centers, meter sockets, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.20.

Table 110.20 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations, except where specifically permitted elsewhere in this *Code*. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

FPN: See 500.7(C). 500.8(C)(6)(b), 502.10(B)(1)(2), 502.10(B)(4), 502.115(B), 502.120(B)(1) and (2), 502.130(B)(2), 502.135(B)(1) *Exception*, 502.135(B)(3), 502.150(B)(1), 503.10(A), 503.115, 503.120, 506.8(D), and 506.15(C)(2) and (8) for use in hazardous (classified) locations of dusttight enclosures.

Substantiation: Correlation issue. 110.20 limits Enclosure Types to "other than hazardous (classified) locations". Table 110.20 FPN associates the term "dusttight" with Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, and 13. In Class II, Division 2 and Class III, Divisions 1 and 2 and Zone 22 classified locations, 500.7(C). 500.8(C)(6)(b), 502.10(B)(1)(2), 502.10(B)(4), 502.115(B), 502.120(B)(1) and (2), 502.130(B)(2), 502.135(B)(1) *Exception*, 502.135(B)(3), 502.150(B)(1), 503.10(A), 503.115, 503.120, 506.8(D), and 506.15(C)(2) and (8) allow "dusttight" as a permitted protection technique.

If the Article 100 definition for "Dusttight" is identical to the 500.2 definition for "Dusttight" and the 506.2 definition for "Dusttight" (redundant definitions compliant with *NEC® Style Manual* 2.2.2.1?), then

110.20 Enclosure Types 3, 3S, 3SX, 3X, 5, 12, 12K, and 13

= Article 100/500.2/506.2 "Dusttight"

= Articles 500/502/503 protection technique for Class II, Division 2 and Class III, Divisions 1 and 2 classified locations

= Article 506 protection technique for Zone 22 classified locations.

Therefore some 110.20 Enclosure Types are NOT always precluded from use in some hazardous (classified) location applications.

Panel Meeting Action: Reject

Panel Statement: The proposal is redundant. Existing language states, "other than hazardous locations." The code sections in the proposed FPN only relate to hazardous locations.

Therefore, there are no places "where specifically permitted" except for hazardous locations.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: The panel should have accepted this proposal in principle. As the submitter has noted, not all enclosure types should be "precluded from use in some hazardous (classified) location." To clarify, the panel should have revised the sentence to read: "Table 110.20 shall be used for selecting these enclosures for use in specific locations." The remaining text is unnecessary, and no other changes to the remainder of the paragraph are needed.

1-170 Log #3817 NEC-P01 **Final Action: Reject**
(110.20)

Submitter: Thomas J. Baker, Puget Sound Electrical Training

Recommendation: Add new text to read as follows:

110.20 Enclosure Types.

Enclosures (other than surrounding fences or walls) of switchboards, panelboards, industrial control panels, motor control centers, meter sockets, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.20.

Table 110.20 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

FPN - IP ratings as used by the European Committee for Electro Technical Standardization (CENELEC) (NEMA IEC 60529 Degrees of Protection Provided by Enclosures - IP Code), and specify the environmental protection an enclosure provides. An IP rating is not equivalent to Enclosure-Type Number in Table 110.20. The following table converts NEMA Enclosure ratings to IEC 60529 IP Ratings.

Substantiation: The 2002 NEC added SI units in section 90.9 Units of Measurement and section 90.1(D). Relation to Other International Standards added a reference to an IEC international standard to clarify the NEC addresses international requirements on potential hazards.

IP ratings are commonly used by European manufacturers, and for domestic products intended for European markets. IP Ratings and NEMA enclosure ratings are not always the same, per information from NEMA. By adding the information the FPN, users of international products can determine if they meet NEC requirements.

Luminaire manufacturers frequently use IP ratings in product literature. A typical advertisement from a recent LD&A, (published by the Illuminating Engineering Society) is included, notice the product is shown as "IP67".

The following IP to NEMA enclosure table is from NEMA:

See Table A-1 on Page 84

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 1-251.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ANTHONY, M.: See comment on Proposal 1-251.

1-171 Log #4388 NEC-P01 **Final Action: Accept**
(110.20)

Submitter: John R. Kovacik, Underwriters Laboratories Inc.

Recommendation: Revise text as follows:

110.20 Enclosure Types.

Enclosures (other than surrounding fences or walls) of switchboards, panelboards, industrial control panels, motor control centers, meter sockets, enclosed switches, transfer switches, power outlets, circuit-breakers, adjustable-speed drive systems, pullout switches, portable power distribution equipment, termination boxes, general purpose transformers, fire pump controllers, fire pump motors, and motor controllers, rated not over 600 volts nominal and intended for such locations, shall be marked with an enclosure-type number as shown in Table 110.20.

Table 110.20 shall be used for selecting these enclosures for use in specific locations other than hazardous (classified) locations. The enclosures are not intended to protect against conditions such as condensation, icing, corrosion, or contamination that may occur within the enclosure or enter via the conduit or unsealed openings.

Substantiation: The enclosures of the products proposed to be added to 110.20 are required to be marked with an enclosure-type number.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-172 Log #4579 NEC-P01 **Final Action: Accept**
(110.20)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Relocate this material as 110.28 in Part II of the article.

Substantiation: This material does not apply to medium voltage applications. Its location in Part I is therefore incorrect because 110.30 specifically incorporates all coverage in Part I except as supplemented or modified by part III provisions, and no provision in Part III modifies the NEMA enclosure types. It must be located where it will only apply to installations operating at 600V and below.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

BOYCE, K.: The proposal should be rejected. The present text clearly and effectively identifies the requirements as applicable to specific equipment rated not more than 600 V. The proposed relocation of these requirements - for a third time in three Code cycles - will have a negative impact on Code users.

Table A-1 Conversion of NEMA Enclosure Type Ratings to IEC 60529Enclosure Classification Designations (IP) (Cannot be Used to Convert IEC classification Designations to NEMA Type Ratings)

IP First Character	NEMA Enclosure type																		IP Second Character
	1		2		3, 3X, 3S, 3SX		3R, 3RX		4, 4X		5		6		6P		12, 12K, 13		
IPO_																			IP_O
IP1_																			IP_1
IP2_																			IP_2
IP3_																			IP_3
IP4_																			IP_4
IP5_																			IP_5
IP6_																			IP_6
																			IP_7
																			IP_8
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	

A = A shaded block in the "A" column indicates that the NEMA Enclosure Type exceeds the requirements for the respective IEA 60529 IP First Character Designation. The IP First Character Designation is the protection against access to hazardous parts and solid foreign objects.
B = A shaded block in the "B" column indicates that the NEMA Enclosure Type exceeds the requirements for the respective IEC 60529 IP Second Character Designation. The IP Second Character Designation is the protection against the ingress of water.

1-173 Log #1865 NEC-P01 **Final Action: Reject**
(110.21)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The manufacturers name, trademark, or other descriptive marking by which the ~~organization responsible for the product~~ manufacturer can be identified shall be placed on all electrical equipment. Other markings that indicate voltage, current, wattage, or other ratings shall be provided as specified elsewhere in this Code. The markings shall be ~~of sufficient durability to withstand the environment involved~~ durable.
Substantiation: Since the manufacturers name, etc. is required, the manufacturer should be the "organization". "Durable" is defined as able to exist for a long time, which inherently includes environments for which the equipment is suitable. "Sufficient" is subjective and a term to be avoided per the Style manual.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-174 Log #2678 NEC-P01 **Final Action: Reject**
(110.21)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
The marking shall be permanently affixed and durable ~~of sufficient durability to withstand the environment involved~~.
Substantiation: Edit. "Sufficient" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects. In addition, the panel does not agree that the proposed change is editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, the word "sufficient" is subjective and should be avoided. The proposed text more clearly defines the intent of the section.

1-175 Log #2135 NEC-P01 **Final Action: Reject**
(110.22)

Submitter: Kenneth Dale Bristow, Stellar Technologies
Recommendation: 110.22 All conductors to terminal parts shall be identified as to indicate its disconnecting device.
Substantiation: This sentence, at the beginning of the existing text, will reduce time in circuit verification during final installation and service.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with NFPA Regulations Governing Committee Projects Section 4.3.3(d).
There is no substantiation for the proposed change.
The panel refers the submitter to 90.1(B).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: Marking the load end of a supply circuit is a haltingly clever; though the specifics of how wires would be labeled would have to be worked out. We disagree with panel statement regarding insufficient substantiation. This is one of several proposals this cycle that are so intuitively understandable so as to be their own substantiation.

1-176 Log #2677 NEC-P01 **Final Action: Reject**
(110.22(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
The marking shall be permanently affixed and durable ~~of sufficient durability to withstand the environment involved~~.
Substantiation: Edit. "Sufficient" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The term is not unenforceable or vague in context as provided for in 3.2.1 of the NEC Style Manual.
In addition, the proposed change is not editorial.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, the word "sufficient" is subjective and should be avoided. The proposed text more clearly defines the intent of the section.

1-177 Log #2935 NEC-P01 **Final Action: Accept in Principle in Part**
(110.22(B))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 10 for comment.
Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
(B) Engineered Series Combination Systems. ~~Where~~ Equipment enclosures for circuit breakers or fuses ~~are~~ applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) ~~and marked on the equipment as directed by the engineer, the equipment enclosure(s)~~ shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM ~~RATED _______ AMPERES~~. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED. SEE DOCUMENTATION LOCATED ____________.

Substantiation: While the addition of this subsection for the 2008 NEC was needed, several valid questions continue to be raised that this Proposal intends to answer. First, where does the rule come from? [240.86(A)]. Second, what gets marked in the existing blank? The ampere rating of the breaker or fuse? The ampere rating of the switchboard or panelboard? The short-circuit current rating of the respective equipment? In reality, the engineer must include the make, model and operating characteristics of the overcurrent devices to be used in the engineered series-combination in the documentation for the series-combination. Any other information in the existing blank is inadequate for future maintenance, repair or replacement. The documentation referred to in this proposal is required as a condition in 240.86(A).

Other changes are intended to be editorial in nature.

Panel Meeting Action: Accept in Principle in Part

Revise the proposed wording to read as follows:

"(B) Engineered Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with series combination ratings selected under engineering supervision in accordance with 240.86(A) shall be legibly marked in the field as directed by the engineer to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following:

CAUTION — ENGINEERED SERIES COMBINATION SYSTEM RATED _______ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED."

The FPN in the existing code is to be deleted.

Panel Statement: By virtue of the meeting action, the panel has rejected the proposed revisions to the marking and Accepted the remainder of the proposed text.

In addition, the panel deleted the FPN in the existing code since the language has now been incorporated into the text.

The proposed revisions to the marking have not been substantiated.

240.86(A) contains the prescriptive requirements for documentation and marking of the rating.

The panel requests that the Technical Correlating Committee refer this proposal to Code-Making Panel 10 for comment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-178 Log #2936 NEC-P01 **Final Action: Accept in Principle in Part**

(110.22(C))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 10 for comment.

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

(C) Tested Series Combination Systems. Equipment enclosures for ~~Where~~ circuit breakers or fuses ~~are~~ applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B)~~, the equipment enclosure(s)~~ shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES, OVERCURRENT DEVICE CATALOG NUMBER _______. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED.

Substantiation: While the addition of this subsection for the 2008 NEC was needed, several valid questions continue to be raised that this Proposal intends to answer. First, where does the rule come from? [240.86(B)]. Second, what gets marked in the existing blank? The ampere rating of the breaker or fuse? The ampere rating of the switchboard or panelboard? The short-circuit current rating of the respective equipment? In reality, the make and model of the overcurrent device to be operated as a series-combination along with the ampere rating should be provided. Any other information in the existing blank is inadequate for future maintenance, repair or replacement.

Other changes are intended to be editorial in nature.

Panel Meeting Action: Accept in Principle in Part

The panel revises the proposed text to read as follows:

"(C) Tested Series Combination Systems. Equipment enclosures for circuit breakers or fuses applied in compliance with the series combination ratings marked on the equipment by the manufacturer in accordance with 240.86(B) shall be legibly marked in the field to indicate the equipment has been applied with a series combination rating. The marking shall be readily visible and state the following:

CAUTION — SERIES COMBINATION SYSTEM RATED ____ AMPERES. IDENTIFIED REPLACEMENT COMPONENTS REQUIRED."

In addition, delete the FPN in the existing code text.

Panel Statement: The panel has rejected the proposed revisions to the marking and accepted the remainder of the proposed text.

In addition, the panel deleted the FPN in the existing code since the language has now been incorporated into the text.

The proposed revisions to the marking have not been substantiated.

The panel requests that the Technical Correlating Committee refer this proposal to Code-Making Panel 10 for comment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-179 Log #1765 NEC-P01 **Final Action: Reject**

(110.23)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete "potentially".

Substantiation: Edit. It is unclear if "potentially" is related to voltage or possibility.

Panel Meeting Action: Reject

Panel Statement: Use of the term "potentially" to refer to the possibility of energization is necessary and removal is not substantiated.

3.2.5.6 of the NEC Style Manual requires the use of the word "voltage" rather than "potential".

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: The panel should have accepted this proposal. As the submitter has noted, use of the word "potentially" is unclear, a bit misleading and adds no value to the code requirement. Generally, unused current transformers, whether associated with energized or de-energized circuits should be short-circuited.

1-180 Log #2222 NEC-P01 **Final Action: Reject**

(110.24)

Submitter: Allen Forbes, L & A Electric, Inc.

Recommendation: Add new text to read as follows:

110.24 Qualified Persons. Electrical installations shall be made by qualified persons, or those persons directly supervised by qualified persons.

Substantiation: To prevent untrained persons from doing electrical installations.

Panel Meeting Action: Reject

Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

Qualifications of installers are outside the purview of the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-181 Log #2937 NEC-P01 **Final Action: Reject**

(110.24)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

110.24 Locked Electrical Equipment Rooms or Enclosures. Electrical equipment rooms or enclosures housing electrical apparatus that are controlled by a lock(s) shall be considered readily accessible to persons who have a key or other means of ready access.

Delete existing 110.26(G) in the 2008 NEC.

Substantiation: CMP-1 took an important first step in clarifying an important rule when they moved the provision for accessing locked equipment or equipment rooms from the opening paragraph of 110.26 while processing the 2008 NEC.

Another logical step needs to be for this Code cycle by moving these provisions for "Locked Electrical Equipment Rooms or Enclosures" out of Section 110.26. Section 110.26 continues to apply to working spaces and dedicated equipment space and not directly to access to locked electrical equipment. For example, look at the titles and or opening phrases of the following subsections of 110.26:

(A) Working Space.

(B) Clear Spaces. Working space...".

(C) Entrance to and Egress from Working Space.

(D) Illumination. Illumination shall be provided for all working spaces...".

(E) Headroom. The minimum headroom of working spaces...".

(F) Dedicated Equipment Space.

This provision for access to locked equipment should be located in the General Part of Article 110 so it will apply to both equipment rated through 600 volts as well as to equipment rated over 600 volts. This revised rule will answer an often asked question, "Can equipment that is locked to prevent unauthorized access be considered readily accessible if authorized personnel have a key or other means of access?" The answer needs to be "Yes" since controlled access to electrical equipment and disconnecting means is necessary in many, many occupancies.

Panel Meeting Action: Reject

Panel Statement: The requirement for locked enclosures in equipment and installations over 600 Volts is addressed by 110.31. To apply this generally would diminish the present requirement in 110.31 that access is only for qualified persons.

To relocate 110.26(G) to a general requirement removes it from association with the accessibility requirements in other parts of 110.26.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, the text should be removed from 110.26(G) and placed into new 110.24. Logically, locked electrical equipment rooms or enclosures have nothing to do with spaces about electrical equipment. Had the panel accepted this proposal, it is appropriate that they visit 110.34(C) and 110.76(B) as correlation issues may exist.

1-182 Log #3792 NEC-P01 **Final Action: Accept in Principle**
(110.24 (New))

Submitter: Jacquelyn Dickerson, Sterling Heights, MI
Recommendation: Add a new 110.24.

110.24 Available Short-Circuit Current Marking. Enclosures in other than residential occupancies in which service or feeder conductors terminate shall be field marked with:
(1) The available short-circuit current and
(2) The date that the short-circuit current was determined.

Substantiation: Since determination of the available short-circuit current is already mandatory before distribution equipment can be specified or installed, it is only a minor inconvenience to require that the value be field marked on service and feeder equipment. In return for that minor inconvenience, electrical inspectors can more easily enforce 110.9 and 110.10. Future engineers and electricians will have a pretty good feel for the approximate available fault current and can begin their modification/new addition work with a good starting point. The values can of course change, so additional calculations may be necessary, depending upon how long ago the original determination was made. The proposal limits the requirements to enclosures where service and feeder conductors terminate so that individual light switches, outlets boxes, light fixtures, and similar branch circuit components have no chance of coming under this requirement.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 1-183.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:

ANTHONY, M.: Acceptance of this proposal is tantamount to the requirement for incident energy calculations engraved on all equipment labels that has been rejected in the past several code cycles.

Acceptance of this proposal would mean that even smaller motor feeders and would have to be modeled on a computer. No architectural-engineering design budget can afford the cost of data gathering in alteration projects. According to this proposal, a premises wiring model would have to get down 30 ampere end-use equipment levels. Few operations and maintenance budgets in our industry can afford to gather and store and maintain this information either. Whatever money is available would be more effectively spent on training, developing shut-down practices (per NFPA 70B), and installing next generation equipment that reduces flash hazards.

Available fault current changes as source-load and branch-node configuration change over time. Available fault current is always a computed – never measured – value. To quote an electrical professional at one of APPA's member institutions:

"Why would we want to add a permanent label knowing that it can be inaccurate someday (possibly even the first day of service if the utility made a recent change to their system)? This is not a concern with other equipment nameplates and labels because they don't become dated (e.g. voltage doesn't change, bus ampacity doesn't change, the serial number doesn't change, and transformer capacity doesn't change).

The addition of the date does little to remedy the situation. Who determines how old is too old? Absent any direction, I expect engineering consultants would use that data as a starting point for their work including an arc flash analysis. A proper engineering design for additions, modifications, or analysis should always start from scratch which requires the latest available short circuit current from the utility…".

…If the proposal goes through, what short circuit current value do we post if we have multiple sources (e.g. primary selective system)? We have locations where the short circuit current is one value if supplied from one feeder, a different value if supplied from the other, and higher during a closed transition (which our design anticipates). Posting the worst case value isn't always the best solution. We've seen examples where the lower short circuit current produced the higher arc flash energy because the tripping time was longer."

If this proposal is accepted then many adopting jurisdictions will simply take exception to it. It is conceivable that this passage would be the most widely rejected passage of the 2011 NEC. The NEC will be dragged out in front of state legislators as "too costly to adopt" by interveners during state-level electrical advisory board adoption processes.

Allocating resources to gather branch and node data for circuit models – ad infinitum -- so that the mathematics of a building distribution model – not the equipment itself – can be maintained is not a wise use of scarce resources. We should heed the language of Section 90.1 that refers to the **practical** safeguarding of persons and property from hazards arising from the use of electricity. This proposal is a good idea; but it is not practical.

The panel seems to have recognized this by accepting in principle and reducing its scope. Please refer to our comments on Proposal 1-183.

FISKE, W.: See my Explanation of Negative on Proposal 1-183 (Log #3792).

MONIZ, G.: See NEMA's statement on Proposal 1-183.

1-183 Log #4783 NEC-P01 **Final Action: Accept in Principle**
(110.24)

TCC Action: The Technical Correlating Committee directs that the Chairs of Code-Making Panels 1 and 10 form a Task Group to correlate the actions taken on Proposals 10-72 and 1-183.
Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Add the following new text:

110.24 Available Fault Current.

(A) Marking. Electrical equipment such as switchboards, panelboards, industrial control panels, motor control centers, and HVAC equipment, that are in other than dwelling occupancies, shall be field marked with the available short-circuit current and the date the label was applied.

(B) Modification or Renovation to Electrical Distribution System. When modification or renovation to the electrical distribution system occurs, the available fault current shall be recalculated. Equipment interrupting ratings and short-circuit current ratings shall be verified or corrected to be adequate for the recalculated available fault.

Substantiation: Equipment is required to have an interrupting rating or short-circuit current rating equal to or greater than the available fault current. This requirement applies to all equipment, all the time. Any equipment operating with ratings less than the available fault current is in violation of the NEC and creates a potentially unsafe condition. Existing electrical distribution systems often experience change over the life of the system. As the system ages, the supply network to which it is connected is impacted by growth and is forced to increase capacity or increase efficiency by reducing transformer impedance. In some cases, optional standby systems can be added to provide back-up power to select loads. All of these changes to the electrical distribution system can result in an increase of the available fault current. This increase in available fault can exceed the ratings of the originally installed equipment (creating a violation of 110.9 and 110.10 and an unsafe condition for personnel). This proposal is an effort to bring awareness to a real problem that usually goes ignored by owners, designers, and contractors (often because they are unaware of the affect of system changes to equipment ratings).

It is important to note that OSHA requires what is being proposed here and that these requirements are for the life of the system. This proposal is consistent with what OSHA requires. The question of whether or not the above referenced requirements apply to previously installed equipment is specifically addressed in 1910.303(b) therefore, in consideration of this proposal recall that Federal law requires that the interrupting rating must always be sufficient for the current that is available at the line terminals of the equipment, regardless of when the equipment is installed.

Requirements in the 2009 Edition of NFPA 70E rely on the available fault current to be known to complete an arc flash hazard analysis per 130.3. For instance, the available fault current must be known to determine the Arc Flash Protection Boundary and required PPE in accordance with 130.3(A) and 130.3(B). The equipment must be then be marked with the incident energy or required level of PPE per 130.3(C). In addition, per 130.3, an arc flash hazard analysis is also required to be updated when major modifications or renovations take place. The analysis must be reviewed periodically and not exceed a 5 year timeline and account for changes in the electrical distribution system that could affect the original arc flash analysis.

NFPA 70E is a workplace safety document and NFPA 70 is an installation Code. There are rules in each document that should provide for consistency in achieving and maintaining minimum levels of safety for the installation and workers. The need for more effective correlation is apparent between NFPA 70E and NFPA 70 with regard to available fault current levels at equipment since it is an essential component of achieving compliance in both documents. This proposal provides additional language in Article 100 that already requires equipment to have suitable interrupting ratings (110.9) and short circuit current ratings (110.10) regardless if it is existing or newly installed equipment. The new requirement provides a clear reminder that electrical distribution system alterations or modifications should always include verification and assurances of compliance with 110.9 and 110.10, which should be happening anyway, but is in reality consistently left unaddressed, resulting in numerous unsafe conditions and improper application of existing energized electrical equipment operating on systems where the available fault current is beyond the maximum rating of the equipment. This proposal is an effort to promote consistent correlation between requirements on NFPA 70E and NFPA 70 and more importantly include requirements that address real safety issues and unsafe conditions that are often knowingly allowed to exist which contradicts the provisions in 90.1(A).

In addition to the reasons stated above, this is a common and challenging issue that Code enforcement authorities have to deal with on a regular basis. In some jurisdictions, they handle this issue through administrative provisions that address existing installations. However, this is not the norm. Including clear requirements in the NEC that reinforce the requirements of 110.9 and 110.10 are met, will assist jurisdictions in their efforts to approve such installations.
Panel Meeting Action: Accept in Principle

The panel revised the proposed wording to read as follows:

110.24 Available Fault Current

(A) Field Marking. Service equipment in other than dwelling units shall be legibly marked in the field with the available fault current. The field marking(s) shall include the installation date and be of sufficient durability to withstand the environment involved.
(B) Modifications. When modifications to the electrical installation occur, that affect the available fault current at the service, the available fault current shall be verified or recalculated as necessary to ensure the service equipment interrupting ratings are sufficient for the available fault current at the line terminals of the equipment. The required field marking(s) in (A) above shall be adjusted to reflect the new level of available fault current.

Exception: The field marking requirements in (A) and (B) shall not be required in industrial installations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.

Panel Statement: The revised recommendation meets the intent of the submitter.
The panel does not necessarily agree with all of the submitter's substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 8 Negative: 3 Abstain: 1
Explanation of Negative:

FISKE, W.: CMP-1 should accept the addition of 110.24(A) Field Marking, to the NEC, but not 110.24(B) Modifications. Subpart (B) would create a requirement that cannot generally be fulfilled. Utilities are not required to notify customers when they make changes to the supply system that would affect available fault current at the service. The NEC Style Manual proscribes unenforceable language, and 110.24(B) would be unenforceable.

LABRAKE, JR., N.: This proposal should be rejected since the requirement covering the need for most occupancies other than dwellings is already covered by OSHA as stated by the Submitter. In addition, the need for restricting the requirements to "other than dwelling units" as proposed, has not been established. Some dwelling occupancies could have higher available fault current as noted in the Panel's discussion.

MONIZ, G.: The accepted language requires the available fault current to be marked on service equipment. However, the acceptance of this proposal creates questions and safety concerns.

Is the value marked on the service equipment the maximum utility provided value, or was a calculation performed from the actual transformer parameters? If it is the maximum utility provided value, it would be the "worst case" number applicable only for determining equipment ratings. However, the maximum utility provided value can not be used for making arc flash calculations for NFPA 70E purposes (contrary to the statement in the Substantiation). Determining arc flash energy by using a conservatively high level of short circuit current can actually equate to an incorrect lower value of arc flash energy which would then expose workers to unnecessary hazards.

Once a label is placed on the equipment with an available fault current, how does the next person know if that is for "equipment ratings only" or can that value be used for the arc flash analysis as may be found on markings now required by NFPA 70E?

The most accurate information can be obtained from a current document based on the status of the system, not based on a marking on the equipment.

NEMA also opposes this marking requirement due to concerns about its validity and accuracy. The marking as conveyed in the accepted text places workers unnecessarily at risk, and makes uniform enforcement questionable. Also see NEMA comment to 10-71.

Explanation of Abstention:

ANTHONY, M.: This proposal is a scaled-down version of the more comprehensive proposal 1-182. As such, it may be more economically feasible than earlier conceptions for flash protection guided by incident energy calculations that require short circuit impedance data.

Keep in mind that the legal artifice known as the "service point" in many campus style complexes can be at any of three different locations: the line side of a medium voltage switch, the line side of a transformer, the load side of the secondary main breaker, or at the primary meter at the high voltage the utility supply. Much depends upon the technical and financial relationship between the utility and the campus microgrid, and the technical and financial relationship between the campus microgrid and the individual buildings.

In most jurisdictions, AIC calculations must be supervised under a registered professional electrical engineer to accumulate impedance data and process it for posting on service labels. APPA electrical engineers would have to contact the local utility to obtain circuit information (source MVA; positive, negative, and zero-sequence impedances, etc.) It is not clear whether the utilities would be entitled to compensation for a step-increase in customers asking for this data. It is not hard to imagine that actions will be brought in front of public utility commissions to grant utilities the ability to adjust their tariffs or to at least back charge customers in order to pay for the additional engineering required to assist its customers to meet an NEC requirement.

Acceptance of this proposal is far less costly than Proposal 1-182. In both cases, however, we believe that scarce resources are more effectively allocated to training, shutting down circuits, and simply building safer systems.
We will enter an abstention now and wait to read public comment. We will listen for a functional middle ground.

1-184 Log #4827 NEC-P01 **Final Action: Reject**
(110.24 (New))

Submitter: John Whitney, Newtown Square, PA
Recommendation: Add new section:
<u>Where manholes, tunnels and vaults have unused ducts, all unused ducts shall be effectively closed.</u>
Substantiation: Unused openings in underground enclosures permit ingress of ground water which carries soils into the enclosure. Over time, the accumulation of soils will completely engulf the electrical facilities within the enclosure. Accumulation of soils concealing electrical cables and equipment within the space introduces additional hazards into the already hazardous environment of the space. Soils can conceal damaged cables or equipment. Clearing soils from concealed cables and equipment exposes workers to additional risk and requires extreme care not to damage the facilities. Underground enclosures by their location are expected to be subject to ground water ingress, however, the simple requirement to effectively close unused openings will limit or eliminate soils accumulation within underground enclosures resulting in safer installation and maintenance of the electrical facilities therein.
Panel Meeting Action: Reject
Panel Statement: The term "effectively" is unenforceable and vague in the proposed context, in conflict with 3.2.1 of the NEC Style Manual.

The panel reaffirms its position in Proposal 1-160 of the 2008 code cycle.

The submitter's concerns are best addressed by the design professional. Some subterranean installations may be designed to drain into the drainage system located in the manhole, and the proposed text may cause raceways that are arranged to drain into a drainage system to back up into the building, structure, or equipment at the other end.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-185 Log #4828 NEC-P01 **Final Action: Reject**
(110.25 (New))

Submitter: John Whitney, Newtown Square, PA
Recommendation: Add new section:
<u>Duct Sealing. All cables and conductors installed in ducts entering manholes, tunnels and vaults shall be effectively sealed to prevent ingress of fluids and gases.</u>
Substantiation: Underground conduit systems are commonly subject to settlement, subsidence, and undermining as well as other unintended compromises due to careless excavation and inadequate repairs. Damage to underground conduits connected to underground enclosures permits ingress of ground water which carries soils into the enclosure. Over time, the accumulation of soils will completely engulf the electrical facilities within the enclosure. Accumulation of soils concealing electrical cables and equipment within the space introduces additional hazards into the already hazardous environment of the space. Soils can conceal damaged cables or equipment and often render the equipment inoperable. Clearing soils from concealed electrical cables and equipment is a hazardous activity which exposes personnel to additional risk of injury from concealed damage to facilities and requires extreme caution not to damage the facilities while attempting to expose them for maintenance. Underground enclosures by their location are expected to be subject to ground water ingress, however, the simple requirement to effectively close occupied conduits with duct seals will limit or eliminate soils accumulation within underground enclosures resulting in safer installation and maintenance of the electrical facilities therein.
Panel Meeting Action: Reject
Panel Statement: The term "effectively" is unenforceable and vague in the proposed context, in conflict with 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-186 Log #1439 NEC-P01 **Final Action: Accept in Part**
(110.26)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: ~~Sufficient~~ <u>A</u>ccess and working space shall be provided maintained ~~about all electrical~~ <u>in accordance with 110.26(A) and (B)</u> to permit ready and safe operation, maintenance, <u>and inspection</u> of such equipment.
Substantiation: "Sufficient" is a term to be avoided per the Style Manual. Subsection (A) specifies equipment for which working space is required which does not include "all electric equipment" of the first paragraph, which literally includes raceways, cables, and other electric equipment not likely to require examination, adjustment, servicing, or maintenance, especially if underground or encased in concrete. Access and working space per 110.26 is presumed "sufficient".
Panel Meeting Action: Accept in Part

The panel accepts the removal of the word "Sufficient" and rejects the remainder of the proposed text.
Panel Statement: The panel agrees with the submitter that the word

"sufficient" is vague and unenforceable, in this context, according to the NEC Style Manual.

The panel rejects the remainder of the proposal since 110.26 is for all equipment.

The submitter has insufficient technical substantiation to add "inspection" as it is an activity already covered by operation and maintenance as stated in the present requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-187 Log #3288 NEC-P01 **Final Action: Accept in Part**
(110.26)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

~~Sufficient~~ Access and working space shall be provided and maintained about all electrical equipment likely to require examination, adjustment, servicing, or maintenance, to permit ready and safe operation and maintenance of such equipment.

Substantiation: "All" electrical equipment includes raceways. The provisions should be limited to equipment likely to require examination, adjustment, servicing, or maintenance such as specified in (A). "Sufficient" is subjective and a term to be avoided per the Style Manual.

Panel Meeting Action: Accept in Part

The panel Accepts the removal of the word "Sufficient" and Rejects the remainder of the proposed text.

Panel Statement: The panel agrees with the submitter that the word "sufficient" is vague and unenforceable, in this context, according to the NEC Style Manual.

The panel rejects the remainder of the proposal since 110.26 is for all equipment.

The submitter has insufficient technical substantiation to add "likely to require examination, adjustment, servicing" as they are activities already covered by operation and maintenance as stated in the present requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-188 Log #3620 NEC-P01 **Final Action: Reject**
(110.26 (New))

Submitter: David A. Williams, Delta Township

Recommendation: Add new text to read as follows:

Illumination emergency power. In the event of power supply failure, an emergency system shall automatically illuminate the areas around electrical panels. The emergency power system shall provide power for a duration of not less than 90 minutes and shall consist of storage batteries, unit equipment or an on-site generator. This requirement is for buildings that are required to have emergency egress illumination by building code.

Substantiation: The safety of the electrician has been overlooked in the past. Emergency lighting needs to be installed in the areas where electrical panels are located for egress of someone that may have been injured from an electrocution. The building code has not addressed this location and I think this is an area that needs to be addressed for the safety of electrical personnel, or others entering or trying to exit from the electrical equipment room.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 1-249.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

ANTHONY, M.: Emergency illumination for service switchgear--especially switchgear that controls emergency power--should be a general requirement for electrical installations; much as working/clearance/dedicated space, and panic hardware is a general requirement. Electrical people should be looking after their own in this regard; not leaving the issue to the architectural trades that dominate the code panels in the Life Safety Code. The Life Safety Code is generally broken up into 40-odd chapters dealing with occupancy type. Electrical rooms are not an occupancy type and the word "electrical room" does not even appear in NFPA 101.

One need only do a Google search on "arc flash hazard" to find several video files recording flash injuries to electricians. In one of them, the video recorded the fact that a camera was present in the room but emergency lighting was not present in the room (i.e., the recovery operations were impaired because there were no emergency lights).

See related comment on Proposal 1-249

Comment on Affirmative:

HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-189 Log #3985 NEC-P01 **Final Action: Reject**
(110.26 (New))

Submitter: Michael A. Anthony, University of Michigan Business Operations

Recommendation: Add new figure:

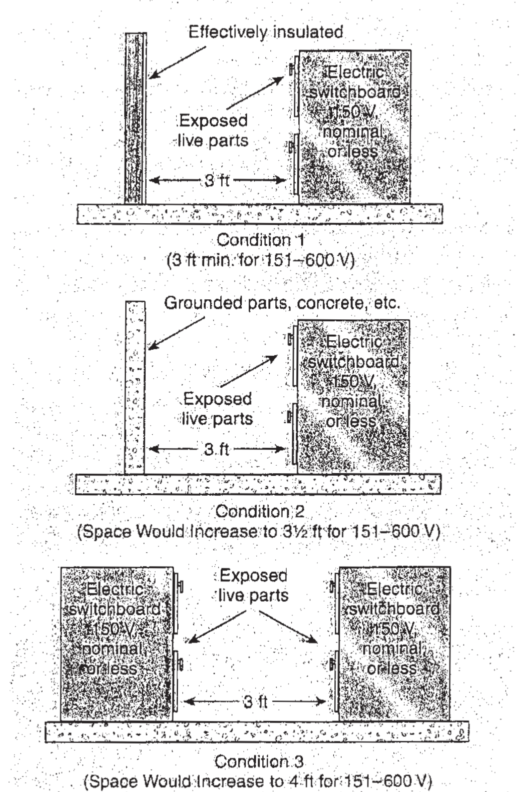


Exhibit for 110.26

Substantiation: 1. The rules regarding space around equipment is one of the most consulted and most difficult parts of the NEC. This illustration, scanned from the 2005 NEC Handbook, will help NEC users.

2. Users should not have to purchase the NEC Handbook in order to understand the NEC.

3. An illustration like this is more likely to be used than Figure 410.2 illustrating closet storage space, or Figure 515.3 illustrating Marine Terminal Handling Flammable Liquids, for example.

4. The presence of figures leavens the look and feel of the NEC and makes the requirement more understandable by electrical professions who learn more quickly from "hands-on", visual aids

Panel Meeting Action: Reject

Panel Statement: Figures may demonstrate an idea or concept to enhance wording in the Code, but there is no technical substantiation provided that any figures need to be added.

90.1(C) makes it clear that the NEC is not an instruction manual for untrained persons.

See section 2.3 of the NEC Style Manual that addresses the use of figures.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

ANTHONY, M.: This proposal should have been Accepted in Principle with the figures re-labeled as Fine Print Notes. The NEC contains several figures and graphics, Figure 410.8, 515.3, 517.41, 800.154. These are managed in the style manual in the following passages, re-produced here for reader convenience:

2.3.1 Mandatory. Tables and figures, including any accompanying notes, represent mandatory requirements, unless specifically noted as in 2.3.2. Tables and figures shall be referenced in the text and shall be designated by the number of the *NEC* rule in which they are referenced. Each table shall have a title and each figure shall have a caption. Titles and captions shall be as brief as possible, consistent with clarity.

2.3.2 Nonmandatory. When the *NEC* is adopted into law, graphics in the text of the document become mandatory. If a Code-Making Panel wishes to use a table or figure to illustrate only a typical situation, not a mandatory requirement, that table or figure shall be identified as a fine print note or be placed in an annex. Each table shall have a title and each figure shall have a caption.

The sheer number of proposals coming in on Article 110 workspace requirements is technical substantiation for the need for the use of graphics in one of the most difficult (and most widely used) articles of the NEC.

1-190 Log #4701 NEC-P01 **Final Action: Reject**
(110.26 (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: New figure shown below:

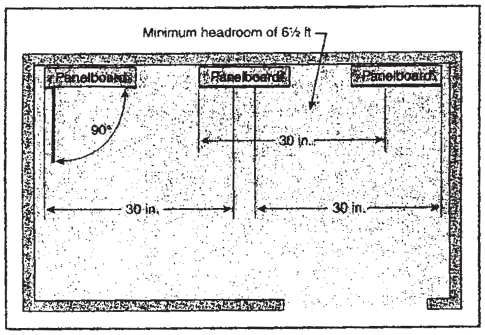


Exhibit 110.12 The 30 in. wide front working space, which is not required to be directly centered on the electrical equipment if space is sufficient for safe operation and maintenance of such equipment.

Substantiation: 1. The rules regarding space around equipment is one of the most consulted and most difficult parts of the NEC. This illustration, scanned from the 2005 NEC Handbook, will help NEC users.
2. Users should not have to purchase the <u>NEC Handbook</u> in order to understand the NEC.
3. An illustration like this is more likely to be used than Figure 410.2 illustrating closet storage space, or Figure 515.3 illustrating Marine Terminal Handling Flammable Liquids, for example.
4. The presence of figures leavens the look and feel of the NEC and makes the requirement more understandable by electrical professions who learn more quickly from “hands-on”, visual aids.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-189.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: See comment on Proposal 1-189.

1-191 Log #4702 NEC-P01 **Final Action: Reject**
(110.26 (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: New figure as shown:

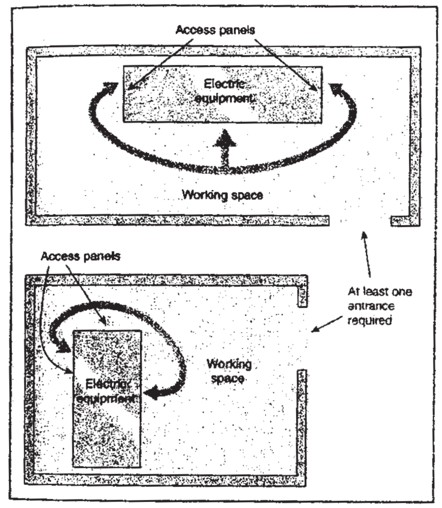


Exhibit 110.14 Basic Rule, first paragraph. At least one entrance is required to provide access to the working space around electrical equipment [110.26(C)(1)]. The lower installation would not be acceptable for a switchboard rated 1200 amperes or more.

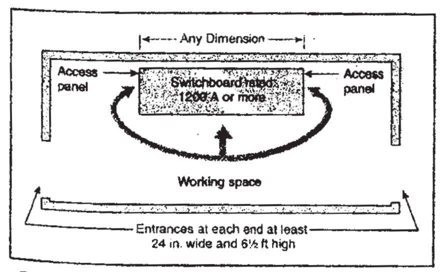


Exhibit 110.15 Basic Rule, second paragraph. For equipment rated 1200 amperes or more, one entrance not less than 24 in. wide and 6½ ft high is required at each end [110.26(C)(2)].

Substantiation: 1. The rules regarding space around equipment are one of the most consulted and most difficult parts of the NEC. This illustration, scanned from the 2005 NEC Handbook, will help NEC users.
2. Users should not have to purchase the <u>NEC Handbook</u> in order to understand the NEC.
3. An illustration like this is more likely to be used than Figure 410.2 illustrating closet storage space, or Figure 515.3 illustrating Marine Terminal Handling Flammable Liquids, for example.
4. The presence of figures leavens the look and feel of the NEC and makes the requirement more understandable by electrical professions who learn more quickly from “hands-on”, visual aids.

Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-189.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: See comment on Proposal 1-189.

1-192 Log #4703 NEC-P01 **Final Action: Reject**
(110.26 (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: New figure shown on the next page:

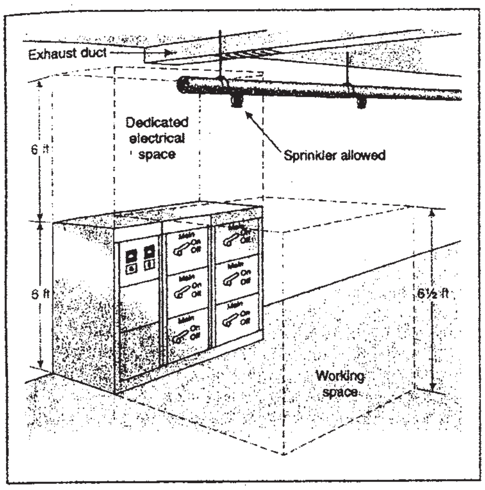


Exhibit 110.19 The two distinct indoor installation spaces required by 110.26(A) and 110.26(F): the working space and the dedicated electrical space.

Substantiation: 1. The rules regarding space around equipment are one of the most consulted and most difficult parts of the NEC. This illustration, scanned from the 2005 NEC Handbook, will help NEC users.

2. Users should not have to purchase the NEC Handbook in order to understand the NEC.

3. An illustration like this is more likely to be used than Figure 410.2 illustrating closet storage space, or Figure 515.3 illustrating Marine Terminal Handling Flammable Liquids, for example.

4. The presence of figures leavens the look and feel of the NEC and makes the requirement more understandable by electrical professionals who learn more quickly from "hands-on", visual aids

5. Movement of these illustrations to the NEC will leave space in the NEC Handbook for its authors to handle other challenging material.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 1-189.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

ANTHONY, M.: See comment on Proposal 1-189.

1-193 Log #780 NEC-P01 **Final Action: Reject**
(110.26(A))

Submitter: Robert Sogla, Coon Rapids, MN

Recommendation: Revise text to read as follows:

110.26 (A) Working Space. Working space for equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance ~~while energized~~ shall comply with the dimensions of 110.26(A)(1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

Substantiation: We need to update this to our current understanding of NFPA 70E. Hopefully, people will find very few things that they must do while the equipment is energized. These rules must be maintained even if it is company policy that the equipment is always de-energized before any work is performed.

Panel Meeting Action: Reject

Panel Statement: Removing the words "while energized" would expand the requirement to de-energized equipment without sufficient substantiation.

The recommendation is in violation of 4.3.3(d) of the NFPA Regulations Governing Committee Projects. The content of proposals must contain a statement of the problem and substantiation for proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-194 Log #781 NEC-P01 **Final Action: Reject**
(110.26(A))

Submitter: Robert Sogla, Coon Rapids, MN

Recommendation: Revise text to read as follows:

110.26(A) Working Space. Working space for ~~equipment~~ power production, service, and distribution equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

Substantiation: By accepting my proposals for new definitions in Article 100 per power production equipment and distribution equipment, we clarify that it is these types of equipment that are involved. We will have general rules for all equipment and specific rules for specific equipment.

Panel Meeting Action: Reject

Panel Statement: The submitter's substantiation does not state the nature of the problem or how the proposal would relieve the problem. This contradicts 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-195 Log #2670 NEC-P01 **Final Action: Reject**
(110.26(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Working space for electrical equipment operating at 600 volts, nominal, or less, ~~to ground,~~ except snap switches, receptacles, luminaries, motors, boxes, and the like, and likely to require examination, adjustment, servicing, or maintenance ~~while energized~~ shall comply with the dimensions of 110.26(A)(1), (A)(2) and (A)(3) or as required or permitted elsewhere in this Code.

Substantiation: Equipment is defined as including appliances, luminaires, snap switches, receptacles, motors, etc. for which this provision literally applies. I have observed many
installation s of disconnecting means for air conditioners, heat pumps, and other equipment installed above or next to such equipment without the specified work space, perhaps justified by the phrase "while energized", which since these disconnecting means can be deenergized by a feeder or service disconnecting means and deemed not to be covered by this section. The reality is that examination and servicing is done while energized, such as voltage check, fuse replacement, etc. Other sections may allow for different requirements. Voltage is already considered to be "to ground".

Panel Meeting Action: Reject

Panel Statement: The recommendation does not enhance clarity or usability.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

MCMAHILL, L.: The panel should have accepted this proposal in part by accepting the addition of the word "electrical" and deletion of the words "to ground." The addition of the word "electrical" would have better clarified the intent and application of the section and the words "to ground" are unnecessary as voltage is considered to ground.

1-196 Log #3642 NEC-P01 **Final Action: Reject**
(110.26(A))

Submitter: Donald A. Ganiere, Ottawa, IL

Recommendation: Revise text to read as follows:

110.26(A) Working Space. Working space for equipment operating at 600 volts, nominal, or less to ground and likely to ~~require examination, adjustment, servicing, or maintenance~~ be examined, adjusted, serviced or maintained while energized shall comply with the dimensions of 110.26(A)(1), (A)(2), and (A)(3) or as required or permitted elsewhere in this Code.

Substantiation: The use of the word "required" in the existing code language makes this section very hard to enforce as there is no code rule or other rule that "requires" equipment to be worked on while energized. If the work is not required the current code rule does not require workspace. The proposed change will require the work space if the equipment is likely to be worked on while energized.

Panel Meeting Action: Reject

Panel Statement: The recommendation does not enhance clarity or usability.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-197 Log #1 NEC-P01 **Final Action: Reject**
(110.26(A)(1)(a) and 110.34.(A))

NOTE: This proposal appeared as Comment 1-77 on Proposal 1-111 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-111 was:

Delete the words "and indicated" from the last sentence, and add the following sentence at the end: "The switch or circuit breaker shall be indicating."

Submitter: Michael P. Walls, American Chemistry Council

Recommendation: Modify 110.34(A)Exception as shown below.

110.34 Work Space and Guarding.

(A) Working Space. Except as elsewhere required or permitted in this *Code*, the minimum clear working space in the direction of access to live parts of electrical equipment shall not be less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from

the enclosure front or opening if such are enclosed.
Exception: Working space shall not be required in back of equipment such as dead-front switchboards or control assemblies
where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on non-electrical de-energized parts on the back of enclosed equipment, a minimum working space of 750 mm (30 in.) horizontally shall be provided.
Substantiation: The panel action should continue to be Reject on Proposal 1-111 because Condition 1, 2, or 3 working clearances may still be needed on de-energized equipment for tasks such as testing for the absence of voltage as noted in Mr. Barrios' ROP affirmative ballot comment. Also as noted in Mr. Barrios' ballot comment, "de-energized parts" in 110.34(A) Exception should be changed to "non-electrical parts" as shown above so that the requirements in 110.26(A)(1)(a) and 110.34(A) are consistent. Failure to modify 110.34(A) will continue the inconsistency between the low voltage and medium voltage clearance requirements behind dead front equipment for another code cycle. This action should not be considered as new material since the proposed changes in 110.34 (A) Exception appeared in the ROP.
Panel Meeting Action: Reject
Panel Statement: The proposal is unclear as to the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BARRIOS, L.: The recommendation in this proposal was incorrectly stated from NFPA. Proposal 1-197 was a HOLD on Comment 1-77 from the 2008 Code Cycle. Comment 1-77 proposed to change "de-energized" to "non-electrical" in the Exception to 110.34A in order to correct an inconsistency in the requirements for safe work clearance behind electrical equipment that presently exists between equipment operating 600V and below, and equipment operating above 600V. The panel considered the proposed change in Comment 1-77 as new material and acted to HOLD this comment for the 2011 Code cycle. Justification for change: Section 110.26(A)(1)(a), which covers equipment rated 600V nominal and less states, "Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided". The exception to Section 110.34A, which covers equipment rated over 600V nominal states, "Where rear access is required to work on de-energized parts on the back of enclosed equipment, a minimum working space of 762mm (30 in.) horizontally shall be provided. Changing "de-energized parts" to "nonelectrical parts" will remove the inconsistency between the two requirements.

1-198 Log #782 NEC-P01 **Final Action: Reject**
(110.26(A)(1)(C))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(C) Existing Buildings. In existing buildings where ~~electrical equipment~~ power production, service, or distribution equipment are ~~is~~ being replaced, Condition 2 working clearance shall be permitted between dead-front switchboards, panelboards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.
Substantiation: By accepting my proposals for new definitions in Article 100 for "power production equipment" and "distribution equipment", we clarify that it is these types of equipment that are involved. We will have general rules for all equipment and specific rules for specific equipment. These rules are not to be used simply because anything that falls into the general definition of equipment is being replaced.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-199 Log #783 NEC-P01 **Final Action: Reject**
(110.26(A)(1)(C))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(C) Existing Buildings. In existing buildings where electrical equipment is being replaced, Condition 2 working clearance shall be permitted between ~~dead front switchboards, panelboards, or motor control centers~~ such equipment located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.
Substantiation: By replacing "switchboards, panelboards, or mcc's" with "such equipment" we are removing this list and replacing it with a term that will, by definition if you adopt my other proposal, add items that we did not have before in this list yet none of the items added have created anything more dangerous than what we started with. (Please see my other proposals for 110.26(A)(1)(C)).
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-200 Log #784 NEC-P01 **Final Action: Reject**
(110.26(A)(1)(C))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(C) Existing Buildings. In existing buildings where ~~electrical equipment~~ power production, service, or distribution equipment are ~~is~~ being replaced, Condition 2 working clearance shall be permitted between ~~dead front switchboards, panelboards, or motor control centers,~~ such equipment located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on both sides of the aisle from being open at the same time and qualified persons who are authorized will service the installation.
Substantiation: By accepting both of my other proposals for 110.26(A)(1)(C), we will end up with this clearly defined statement which will allow existing buildings to modify the limited space they have to accommodate these types of equipment without violating the basic intent of this section.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-201 Log #561 NEC-P01 **Final Action: Reject**
(110.26(A)(2))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
(2) Width of Working Space. The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.) whichever is greater. ~~In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.~~
(3) Hinged Covers and Doors. Electrical equipment enclosures that include hinged covers or doors shall comply with either (a) or (b) or both as applicable.
(a) Equipment Without Environmental Enclosure(s). The work space in front of electrical equipment shall permit at least a 90 degree opening of equipment doors, enclosure doors or hinged panels.
(b) Equipment Within Environmental Enclosure(s). The work space in front of electrical equipment shall permit at least a 90 degree opening of equipment environmental enclosure doors or hinged panels. Equipment doors, enclosure doors or hinged panels inside an environmental enclosure shall be capable of opening 90 degrees without the removal or modification of the environmental enclosure.
(4) ~~(3)~~ Height of Working Space. Text unchanged...
Substantiation: The proposal intends to clarify the requirements for at least a 90 degree opening of hinged doors or hinged panels that serve as the deadfront of the equipment in addition to any hinged doors or hinged panels that are included with environmental enclosures of equipment. As an example, some equipment such as switchboards and panelboards is manufactured with Type 3R enclosures that include environmental hinged covers or doors that meet the 90 degree swing requirement, but the hinged deadfront doors or panels inside are restricted from opening 90 degrees. There are claims about inconsistencies between the NEC product standards for switchboards and panelboards about this specific issue. The proposed language clarifies what is required by the NEC for worker safety and can also serve as a basis for any necessary revision to these applicable product standards. See the photos that I have provided.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposal's attempt to clarify the requirement of the width of the working space in front of the electrical equipment misses the purpose of the requirement, which is to ensure that the "work space" permits at least a 90 degree opening of equipment doors or hinged panels. Section 110.26(A)(2) addresses the "working space" and not the equipment. The submitter's concern is a product standards issue and should be raised with the standards development organizations responsible for such equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: Manufacturers should be reading the debate on this proposal and should be thinking of ways to solve a common problem in this industry: how to specify the doors correctly. Here we are presented an opportunity to balance the specifics and the interconnectedness of the installation-versus-product standard conundrum.
Comment on Affirmative:
BOYCE, K.: The effort to pursue development of requirements in applicable product standards to address this issue is supported as the most effective and appropriate path.
FISKE, W.: Intertek fully supports the Panel Statement. Going beyond the

Panel Statement that questions regarding proper construction of equipment should be directed to standards-developing organizations, we note that such a sweeping requirement as a 90 degree opening of all doors and covers, regardless of where located on equipment, would extend to a very large number of doors and covers where 90 degree opening is not needed for safety, or even for convenience.

1-202 Log #785 NEC-P01 **Final Action: Reject**
(110.26(A)(2))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(2) Width of Working Space. The width of the working space in front of the electrical equipment power production, service, and distribution equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater.
Substantiation: By accepting my proposals for new definitions in Article 100 for "power production equipment" and "distribution equipment", we clarify that it is these types of equipment that are involved. We will have general rules for all equipment and specific rules for specific equipment.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in compliance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-203 Log #3518 NEC-P01 **Final Action: Reject**
(110.26(A)(2))

Submitter: Randy Hunter, City of Las Vegas
Recommendation: Revise text to read as follows:
(2) Width of Working Space. The width of the working space in front of the electrical equipment shall be the width of the equipment or 762 mm (30 in.), whichever is greater. In all cases, equipment doors or hinged panels shall open at least 90 degrees and the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.
Substantiation: After receiving the official interpretation from the UL PDE that doors don't actually have to open 90 degrees, only the UL standard and the code require the "space" to allow a door to open 90 degrees, I felt the language needed to be made clearer, and less interpretive. The changes above leave no doubt as to the requirement that we must have the doors open 90 degrees.
See the figure that I have provided which according to UL met the standard and the existing code as written.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-201.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: See comment on Proposal 1-201.
Comment on Affirmative:
BOYCE, K.: The effort to pursue development of requirements in applicable product standards to address this issue is supported as the most effective and appropriate path.
FISKE, W.: See my Comment on Affirmative on Proposal 1-201 (Log #561).

1-204 Log #623 NEC-P01 **Final Action: Reject**
(110.26(A)(3))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete text as follows:
(3) Height of Working Space. The work space shall be clear and extend from the grade, floor, or ~~platform~~ to the height required by 110.26(E). Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.
Substantiation: This requirement applies to readily accessible electrical equipment. The term platform implies that the equipment installed on the platform would not meet the readily accessible definition.
Panel Meeting Action: Reject
Panel Statement: The degree of equipment accessibility is determined by other sections of the Code. The panel disagrees that the term" platform" implies the equipment installed on a platform would not meet the readily accessible definition. The existing requirement clarifies that the height of the working space is measured from the level of the platform where the equipment is installed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-205 Log #624 NEC-P01 **Final Action: Reject**
(110.26(A)(3))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Revise text to read as follows:
(3) Height of Working Space. The work space shall be clear and extend from the grade, floor, or a readily accessible platform to the height required by 110.26(E). Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.
Substantiation: This requirement applies to readily accessible electrical equipment and the term platform implies that the equipment installed on platforms may require portable ladders to access the equipment which would not meet the definition of readily accessible.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-204.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-206 Log #786 NEC-P01 **Final Action: Reject**
(110.26(A)(3))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(3) Height of Working Space. The work space shall be clear and extend from the grade, floor, or platform to the height required by 110.26(E). Within the height requirements of this section, all ~~other~~ equipment that has removable covers and that is associated with the power production, service, or distribution equipment ~~electrical installation and is located above or below the electrical equipment~~ shall be installed so that the front of all such equipment is common and none of these types of equipment ~~permitted to~~ extends ~~not~~ more than 150 mm (6 in.) beyond the front of all other such equipment located in this area ~~the electrical equipment~~.
Substantiation: By defining the types of equipment under discussion, we eliminate the other kinds of equipment, such as fittings, that have no merit in this topic. Then, we clarify that all of the equipment that someone might need to access, cannot extend out nor be recessed, more than 6 in. from all other equipment requiring access in this area.
Panel Meeting Action: Reject
Panel Statement: The recommendation does not enhance clarity or usability and the submitter did not provide adequate technical substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-207 Log #2381 NEC-P01 **Final Action: Accept**
(110.26(A)(3))

Submitter: David G. Humphrey, Midlothian, VA
Recommendation: Revise text to read as follows:
110.26(A)(3) Height of Working Space. The work space shall be clear and extend from the grade, floor, or platform to ~~the height required by 110.26(E)~~. a height of 2.0 m (6 1/2 ft) or the height of the equipment, whichever is greater. Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in.) beyond the front of the electrical equipment.
Exception: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the height of the working space is less than 2.0 m (6 1/2 ft).
Substantiation: The requirements of sections 110.26(A)(3) and 110.26(E) are effectively the same. To determine the height of the working space we are directed to the height of the headroom requirement referenced in 110.26(E) illustrating the point that the 2.0 m (6 1/2 ft) height/headroom: is different than "height of working space" and this minimum "height/headroom dimension appears to be a redundant requirement. The requirements of 110.26(E) are limited to service equipment, switchboards, panelboards, or motor control centers. Separation of these specific pieces of equipment into another section, and the use of the term "headroom" in lieu of "height of working space" can lead to confusion by the user. The implication may be that "headroom" is different than "height of working space" and this minimum "height/headroom" requirement of 110.26(E) is only applicable to these specific equipment types.
110.26(E) separates the requirement for the "height of working space" and declares this space "headroom". It is difficult to imagine the service equipment, switchboard, panelboard or motor control center that would not require examination, adjustment, servicing, or maintenance while energized, thus, necessitating compliance with 110.26(A)(3) requiring a height of working space to be that of the referenced "Headroom". Accordingly, 110.26(E) is a redundant requirement of 110.26(A)(3) and with the proposed relocation of the Exception to 110.26(A)(3) and elimination of the term "headroom", the requirement for this working space is clear and this redundancy is eliminated.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-208 Log #787 NEC-P01 **Final Action: Accept**
(110.26(A)(3) Exception)

TCC Action: The Technical Correlating Committee directs that the panel reconsider the panel action to comply with the NEC Style Manual regarding the word "allowed".

This action will be considered by the panel as a public comment.

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise to read as follows:

Exception: Meters that are installed in meter sockets shall be allowed to extend beyond the other equipment. The meter socket shall be required to follow the rules of this section.

Substantiation: Meters can often have a big impact on where this plane is established. Often, they are owned by others and can be 6 in. deep all by themselves. Without this exception, a legal installation could become illegal after the meter is installed.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-209 Log #755 NEC-P01 **Final Action: Reject**
(110.26(C)(1))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:

(1) Minimum Required. At least one entrance of sufficient area shall be provided to give access to and egress from the working space about ~~electrical equipment~~ power production, service, and distribution equipment.

Substantiation: The phrase "electrical equipment" is just too broad and covers many items that are not being discussed here. We should replace it with well defined terms. See my proposed new definitions - "power production equipment" and "distribution equipment".
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-210 Log #2618 NEC-P01 **Final Action: Reject**
(110.26(C)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

At least one entrance ~~of sufficient area~~ not less than 610 mm (2 ft) and 2.0 m (6 1/2 ft) high shall be provided to give access to ~~and egress from~~ the required working space ~~about~~ for electrical equipment.

Substantiation: "Sufficient" is subjective and a term to be avoided per the Style Manual. Proposal is similar to 110.33(A). The working space should be that required for specific equipment covered by 110.26(A) not equipment such as raceways, fittings, boxes, etc., which don't require service or maintenance.
Panel Meeting Action: Reject
Panel Statement: The recommendation does not enhance clarity or usability, the submitter did not provide adequate technical substantiation, and the term is not unenforceable or vague in context as provided for in 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-211 Log #756 NEC-P01 **Final Action: Reject**
(110.26(C)(2))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(2) Large Equipment. For ~~equipment~~ power production, service, and distribution equipment rated 1200 amperes or more and over 1.8 m (6 ft) wide ~~that contains overcurrent devices, switching devices, or control devices,~~ there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space.
Substantiation: By removing the rather vague term "equipment" and replacing it with well defined terms from Article 100, we no longer have to include this list to define the type of equipment under discussion. See my proposals for new definitions - "power production equipment" and "distribution equipment".
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

The recommendation does not enhance clarity or usability.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-212 Log #2249 NEC-P01 **Final Action: Reject**
(110.26(C)(2))

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Add new and delete text to read as follows:

...not less than ~~(610 mm (24 in.)~~...812 mm (32 in.)...

Substantiation: This is to be consistent with NFPA 5000 (11.2.1.2.4 Minimum Door Width), NFPA 101 (7.2.1.2.4 Minimum Door Width) and ICC 2006 (1008.1.1 Size of door). During the last code cycle, there were several proposals emphasizing space within electrical equipment and means of egress recommendations as well as access and locking suggestions. There were no proposals for widening the access to such spaces. Which is as important as maintaining the safety of the personnel accessing them by providing not only the minimum area for the spaces, but also sufficient width to get in and out of such spaces.
Panel Meeting Action: Reject
Panel Statement: In general, the area in question is accessible to qualified persons only and is not required to be a door. The dimensions noted are a minimum. In addition, if the building or life safety code requires a door opening wider than the NEC minimum, then those requirements would apply. As a note, NFPA 5000 allows the door width to be less than 32 in. (810 mm) based on certain conditions. For example, exit access doors serving a room not exceeding 70 ft^2, and not required to be accessible to persons with severe mobility impairments shall be not less than 24 in. (610 mm); door openings serving a building or portion thereof not required to be accessible to persons with severe mobility impairments shall be permitted to be 28 in. (710 mm).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-213 Log #2757 NEC-P01 **Final Action: Reject**
(110.26(C)(2))

Submitter: Rich Wolfe, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:

(2) Large Equipment. For equipment rated 1200 amperes or more ~~and over 1.8 m (6 ft) wide~~ that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high at each end of the working space.

Substantiation: The width and/or size of the equipment should be deleted. The potential for an arc flash and need for proper exits and panic hardware is not reduced because of narrow switchgear. In my opinion, it would be worse because electrical equipment rooms are becoming smaller and smaller. It would also be consistent with text in 110.26(C)(3) which notes 1200 ampere or greater, but does not have the 6 ft rule.
Panel Meeting Action: Reject
Panel Statement: The panel reaffirms its action on the Proposal 1-127 from the 2008 ROP to reinstate the 6 ft width requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, the width of the equipment should have no relationship to the entrance to and egress requirements from the working space. Theoretically, the hazard can be greater for a 4-foot wide 3,000 ampere switchboard as it is for an 8-foot wide 1,200 ampere switchboard. This change would also eliminate the application concern as to whether the requirement applies only to a single assembly or to multiple assemblies. In other words, does the requirement apply to six separate 2-foot wide side-by-side 1200 ampere switchboard sections? As the submitter has further noted, the proposed change would also allow for parallel structure with 110.26(C)(3).

1-214 Log #3643 NEC-P01 **Final Action: Reject**
(110.26(C)(2))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(2) Large Equipment. For equipment rated 1200 amperes or more and ~~over 1.8 m (6 ft) wide~~ where the arc flash protection boundary exceeds the workspace in front of the equipment, that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (61/2 ft) high at each end of the working space.
~~A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.~~
~~(a) Unobstructed Egress. Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted.~~
~~(b) Extra Working Space. Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.~~
Substantiation: Arc flash is a serious hazard and the installation needs to be

made in a manner that will reduce the hazard to workers. Providing a second means of egress where the arc flash boundary exceeds the available work space will help limit the exposure to the arc flash hazard.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-213. In addition, the proposal would add an unenforceable requirement in that the arc flash protection boundary is not necessarily required to be known at the time of installation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-215 Log #4523 NEC-P01 **Final Action: Reject**
(110.26(C)(2)(a))

Submitter: Justin B. Biller, Roanoke County Office of Building Safety / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
A single entrance to and egress from the required working space shall be permitted where either of the conditions in 110.26(C)(2)(a) or (C)(2)(b) is met.
(a) Unobstructed Exit. Where the location permits a continuous and unobstructed ~~way of egress travel~~ aisle with a minimum clear width of 30 in. (761 mm), a single entrance to the working space shall be permitted.
Also, add the definition "Aisle" extracted from NFPA 5000 to Article 100 Definitions as follows:
Aisle. An unenclosed path of travel that forms part of the exit access and provides an open and unobstructed path of egress travel to another aisle, a corridor, a vomitory, or an exit. [NFPA 5000 3.3.2.1]
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
Currently language in section 110.26(C)(2)(a) is vague in its description of what constitutes a clear "way of egress travel" to assist the code user in determining whether a single entrance into electrical rooms is permitted. This proposed language intends to clearly establish what provides a minimum safe exit access from potential electrical hazards. Aisle is a defined term in the NFPA 5000, *Building, Construction and Safety Code* and is proposed to be extracted for continuity between codes. This proposal adds a requirement of 30 in. for the width of the aisle when only one entrance to and egress from the required working space is allowed as an exception. Effectively, the 30 in. working space requirement must be provided all the way to the one entrance/exit of the working space for this exception.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the current text is vague and prefers the phrase "way of egress travel" because the term "aisle" is more associated with a passageway between areas of seating. The use of the term "aisle" as defined in the recommendation precludes those exits paths that lead to an open area on the perimeter of the working space within the same room. The submitter has not identified a problem and failed to provide adequate substantiation. Section 4.3.3 of the NFPA Regulations Governing Committee Projects requires each proposal to include a statement of the problem and substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-216 Log #4762 NEC-P01 **Final Action: Reject**
(110.26(C)(2)a.)

Submitter: Scott Kale, Mecklenburg County
Recommendation: Add revised text to read as follows:
Unobstructed Exit. Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted. Obstructions include door or other barriers.
Substantiation: The word "unobstructed" needs clear examples or defining. This wording is being used as a catch-all to reduce working clearances.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-217 Log #757 NEC-P01 **Final Action: Reject**
(110.26(C)(3))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(3) Personnel Doors. Where ~~equipment~~ power production, service, or distribution equipment rated 1200 A or more ~~that contains overcurrent devices, switching devices, or control devices~~ is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.
Substantiation: By removing the rather vague term "equipment" and replacing it with well defined terms from Article 100, we no longer have to include this list to define the type of equipment under discussion. See my proposals for new definitions - "power production equipment" and "distribution equipment".
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-218 Log #3556 NEC-P01 **Final Action: Reject**
(110.26(C)(3))

Submitter: James T. Dollard, Jr., IBEW Local 98
Recommendation: Revise text to read as follows:
110.26 (C)(3) Personnel Doors. Where equipment ~~rated 1200 A or more~~ that contains overcurrent devices, switching devices, or control devices that is likely to require examination, adjustment, servicing, or maintenance while energized is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.
This requirement shall not apply to the following:
(1) Systems rated 240-volts or less where the system is supplied by a single transformer and the transformer is rated less than 125 kVA
(2) Electrical equipment inside an individual dwelling unit.
Substantiation: The requirement of second level subdivision 110.26(C)(3) exists for the sole purpose of personnel safety. In the event of an arc flash/blast, electrical installers/maintainers need to have doors that open in the direction of egress and panic hardware to escape the extreme thermal energy and other hazards that accompany an arc flash/blast.
The original requirement for "Large Equipment" in 110.26(C) did not address the need for personnel doors to open in the direction of egress, and the need for panic hardware. The original requirement was based on the need for a door at each end of the working space. The requirement specifically addressed "Large Equipment" and settled on 1200-amps as the trigger for two doors. This requirement was equipment driven. The present text of 110.26(C)(3) is people driven. It's purpose, is to allow the quickest means of egress to an installer/maintainer in the event of a fault.
The present text of 110.26(C)(3) includes a trigger of 1200 amps because it was editorially separated into a new third level subdivision in the 2008 NEC ROC stage. While the trigger of 1200 amps may be appropriate for the need for two doors, it is not substantiated with respect to personnel safety. Serious injury and fatalities have, and continue to occur in equipment rated at levels far below 1200 amps.
The need for safe electrical work practices is recognized. In accordance with NFPA 70E, energized electrical work may only occur when either the infeasibility or greater hazard threshold is met. An arc flash hazard analysis is required, as well as appropriate personal protective equipment. When all of the prudent measures are taken for energized work, the need for doors that open in the direction of egress and panic hardware still exist.
It is not practical, nor is it substantiated to deny doors that open in the direction of egress and panic hardware for equipment rated less than 1200 amps. It is "common knowledge" that serious injuries and fatalities occur from arc flash/blast in equipment rated 30 to 1000 amps. It is imperative that installer/maintainers be provided with a means a speedy egress in the event of a fault.
Exceptions are included (in positive text) for the following:
(1) Systems rated 240-volts or less where the system is supplied by a single transformer and the transformer is rated less than 125 kVA
NFPA 70E added a new exception No.1 to 130.3 that requires an arc flash analysis, to recognize that a systems rated 240-volts or less, where the system is supplied by a single transformer, and the transformer is rated less than 125 kVA, are not as prone to arc duration as other systems.
(2) Electrical equipment inside an individual dwelling unit
The phrase "electrical equipment inside of a dwelling unit" is used to exempt all panelboards etc. inside of a dwelling unit. This choice of words is necessary to include distribution equipment for example in a high rise condominium. The requirement for personnel doors would not exist inside of a condominium (the individual dwelling unit) but may exist in the electrical room on each floor.
Panel Meeting Action: Reject
Panel Statement: This proposal is too restrictive and does not enhance clarity or usability as proposed. The submitter did not provide adequate substantiation to make this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
HICKMAN, P.: We are in general agreement with the recommendation.
We are voting negative on the panel action to reject this proposal. Our notes indicate that Panel 1 generally agreed with the concept in Proposal 1-218.
The submitter has correctly identified a serious safety concern. Consider two separate installations; (1) a 277/480-volt, 1200-amp feeder supplying a switchboard and (2) a 277/480-volt, 800-amp feeder supplying a switchboard. The present text would require personnel door(s) to open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure for the 1200-amp feeder but not the 800-amp feeder. The 277/480-volt, 1200-amp feeder would require ground-fault protection of equipment in accordance with 215.10 but the

277/480-volt, 800-amp feeder would not.

Panel 1 correctly asked that additional substantiation be presented in a comment in the Report on Comments to substantiate to the reduction or removal of the 1200-amp threshold. We suggest the reduction of the 1200-amp threshold below the 1000-amp threshold for ground-fault protection of equipment. The next smaller standard OCPD size below 1000-amp in 240.6 is 800-amp. We believe that this proposal should have been accepted in principle as follows:

"(3) Personnel Doors. Where equipment rated 800 A or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure."

Explanation of Abstention:

ANTHONY, M.: We agree with the submitter that 1200A threshold is high and the purpose of safety would be advanced with the 1200A level removed. The proposal would be improved if exceptions (1) and (2) were cast in positive language. In our view, the proposal enhances clarity and usability. Adequate substantiation – including "common knowledge" has been provided.

For the convenience of readers and extract from the NFPA Rules Governing Committee Projects has been reproduced here as a reference in the determination of what constitutes adequate substantiation:

4.3.3 Content of Proposals. Each Proposal shall be submitted to the Council Secretary and shall include the following:

(a) Identification of the submitter and his or her affiliation (i.e., TC, organization, company), where appropriate

(b) Identification of the Document, edition of the Document, and paragraph of the Document to which the Proposal is directed

(c) Proposed text of the Proposal, including the wording to be added, revised (and how revised), or deleted

(d) Statement of the problem and substantiation for Proposal

It appears that in Section 4.3.3(d) the term "substantiation" is not substantiated.

1-219 Log #3851 NEC-P01 **Final Action: Reject**
(110.26(C)(3))

Submitter: Bill McGovern, City of Plano

Recommendation: Revise text as follows:

(3) Personnel Doors. Where equipment rated 1200 A or more contains overcurrent devices, switching devices, or control devices ~~is~~ are installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors(s) shall open in the direction of egress and equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.

Substantiation: This is an editorial correction to the statement.

Panel Meeting Action: Reject

Panel Statement: The panel concludes that the present language is correct and the proposed change is not substantiated. "Equipment" is a singular noun.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-220 Log #3865 NEC-P01 **Final Action: Reject**
(110.26(C)(3))

Submitter: Mike Weitzel, Bechtel

Recommendation: Revise text as follows:

(3) Personnel Doors. Where equipment... existing paragraph text remains as is... latched but open simple pressure.

Add new sentence.

This requirement shall not apply to doors other than the access and egress doors to and from the working space

Substantiation: There has been misunderstanding and confusion on the part of the Authority Having Jurisdiction as to how to apply this requirement. It is a good requirement, and serves the purpose of improved electrical safety for the worker. However, the requirement has been interpreted by some as requiring all doors within 25 feet of the edge of a working space to have hardware that opens under simple pressure. Such doors may not be the egress or exit door to the space, but actually the next door or set of doors to a hallway, or which may lead to a flight of stairs. Yet still located within 25 ft of the space. The door(s) in question could also be a closet door within 25 feet off the working space. Some building inspectors may interpret the requirement to apply to all doors within 25 ft and make them part of the building exit paths required in the building codes. I do not believe that this was the intent of the Code Panel.

Panel Meeting Action: Reject

Panel Statement: The present wording identifies that the requirement applies only to the personnel door(s) intended for entrance to or egress from the working space. The requirement does not necessarily apply to all other doors within 7.6 m of the working space.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ANTHONY, M.: In our view, this proposal accommodates architecturally complex arrangements; room within a room situations, for example. There is enough ambiguity in the present language to merit the proposed changes, even at the risk of redundancy.

SASSAMAN, H.: This proposal provides further clarity and usability to this section.

1-221 Log #205 NEC-P01 **Final Action: Reject**
(110.26(D))

Submitter: Seth Jamison, Jamison Electric

Recommendation: Revise as follows:

110:26 (D) Illumination shall be provided for all working spaces about service equipment, switchboards, panelboards, or motor control centers installed indoors. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles. In electrical equipment rooms, the illumination shall not be controlled by automatic means only. Any automatic means of illumination installed in electrical equipment rooms shall be installed in such a way to allow the automatic means of illumination to be bypassed to provide personal controlled illumination in electrical equipment rooms.

Substantiation: Recently I installed a Metering device in an electrical equipment room. I had both hands inside a 300 amp main disconnect when the lights in the room went out. I automatically assumed that a power outage had occurred but the light coming from under the door from the adjacent room made me realize that wasn't the case. I made my way towards the door and the light came back on. I looked to the side of the door and realized the culprit was a wall mounted motion sensor with a large UPS blocking its field of view. I flipped the switch on the motion sensor, but all it would do was cut the lights off or, when in the on position, allow the motion sensor to control them. 110:26 (D) does not go far enough to protect the field electrician. Automatic means often include poorly positioned motion sensors. These sensors are often located on the wall with an obstructed field of view. The code should be more specific to require total area coverage when automatic means off illumination are used in electrical equipment rooms.

The statement "In electrical equipment rooms, the illumination shall not be controlled by automatic means only" is not explicit enough. Motion sensors are often installed in a manner that allows you to turn of the lights, but not override control of the motion sensor. In other words if the device is on the lights are being controlled by the motion sensor. If you turn the device off then the lights go out.

Unfortunately, value engineering and the push to lower energy consumption often leaves electricians in the dark will working in live panels. Please consider revising the code to specify that the automatic means of illumination can be overridden to provide illumination in electrical equipment rooms.

Panel Meeting Action: Reject

Panel Statement: The existing text is clear in that "the illumination shall not be controlled by automatic means only." The additional text is redundant.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-222 Log #491 NEC-P01 **Final Action: Reject**
(110.26(D))

Submitter: Joe Tedesco, Tedesco Electrical Code Consultants, Inc.

Recommendation: Add new text as follows:

Add: "Table 110.26(D) MINIMUM ILLUMINATION INTENSITIES IN FOOT CANDLES"

See Page 96 for Table 110.26(D)

Substantiation: Illumination is not defined. See OSHA Standard 1926.56(a).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: Minimum illumination levels are addressed in the building and life safety codes. In addition, the submitter has not provided sufficient substantiation for the change in accordance with the NFPA Regulations Governing Committee Projects, Section 4.3.3(d).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

TABLE 110.26(D) MINIMUM ILLUMINATION INTENSITIES IN FOOT CANDLES

Foot-Candles	Area of Operation
5…………….	General construction area lighting.
3…………….	General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas.
5…………….	Indoors: warehouses, corridors, hallways, and exitways.
5…………….	Tunnels, shafts, and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau of Mines approved cap lights shall be acceptable for use in the tunnel heading)
10…………...	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active store rooms, mess halls, and indoor toilets and workrooms.)
30…………...	First aid stations, infirmaries, and offices.

1-223 Log #758 NEC-P01 **Final Action: Reject**
(110.26(D))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(D) Illumination. Illumination shall be provided for all working spaces about ~~service equipment, switchboards, panelboards, or motor control centers~~ power production, service, and distribution equipment installed indoors.
Substantiation: By using well defined terms from Article 100, we no longer have to include this list to define the type of equipment under discussion. See my proposals for new definitions - "power production equipment" and "distribution equipment".
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation for inclusion of the new text and deletion of the existing text in accordance with the NFPA Regulations Governing Committee Projects, Section 4.3.3(d).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-224 Log #791 NEC-P01 **Final Action: Reject**
(110.26(D))

Submitter: Joseph E. Rossi, Township of Clinton
Recommendation: Revise text to read as follows:
Illumination shall be provided for all working spaces about service equipment, switchboards, panelboards, or motor centers with an illumination luminaire fixture that shall not be greater than 3 ft away for indoor installation.
Substantiation: This section of 110.26 is too ambiguous. Currently in a single-family dwelling, a basement can have a luminaire fixture 6 ft away with a 40 watt bulb and still meet code. As per 90.1 the purpose of the NEC is to practice safeguarding. A bulb at any distance farther than 3 ft will certainly not shine enough light.
This will ensure that personnel working on the panel will be in a safe condition.
Panel Meeting Action: Reject
Panel Statement: This requirement would be overly restrictive, and difficult to enforce. The illumination is the important aspect and not the location of the luminaire. In accordance with the NFPA Regulations Governing Committee Projects, Section 4.3.3(d), the submitter has not provided sufficient substantiation for the change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-225 Log #1440 NEC-P01 **Final Action: Reject**
(110.26(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete: "installed indoors".
Substantiation: The Code is a safety code. Is there no potential hazard involved where 600 volt or less equipment is installed outdoors? Section 110.26 (A) requires working space for equipment for safety; illumination is also a necessary component for safety.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with Section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-226 Log #1686 NEC-P01 **Final Action: Reject**
(110.26(D))

Submitter: Michael Worthington, URS Corp.
Recommendation: Add new text to read as follows:
(D) Electrical Equipment Illumination.
(1) Illumination. (Retain the existing paragraph as it is now).
(2) Emergency Lighting. Where electrical equipment is rated 1000 A. or more that contain switchboards, panelboards or industrial control panels where personnel are permitted to examine, adjust, operate or maintain. Emergency lighting shall be provided to illuminate an egress path from the working space about the electrical equipment in case of failure to the area lighting. The emergency lighting system shall meet the requirements of Articles 700.IV and 700.V.
Substantiation: The problem of personnel being injured, unconscious or blinded by an equipment failure, such as an arc flash which could send the entire work area into total darkness. If personnel cannot see to escape the area or rescue personnel cannot see to rescue the injured, the delay could be the difference between surviving and not surviving an accident. This safety issue could be eliminated by providing emergency lighting around the electrical equipment and to an egress path. What good is it to have panic bars on doors (Article 110.26(C)(3)) if there is no egress lighting to guide personnel to the doors.
I recently saw a video of electricians working in a large well illuminated electrical room racking in a circuit breaker. There was a arc flash (the object of the film), the room went totally dark and the video continued to run with a dark screen. The electricians were in the dark without egress lighting so they cannot see to get around electrical equipment and safely escape. This video demonstrated a life safety issue that needs to be addressed and is easily resolved with a minimum amount of cost for emergency lighting equipment that already exist on the market.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-249.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ANTHONY, M.: Please refer to comment on Proposal 1-249.
Comment on Affirmative:
HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-227 Log #2142 NEC-P01 **Final Action: Accept in Principle**
(110.26(D))

Submitter: Richard McAllister, La Center, WA
Recommendation: Delete text as follows:
~~In electrical rooms~~, the illumination shall not be controlled by automatic means only.
Substantiation: Currently, room occupancy type is determined by the building department/code. In a new school, we have electrical rooms (including the building service) that, since they were designated "storage", have automatic lighting controls only. By removing "in electrical rooms", we would assure that all areas referred to by this article would have safe lighting.
Panel Meeting Action: Accept in Principle
Revise the wording in the existing text to read as follows:
(D) Illumination. Illumination shall be provided for all working spaces about service equipment, switchboards, panelboards, or motor control centers

installed indoors and shall not be controlled by automatic means only. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source or as permitted by 210.70(A)(1), Exception No. 1, for switched receptacles.
Panel Statement: The revision meets the submitter's concerns and clarifies that the illumination is for all working spaces about service equipment, switchboards, panelboards, or motor control centers installed indoors.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-228 Log #621 NEC-P01 **Final Action: Reject**
(110.26(E))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Revise text to read as follows:
(E) Headroom. The minimum headroom of working spaces about ~~service equipment, switchboards, panelboards, or motor control centers~~ electrical equipment likely to require examination, adjustment, servicing, or maintenance while energized shall be 2.0 m (6 1/2 ft). Where the electrical equipment exceeds 2.0 m (6 1/2 ft) in height, the minimum headroom shall not be less than the height of the equipment.
Substantiation: This change will include all equipment that is mandated by 110.26(A).
Panel Meeting Action: Reject
Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-229 Log #622 NEC-P01 **Final Action: Reject**
(110.26(E))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Revise text to read as follows:
(E) Headroom. The minimum headroom of working spaces about ~~service equipment, switchboards, panelboards, or motor control centers~~ electrical equipment meeting the requirements of 110.26(A) shall be 2.0 m (6 1/2 ft). Where the electrical equipment exceeds 2.0 m (6 1/2 ft) in height, the minimum headroom shall not be less than the height of the equipment.
Substantiation: This change incorporates the requirements of 110.26(A), and deletes the laundry list of electrical equipment, which only limits having the required headroom to only service equipment, switchboards, panelboards, or motor control centers.
Panel Meeting Action: Reject
Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-230 Log #759 NEC-P01 **Final Action: Reject**
(110.26(E))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
(E) Headroom. The minimum headroom of working spaces about ~~service equipment, switchboards, panelboards, or motor control centers~~ power production, service, and distribution equipment shall be 2.0 m (6 1/2 ft). Where the electrical equipment exceeds 2.0 (6 1/2 ft) in height, the minimum headroom shall not be less than the height of the equipment.
Substantiation: By using well defined terms in Article 100, we no longer have to have this list of items. See my proposals for new definitions - "power production equipment" and "distribution equipment".
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-231 Log #2382 NEC-P01 **Final Action: Accept**
(110.26(E))

Submitter: David G. Humphrey, Midlothian, VA
Recommendation: Delete the following text:
~~110.26(E) Headroom. The minimum headroom of working spaces above service equipment, switchboards, panelboards, or motor control centers shall be 2.0 m (6 1/2 ft). Where the electrical equipment exceeds 2.0 m (6 1/2 ft) in height, the minimum headroom shall not be less than the height of the equipment.~~
~~*Exception: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the headroom is less than 2.0 (6 1/2 ft).*~~
Substantiation: This is a companion proposal to the section 110.26(A)(3) proposal blending the language of 110.26(E) and 110.26(A)(3), thus, necessitating the need for the deletion of 110.26(E).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-232 Log #760 NEC-P01 **Final Action: Reject**
(110.26(E) Exception)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Delete the following text:
~~Exception: In existing dwelling units, service equipment or panelboards that do not exceed 200 amperes shall be permitted in spaces where the headroom is less than 2.0 m (6 1/2 ft).~~
Substantiation: Where such items are located does not diminish the power that such items contain. If this is allowed, then allow it. A dwelling unit should not change the issue. If someone wishes to redo such an installation, make them do it correctly. Such equipment can always be mounted outside if it must. This will increase the safety of anyone working on such equipment.
Panel Meeting Action: Reject
Panel Statement: The exception applies to existing dwelling installations and allows minor relief where it is impossible to attain the minimum headroom. The exception is applicable to 200A service equipment or panelboards.
The submitter has not provided sufficient substantiation for the proposed change in accordance with the NFPA Regulations Governing Committee Projects, Section 4.3.3(d).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted. We do not necessarily agree that the relief granted in the exception is minor so we therefore do not necessarily agree with all of the panel statement.

1-233 Log #53 NEC-P01 **Final Action: Accept**
(110.26(F))

Note: This Proposal appeared as Comment 1-94 on Proposal 1-135 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-135 was:
Delete the term "distribution boards" to read as follows:
"All switchboards, panelboards, ~~distribution boards~~, and motor control centers...".
Submitter: Code-Making Panel 19,
Recommendation: The following is the Final Action of a task group appointed to review Proposal 1-135. CMP-19 recommends accepting this proposal.
Substantiation: CMP-19 agrees that the NEC does not define distribution board and that a distribution board is considered a type of panelboard. Removing the words "distribution boards" from 110.26(F) may alleviate the submitter's concern, while maintaining the requirement for dedicated equipment space for all types of panelboards. This change will not impact the articles under the purview of CMP-19.
This comment was balloted through CMP-19 with the following results:
14 Eligible to Vote
12 Affirmative
2 Not Returned (W. Bowman and R. Carlson)
Panel Meeting Action: Accept
Panel Statement: The panel does not necessarily agree with all of the submitter's substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-234 Log #54 NEC-P01 **Final Action: Accept**
(110.26(F))

Note: This Proposal appeared as Comment 1-95 on Proposal 1-135 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-135 was:
Delete the term "distribution boards" to read as follows:
"All switchboards, panelboards, ~~distribution boards~~, and motor control centers...".
Submitter: Code-Making Panel 9,
Recommendation: Recommend the proposal be held for study.
Substantiation: CMP-9 believes the proposal has merit, however, it needs to be correlated with Article 408, which uses the phrase "switchboards, panelboards, and distribution boards" units scope. The current text in 110.26(F) simply repeats that scope information so as not to inadvertently change the application of 110.26(F), which originated within what is now Article 408 in the 1981 cycle and remained there for almost twenty years. CMP-9 will review the scope statement in 408.1 during the 2011 code cycle, and the text of 408.1 and 110.26(F) can be correlated during that cycle. CMP-9 understands that scope statements are under the purview of the Technical Correlating

Committee.

This comment has been balloted through CMP-9 with the following balloting results.

11 Eligible to Vote

10 Affirmative

1 Not Returned (H. deVega)

Panel Meeting Action: Accept

Panel Statement: The panel does not necessarily agree with all of the submitter's substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-235 Log #761 NEC-P01 **Final Action: Reject**

(110.26(F))

Submitter: Robert Sogla, Coon Rapids, MN

Recommendation: Revise text to read as follows:

(F) Dedicated Equipment Space. All ~~switchboards, panelboards, distribution boards, and motor control centers~~ <u>power production, service, and distribution equipment</u> shall be located in dedicated spaces and protected from damage.

Substantiation: By using well defined terms from Article 100, we can remove this list. See my proposals for new definitions - "power production equipment" and "distribution equipment".

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-236 Log #2050 NEC-P01 **Final Action: Accept**

(110.26(F))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.

Recommendation: Revise text to read as follows:

110.26(F) Dedicated Equipment Space.

All switchboards, panelboards, ~~distribution boards,~~ and motor control centers shall be located in dedicated spaces and protected from damage.

Substantiation: The 1937 NEC makes this statement, "**3841. Scope.** The requirements of this Article shall apply to all switchboards, panelboards, and distribution boards used for the control of light and power circuits...".

What is a distribution board? No one seems to know. The title of Article 408 is Switchboards and Panelboards and we have clear definitions of both in Article 100, but *distribution boards* are not defined in Article 408 or Article 100. In 1937, everyone in the electrical industry probably knew what a *distribution board* was, but not today. At least one AHJ in a major city considers a UPS a distribution board and is requiring dedicated space (110.26(F)) above all UPS equipment. In the opinion of another AHJ, separate safety switches mounted on a 2 ft x 4 ft sheet of plywood constitutes a distribution board.

Distribution board appears to be an archaic term that should be deleted. If not deleted, distribution boards should be defined in Article 100 or Article 408.

Panel Meeting Action: Accept

Panel Statement: The panel does not necessarily agree with all of the submitter's substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-237 Log #2673 NEC-P01 **Final Action: Reject**

(110.26(F))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete: "and protected from damage".

Substantiation: Edit. already covered by 110.27(B) which uses the word "likely". This section requires protection whether or not damage is likely.

Panel Meeting Action: Reject

Panel Statement: 110.27 is specific to guarding of live parts. 110.26(F) addresses dedicated equipment space. The panel does not agree that this is editorial.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-238 Log #487 NEC-P01 **Final Action: Reject**

(110.26(F)(1)(e))

Submitter: Brenson (Ben) Kingren, Louisville Electrical Joint Apprenticeship Training Committee

Recommendation: Add new text as follows:

Access. Permanent ladders or stairways, or pull down ladders or stairways shall be provided to give access to the working space around electrical equipment installed in attics of dwelling units (i.e., furnaces – either all electric or combination gas/electric, h2o heaters and similar equipment-either gas or electrically operated).

Substantiation: Most scuttle holes (attic accesses) end up in clothes closets with the access point over the top of shelving in a confined space that doesn't accommodate either inspection or service of the above mentioned equipment. Another problem with these installations is the scuttle holes are small and impede access. This change would accommodate these areas being inspected as they should be and maintenance done on equipment more regularly to maintain safety within the dwelling.

Panel Meeting Action: Reject

Panel Statement: Section 110.26(F) addresses dedicated equipment space and what is permitted in and above this space. Access to equipment is covered by 110.26(C).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-239 Log #1330 NEC-P01 **Final Action: Reject**

(110.26(F)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete present text and substitute:

Electrical equipment installed outdoors shall be identified for the use and location. Exposed live parts shall be protected from contact by unqualified persons. Where judged necessary by the authority having jurisdiction equipment shall be protected where likely to be subject to physical damage or drainage from piping or rain gutter systems. No architectural appurtenance, aboveground sprinkler systems, electrical or nonelectrical equipment, or plant growth that impairs the working space required in 110.26(A) shall be permitted.

Substantiation: "Unauthorized" is not defined, a person may be authorized, but not qualified. Identified enclosures with no exposed live parts or exposed live parts behind fences or walls do not need additional protection from contact by persons. Where deemed necessary by the AHJ, protection from physical damage whether or not from vehicular traffic, should be required.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-240 Log #1892 NEC-P01 **Final Action: Reject**

(110.26(F)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete present text and substitute: Electrical equipment installed outdoors shall be identified for the use and location There shall be no exposed live parts accessible to unqualified persons.

Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. "Identified for the use and location" provides for environmental conditions, likelihood of physical damage, type of enclosures. All electrical equipment doesn't require the working space specified in 110.26(A) which also requires the work space to be clear.

Panel Meeting Action: Reject

Panel Statement: An enclosure, as used in this section, could be the housing of apparatus, or the fence or walls surrounding the equipment to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage.

The term "suitable" as used in this context is the correct term as provided by 3.2.1 of the NEC Style Manual.

Section 110.26(F)(2) applies to all specified equipment, dedicated space and working clearance space as described in 110.26(A).

The panel does not agree that this proposal is editorial.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-241 Log #1975 NEC-P01 **Final Action: Reject**

(110.26(F)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: ~~Outdoor~~ <u>E</u>lectrical equipment <u>installed outdoors</u> shall be installed in ~~suitable~~ <u>identified</u> enclosures and shall be protected <u>where likely to be exposed to physical damage</u> ~~from accidental contact by unauthorized personnel or by vehicular traffic or by accidental spillage or leakage from piping systems.~~ The working clearance shall include the zone described in 110.26(A). <u>No architectural appearance, plant growth other than grass or other equipment shall be located in this zone.</u>

Substantiation: Outdoor electrical equipment may be perceived as equipment that is marked "for outdoor use" and this equipment will have identified enclosures. "Suitable" is subjective and a term to be avoided per the Style Manual. "Identified" will provide protection from accidental contact with live parts by persons or animals, and be recognized for use in the environment. "Likely to be subject to physical damage" covers all sources not just vehicles. Outdoor equipment includes raceway, for example, which if identified for use do not need other enclosures. "Physical damage" includes spillage and leakage, whether or not accidental. Section 110.26 already applies without the reference and is more comprehensive since it covers working space and access to equipment.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-242 Log #2619 NEC-P01 **Final Action: Reject**
(110.26(F)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~Outdoor~~ Electrical equipment installed outdoors shall be ~~installed in suitable enclosures~~ identified and shall be protected where likely to be subject to physical damage. ~~from accidental contact by unauthorized personnel or by vehicular traffic, or by accidental spillage or leakage from piping system. The working space shall include the zone described in 110.26 (A). No architectural appurtenance or other equipment shall be located in this zone.~~
Substantiation: "Suitable" is subjective and a term to be avoided per the Style Manual. "Outdoor" equipment may be perceived as equipment marked for outdoor or wet locations, or weatherproof or raintight types. Equipment such as RMC, IMC, RNMC, LTFMC, LTFNMC, EMT, weather boxes and fittings etc., identified for the use do not need additional enclosures. 110.26 already applies, but only where required for operation and maintenance, while this section has no such limitation and doesn't include 110.34 for over 600 volts.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-243 Log #2977 NEC-P01 **Final Action: Reject**
(110.26(F)(2))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(2) Outdoor. Outdoor electrical equipment shall be installed in suitable enclosures and shall be protected from accidental contact by unauthorized personnel, or by vehicular traffic, or by accidental spillage or leakage from piping systems. ~~The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.~~
Substantiation: These sentences are simply unnecessary repetition. The working space provisions are clearly explained in 110.26(A), so there is no reason to have them repeated in this subsection. Furthermore, the first sentence of the proposed deletion uses the term "working clearance space", as opposed to the more accurate term "working space".
Panel Meeting Action: Reject
Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted. As the submitter has noted, the text is simply redundant - working space requirements are addressed in 110.26(A). Section 110.26(F)(1) and (2) are specific to dedicated equipment space. Working space is separate and distinct from dedicated equipment space.

1-244 Log #3284 NEC-P01 **Final Action: Reject**
(110.26(F)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Electrical equipment installed outdoors shall be identified for the use and location. Equipment that is not watertight shall not be located where likely to be subject to drainage from piping or rain gutter systems. No architectural appurtenances, sprinkler equipment, plant growth other than grass, or other electrical or nonelectrical equipment shall be installed in the space required by 110.26
Substantiation: Listed or otherwise identified equipment for outdoor use will have acceptable enclosures. "Suitable" is subjective and a term to be avoided per the Style Manual. RMC and EMT for example are permitted for use outdoors without additional enclosures. "Identified for the use and location" includes protection from damage and accidental contact with live parts, whereas present wording appears to literally require means to prevent contact with equipment such as raceways, transformer enclosures, switches, circuit breakers, luminaries, etc. Live parts and physical damage are additionally covered by 110.27. For correlation all applicable parts of 110.26 should apply not just (A).
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-245 Log #1548 NEC-P01 **Final Action: Reject**
(110.26(F)(2)(a))

Submitter: Richard Hollander, City of Tucson
Recommendation: Add new text as follows:
110.26(F)(2)(a) Dedicated Electrical Space. The space equal to the width and depth of the equipment and extending from the grade to a height of 1.8 m (6 ft) above the equipment, shall be dedicated to the electrical installation. No piping, or other equipment foreign to the electrical installation shall be located in this zone.
Substantiation: Some of the same conditions that apply to an indoor installation in regard to piping and other equipment (Ex: Water piping, Gas Piping, hose Bibs, Phone and Cable boxes) pose the same problems outdoors. Access may be impeded by these foreign objects in the area.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There was inadequate substantiation to support the change.
The panel disagrees that all equipment requires the space suggested in the submitter's recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HICKMAN, P.: We are in general agreement with the recommendation.

1-246 Log #2 NEC-P01 **Final Action: Reject**
(110.26(F)(3))

NOTE: This proposal appeared as Comment 1-96 on Proposal 1-135 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 1-135 was:
Delete the term "distribution boards" to read as follows:
"All switchboards, panelboards, ~~distribution boards~~, and motor control centers...".
Submitter: Charles Ball, S & C Electric Company
Recommendation: Add a new section to 110.26(F)(3):
110.26(F)(3): Arc-Resistant Switchgear. Provide clear space in accordance with the manufacturer's recommendations. No obstructions such as foreign systems, suspended ceilings, piping, dusts or structures shall be located within the required clear space for indoor or outdoor installations. Exceptions listed in 110.26(F)(1) and 110.26(F)(2) are not allowed when the switchgear is arc resistant.
Substantiation: Arc-resistant switchgear is often designed to direct the exhaust from an internal fault away from areas where personnel could be standing. Unobstructed space is required for the equipment to vent properly. Obstructions could impede or prevent proper venting and result in hot gasses being released toward personnel. The NEC should not allow exceptions such as suspended ceilings, that conflict with the requirements of this type of switchgear and cause an unexpected hazard.
Panel Meeting Action: Reject
Panel Statement: The panel supports the installation of arc-resistant switchgear in accordance with instructions. This issue is already addressed by 110.3. The need for a new requirement in 110.26 has not been substantiated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: The language of 110.3 is general. This terminology of this proposal, a) brings visibility to another method that engineers can apply to protect electricians, b) shows that the NEC can be used as an innovative safety technology diffuser.

1-247 Log #2250 NEC-P01 **Final Action: Reject**
(110.26(G))

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Add new text to read as follows:
...shall be considered accessible to qualified personnel and shall be arranged such that a person on the inside can exit when the access door is locked from the outside.
Substantiation: Plenty of effort has been put into Article 110 to accommodate the safety of the personnel servicing electrical equipment. Looking at 110.33(A), it states that...doors shall open in the direction of egress...One cannot exit an area if both locks or padlocks have been set from the other side or perhaps latched due to other circumstances (wind, intentionally, etc.). That is the purpose for this revised text, just to make a clear message that no closet, enclosure, room or vault door shall be locked from outside and/or inside without being able to exit.
Panel Meeting Action: Reject
Panel Statement: 110.26(G) is a permissive allowance in that locked electrical equipment rooms or enclosures can be considered accessible to qualified persons. Regardless of this, locked electrical equipment rooms or enclosures must still comply with the requirements of 110.26(C)(3).
Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

1-248 Log #3760 NEC-P01 **Final Action: Reject**
(110.26(H))

Submitter: Jebediah J. Novak, Cedar Rapids Electrical JATC / Rep. Int'l Brotherhood of Electrical Workers
Recommendation: Add the following section:
110.26(H) Access to Electrical Equipment Behind Panels Designed To Allow Access. Access to electrical equipment shall not be denied by an accumulation of conductors, cables and raceways that prevents removal of panels, including suspended ceiling panels.
Substantiation: A similar requirement already exists in Section 760.21 of the 2008 NEC. By creating this new section in Article 110, this requirement would apply universally throughout the entire NEC.
Panel Meeting Action: Reject
Panel Statement: The concerns of the submitter are already met by 300.23.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-249 Log #3743 NEC-P01 **Final Action: Reject**
(110.26(O) (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Assn. of Education Facility Executives - APPA.ORG
Recommendation: Add text to read as follows:
110.26(0) (NEW) Emergency Illumination. The area around all service panels in non-dwelling unit occupancies 200 amperes and above shall be automatically illuminated upon loss of power. For a period of 90 minutes illumination levels shall be 1-footcandle on the egress path from the switchgear and 3-footcandles on the vertical surfaces of the service equipment.
Substantiation: This proposal provides both an illuminated egress and ingress path for a) the electrician who is working in the service equipment area without a flashlight, b) for the maintenance mechanic who may neither be an electrician nor familiar with the electric service equipment to work on it in the dark.

Electric service panels are not always installed along either the primary or secondary egress path required by the Life Safety Code and this panel should not leave it to Architects to remember that there may be someone stuck in the dark in the electrical room, or that the path to the electrical room ought to be illuminated in order to diagnose a power outage. This should be a General Requirement as much as marking of disconnects or the guarding of live parts.

The 3 footcandle requirement matches the illumination levels required in 7.3.1 of NFPA 110 for Level 1 emergency power systems and follows NESC practices for vertical illumination.
Panel Meeting Action: Reject
Panel Statement: Emergency illumination requirements are a function of the building codes and NFPA 101, *Life Safety Code*.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: Emergency illumination requirements should not be a function of the many competing building codes any more than dedicated space above switchgear should be granted by the Life Safety Code. Electrical services and transfer equipment spaces are typically not on the escape/egress/rescue path. During an outage both the trained and the untrained would be fetching around in the dark unless the area was designed with lighting adequate for diagnosing; for example, transfer switch auto-manual mode, the odor of a fried solenoid or a loose wire on a starting battery. Arguably, lighting around service equipment during power outages is not emergency lighting at all but a concept closer to optional standby. A start would be the 1-2 foot requirement for a limited class of switchgear.

Manufacturers could help the industry with product innovations that have self-contained illumination packages. One could imagine a transfer switch, for example, with some form of an emergency battery (adapted from common unit emergency lighting packs) adapted so that the transfer switch would illuminate at least part of the ingress path electricians would need to diagnose a power problem. All manufacturers could offer an option that would integrate an emergency lighting package in the switchgear itself—thus reducing site conduit and wiring installation cost.
Comment on Affirmative:
BOYCE, K.: The submitter is encouraged to pursue proposals on this topic in the applicable Life Safety and Building Codes.
HICKMAN, P.: We are in general agreement with the recommendation. See our statement on 1-188.

1-250 Log #3295 NEC-P01 **Final Action: Reject**
(110.27(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Where otherwise provided in this code.
Substantiation: Live parts of equipment operating at over 50 volts such as busbars, switches, and circuit breakers without enclosures (404.3(A) Exception No. 2) in nonrestricted occupancies is a hazard. This provision doesn't reference qualified persons as does (1), (2), and (3).
Panel Meeting Action: Reject
Panel Statement: The proposed revision is to 110.27(D)which does not exist. In addition, the proposal does not comply with 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCMAHILL, L.: This proposal should have been accepted in principle. It appears that the submitter is referring to 110.27(A) for the proposed change. The intent of the change makes sense. For clarity, the panel should have revised the first sentence to read "Unless otherwise~~Except as elsewhere~~ required or permitted by this Code, live parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by approved enclosures or by any of the following means:" This change would meet the intent of the submitter and better clarify the intent of the section.

1-251 Log #4420 NEC-P01 **Final Action: Reject**
(110.28, Tables 110.28(a), (b), and (c) (New))

Submitter: John R. Kovacik, Underwriters Laboratories Inc.
Recommendation: Add the following new text as 110.28 and Tables 110.28(a), (b) and (c).
110.28 (NEW) Ingress Protection.
Tables 110.28(a), (b) and (c) provide the basis for determining the protection provided by products and equipment marked with IP ratings. Ingress Protection ratings classify the degrees of protection provided by enclosures and enclosing parts of electrical equipment for two conditions: 1) the protection of persons against access to hazardous parts and protection of equipment against the ingress of solid foreign objects and 2) the ingress of water. The degree of protection against these two conditions is designated by an IP Code. Products claiming ingress protection are marked with the letters IP followed by two characteristic numerals, either of which may be replaced by an "X", with or without suffix letters. The first characteristic numeral indicates the degree of protection provided by the enclosure or enclosing part with respect to persons and solid foreign objects entering the enclosure. The second characteristic numeral indicates the degree of protection provided by the enclosure or enclosing part with respect to the harmful ingress of water. The optional suffix letters indicate protection of persons against access to hazardous parts if higher than that indicated by the first characteristic numeral. IP ratings do not specify degrees of protection against damage of equipment, risk of explosions, or conditions such as moisture (produced for example by condensation) or corrosive vapors.

See Tables 110.28(a), (b), and (c) on page 101

Substantiation: The number of products and equipment being marked with Ingress Protection (IP) ratings has increased significantly over the past few years. Although there are few products which are required to be marked with an IP rating, manufacturers are optionally applying an IP rating to many industrial, commercial and residential products, in most cases to satisfy customer needs. The IP rating system not only applies to enclosures, but also any enclosing part of electrical equipment. This translates into the opportunity to specify a level of ingress protection for open products. This system can designate a degree of protection against contact with live electrical parts, for example, contact by human body parts such as a fist, back of hand or a finger and contact by tools or wires.

The IP rating system is defined in the ANSI/NEMA Standard 60529. This standard was adopted as a US National Standard in 2004. It is an adoption of IEC 60529, Degrees of protection provided by enclosures (IP Code). The ANSI/NEMA standard contains no deviations from the IEC version. However, it is understood that US standards which require enclosed products to be marked with an enclosure type rating specify that the rating shall be from the NEMA/UL enclosure type rating system covered in 110.20 of the NEC.

The proposal is not intended to mandate the marking of an IP rating on any product. It is intended to provide guidance in understanding the meaning of IP ratings and to raise the level of awareness of the existence of the IP rating system. The information proposed to be added will provide Code users an explanation of the protection afforded by products and equipment marked with IP ratings.
Panel Meeting Action: Reject
Panel Statement: Ingress Protection is not an NEC requirement, and inclusion in the NEC may lead the code user to believe that it is a requirement.

This information might be suitable for inclusion in an annex.

The requirements for an IP rating in ANSI/IEC Standard 60529 are not

Table 110.28(a) IP Rating – First Characteristic Numeral		
Ingress of Human Body Parts, Tools and Solid Objects		
Numeral		
0	No protection	
1	Back of hand, Fist	Large foreign bodies, diameter greater than 50mm
2	Finger	Medium-sized foreign bodies, diameter greater than 12.5
3	Tools and wires with a thickness greater than 2.5mm	Small foreign bodies, diameter greater than 2.5mm
4	Tools and wires with a thickness greater than 1mm	Granular foreign bodies, diameter greater than 1mm
5	Complete protection, (limited ingress permitted)	Dust protected; dust deposits are permitted, but their volume must not affect the function of the equipment
6	Complete protection	Dust-proof

Table 110.28(b) IP Rating - Second Characteristic Numeral		
Ingress of Water		
Numeral	**Protection against the ingress of water**	**Protection for a Specific Condition**
0	No special protection	
1	Water dripping/falling vertically	Condensation/Light rain
2	Water sprayed at an angle (up to 15º degrees from the vertical)	Light rain with wind
3	Water sprayed at an angle (any direction up to 60º degrees from the vertical)	Heavy rainstorm
4	Water sprayed from all directions, (limited ingress permitted)	Splashing
5	Low pressure water jets from all directions, (limited ingress permitted)	Hosedown, residential
6	High pressure jets from all directions, (limited ingress permitted)	Hosedown, industrial
7	Temporary immersion, 15 cm to 1m	Temporary immersion in water
8	Permanent Immersion, under pressure	Continuous immersion in water,

Table 110.28(c) IP Rating – Optional Suffix Letters	
Letter	**Protection against Human/Tool Contact**
A	Back of hand, Fist
B	Finger
C	Tools and wires with a thickness greater than 2.5mm
C	Tools and wires with a thickness greater than 1mm

Notes to Tables 110.28(a), (b) and (c)

1. Where a characteristic numeral is not specified, it is replaced by the letter “X” (“XX” if both numerals are omitted).

2. Additional letters may be omitted without replacement.

3. An enclosure or enclosing part marked with a first characteristic numeral indicating a degree of protection also complies with all lower degrees of protection for the first characteristic numeral.

4. An enclosure or enclosing part marked with a second characteristic numeral of 6 or lower indicating a degree of protection complies with the requirements for all lower degrees of protection for the second characteristic numeral. An enclosure or enclosing part designated with second characteristic numeral 7 or 8 may be unsuitable for exposure to water jets (designated by second characteristic numeral 5 or 6) and may not comply with requirements for numeral 5 or 6 unless it is dual coded such as IPX5/IPX7.

5. If an enclosure or enclosing part provides different degrees of ingress protection for different intended mounting arrangements, the relevant degrees of protection related to the respective mounting arrangements are indicated in the instructions provided with the product.

6. Where one part of an enclosure has a different degree of protection to that of another part of the same enclosure, the enclosure is marked to indicate the degree of protection for the specific parts of the enclosure.

7. For products marked with the second characteristic numeral 8, the maximum immersion depth and time are indicated in the instructions provided with the product.

the same as the requirements in Table 110.20 and could lead to misapplied equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
HICKMAN, P.: We are in general agreement with the recommendation, share the concerns expressed in the panel statement, and agree that an accept in principle as Annex information would have been more appropriate than inclusion in Article 110.
Explanation of Abstention:
ANTHONY, M.: While it is true that IP is not an NEC requirement, maybe it should be. Many examples of electrical equipment – such as covered disconnect switches -- did not start as NEC requirements either. Integration of the concept underlying this proposal would be an example of how consensus documents like the NEC can hasten the diffusion of an innovation farther out the "S-Curve". The content of this proposal could start as an informative annex in the NEC – as the panel states -- or in other related NFPA documents.
Comment on Affirmative:
BOYCE, K.: The proposed text would enhance the usability of the Code. Placement of the proposed text in an Informative Annex would be appropriate.

1-252 Log #3747 NEC-P01 **Final Action: Accept**
(110.31(A))

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise 110.31(A) as shown below:
~~**(A) Fire Resistance of**~~ **Electrical Vaults.** <u>Where an electrical vault is required or specified for conductors and equipment operating at over 600 volts, nominal, the following shall apply.</u>
(1) <u>**Walls and Roof.**</u> The walls and roof~~, floors, and doorways of vaults containing conductors and equipment over 600 volts, nominal,~~ shall be constructed of materials that have adequate structural strength for the conditions, with a minimum fire rating of 3 hours. <u>For the purpose of this section, studs and wallboards shall not be considered acceptable.</u>
(2) <u>**Floors**</u>. The floors of vaults in contact with the earth shall be of concrete that is not less than 4 in. (102 mm) thick, but where the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the load imposed on it and a minimum fire resistance of 3 hours. ~~For the purpose of this section, studs and wallboards shall not be considered acceptable.~~
(3) <u>**Doors.** Each doorway leading into a vault from the building interior shall be provided with a tight-fitting door that has a minimum fire rating of 3 hours. The authority having jurisdiction shall be permitted to require such a door for an exterior wall opening where conditions warrant.</u>
(4) <u>**Locks.** Doors shall be equipped with locks, and doors shall be kept locked, access being allowed only to qualified persons. Personnel doors shall swing out and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressure.</u>
(5) <u>**Transformers.** Where a transformer is installed in a vault as required by Article 450, the vault shall be constructed in accordance with the requirements of Part III of Article 450.</u>
<u>*Exception to 1, 2 and 3: Where the vault is protected with automatic sprinkler, water spray, carbon dioxide, or halon, construction of 1-hour rating shall be permitted.*</u>
<u>FPN No. 1: For additional information, see ANSI/ASTM E119-1995, Method for Fire Tests of Building Construction and Materials, NFPA 251-2006, Standard Methods of Tests of Fire Resistance of Building Construction and Materials and NFPA 80-2007, Standard for Fire Doors and Other Opening Protectives.</u>
<u>FPN No. 2: A typical 3-hour construction is 150 mm (6 in.) thick reinforced concrete.</u>
Substantiation: Currently, the provisions in 110.31(A) are both incomplete and somewhat out of place. The language doesn't really have any driving language as to when the requirements might apply.
The following addresses the specific changes:
1) The title is changed to just "electrical vaults" since it is proposed that the section cover more than just the fire resistance rating.
2) Driving language has been added in the main paragraph to indicate that the section applies when a vault is required or specified. Since the NEC doesn't have specific requirements to use a vault (except for Article 450), this appears to be the only way to actually have some application of the language.
3) The section is split into a number of subsections. Item (1) applies to walls and roofs and contains the requirement currently in 110.31(A). Item (2) is added to apply to floors and contains the current provisions in 110.31(A) for floors. Note that the sentence regarding studs and wall board is moved into item (1) since it would not apply to the floor. The reference to "doors" has been taken out of these sections and moved to a new item (3).
4) Item (3) has been added to apply to doors and is taken from 450.43(A).
5) Item (4) has been added to specify the locking requirements for the doors on the vault. These requirements were taken from 450.43(C).
6) Item (5) has been added to make it clear that any vault that is required due to the requirements of Article 450 must be constructed to Article 450 Part III. Although the language in 450 is similar to this proposal, there are requirements for door sills and ventilation that would not be applicable in an equipment/conductor vault. As such, it makes more sense to simply defer to Article 450 where the vault includes a transformer that is required by Article 450 to be in a vault.
7) An exception to the construction requirements is added to allow for 1 hr construction when the vault is protected by a fire suppression system. This exception is taken from 450.42 and 43. If I can reduce a transformer vault to 1 hr by adding fire suppression, having similar permission for a general electrical vault would be acceptable since the transformer fires are likely more severe than what would occur in an equipment room without a transformer.
8) Two new FPNs are added that parallel the existing FPNs in 450.42 and 450.53. Proposed FPN No. 1 is a combined FPN derived from 450.42 FPN 1 and 450.53 FPN. Proposed FPN No. 2 is taken from 450.42 FPN No. 2.
Overall this proposal will improve the usability, completeness and applicability of 110.31(A).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MCMAHILL, L.: The panel should have accepted the proposal in principle and modified as follows:
"Where an electrical vault is required or specified, the following shall apply."
"(2) Floors. Floors in contact with the earth shall be ...".
"(3) Doors. Doors leading into a building or structure shall be tight-fitting and a minimum fire rating of 3 hours...." Relocate the personnel doors requirement to this item.
(4) Locks shall be provided on all doors, and doors shall be kept locked... ".
(5) Transformer vaults shall be constructed in accordance with the requirements of ... ".

1-253 Log #4810 NEC-P01 **Final Action: Reject**
(110.31(A))

Submitter: Leo F. Martin, Jr., Martin Electrical Code Consultants
Recommendation: 110.31(A) Revise the last sentence to read. For the purpose of this section, studs and wallboard construction shall not be acceptable.
Substantiation: More consistent with the language used in Building Codes. In addition, see 450.42 Transformer Vault construction last sentence.
Panel Meeting Action: Reject
Panel Statement: The replacement of "wallboards" with "wallboard construction" is not substantiated.
The proposal does not comply with section 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:
HICKMAN, P.: We support the recommendation in the proposal and disagree that the recommendation is not substantiated. The recommended text is used in 450.42 as the submitter pointed out.
HITTINGER, D.: This proposal should have been accepted. I do not agree with the panel statement that the submitter did not provide substantiation for the change. The submitter's reference to 450.42 provides the parallel wording that should be incorporated in 110.31(A).
MCMAHILL, L.: This proposal should have been accept in principle by revising the last word in the sentence from "acceptable" to "permitted." Section 110.31(A) last sentence to read: "For the purpose of this section, studs and wallboard construction shall not be permitted." This would allow for parallel structure with other code requirements.

1-254 Log #1976 NEC-P01 **Final Action: Reject**
(110.33(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: At least one entrance not less than 610 mm (24 in.) wide and 2.0 m (6 1/2 ft) high shall be provided to give access to the working space <u>required in 110.32</u> about electric equipment.
Substantiation: The working space should be the required space for safe operation and maintenance. "Equipment" includes many parts of electric equipment which do not require operation or maintenance by personnel such as raceways, cables, etc. The provision should clearly indicate entrance requirements apply only to required working space.
Panel Meeting Action: Reject
Panel Statement: The proposed addition is extraneous.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-255 Log #2251 NEC-P01 **Final Action: Reject**
(110.33(A))

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Add new and delete text to read as follows:
...not less than ~~610 mm (24 in.)~~...<u>812 mm (32 in.)</u>...
Substantiation: This is to be consistent with NFPA 5000 (11.2.1.2.4 Minimum

Door Width), NFPA 101 (7.2.1.2.4 Minimum Door Width) and ICC 2006 (1008.1.1 Size of door). During the last code cycle, there were several proposals emphasizing space within electrical equipment and means of egress recommendations as well as access and locking suggestions. There were no proposals for widening the access to such spaces. Which is as important as maintaining the safety of the personnel accessing the area by providing not only the minimum area for the spaces, but also sufficient width to get in and out of such spaces in the event of an emergency.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 1-212.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-256 Log #712 NEC-P01 **Final Action: Reject**
(110.34)

Submitter: Joe Tedesco, Boston, MA
Recommendation: Add FPN: NFPA 70E-2009, Standard for Electrical Safety in the Workplace, covers arc flash hazard analysis, 130.3.
Substantiation: NFPA 70E does not require signs reading: "DANGER HIGH VOLTAGE KEEP OUT".
Panel Meeting Action: Reject
Panel Statement: The proposal is unsubstantiated based on 4.3.3(d) of the NFPA Regulations Governing Committee Projects. In addition, the proposal is redundant to 110.16, FPN No. 1.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-257 Log #762 NEC-P01 **Final Action: Reject**
(110.34)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.34 Except as elsewhere required or permitted in this code, equipment likely to require examination, adjustment, servicing, or maintenance ~~while energized~~ shall have clear working space in the direction of access to ~~live parts of~~ the electrical equipment and shall not be less than specified in Table 110.34(A).
Substantiation: We need to update this to our current understanding of NFPA 70E. Hopefully, people will find very few things that they must do while the equipment is energized. These rules must be maintained even if it is company policy that the equipment is always de-energized before any work is performed.
Panel Meeting Action: Reject
Panel Statement: See the panel action on Proposal 1-193.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-258 Log #1630 NEC-P01 **Final Action: Reject**
(110.40)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Table 310.67 through Table 310.86" to "Table 310.60(C)(1) through Table 310.60(C)(20)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.67 through 310.86 as Tables 310.60(C)(1) through 310.60(C)(20) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: Code-Making Panel 1 understands that Code-Making Panel 6 has purview over Article 310.
The panel requests that the Technical Correlating Committee forward this proposal to Code-Making Panel 6 for comment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-259 Log #763 NEC-P01 **Final Action: Reject**
(110.73)

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
110.73 Equipment Work Space. Where electrical equipment ~~with live parts~~ that is likely to require examination, adjustment, servicing, or maintenance ~~while energized~~ is installed in a manhole, vault, or other enclosure designed for personnel access, the work space and associated requirements in 110.26 shall be met for installations operating at 600 volts or less.
Substantiation: We need to update this to our current understanding of NFPA 70E. Hopefully, people will find very few things that they must do while the equipment is energized. These rules must be maintained even if it is company policy that the equipment is always de-energized before any work is performed.
Panel Meeting Action: Reject
Panel Statement: See the panel action on Proposal 1-193.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HICKMAN, P.: We are in general agreement with the recommendation but do not believe that adequate substantiation has been submitted.

1-260 Log #4897 NEC-P01 **Final Action: Accept in Principle**
(110.74)

TCC Action: The Technical Correlating Committee directs Code-Making Panel 1 to add titles to the first level subdivisions as required by the NEC Style Manual.
This action shall be considered as a public comment.
Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Revise text as follows:
~~110.74 Bending Space for Conductors.~~ Conductor Installation Requirements: Conductors installed in manholes and other enclosures intended for personnel entry shall be installed in accordance with (A) & (B).
(A) Wire bending space for conductors operating at 600 volts or below shall be provided in accordance with the requirements of 314.28. Conductors operating at over 600 volts shall be provided with bending space in accordance with 314.71(A) and (B) as applicable.
(B) All conductors shall be cabled racked up. or arranged in an approved manner that provides ready and safe access for persons to enter for installation and maintenance.
Substantiation: To be consistent with the manual of style. Eliminate multiple requirement in a single paragraph.
Panel Meeting Action: Accept in Principle
Revise the the proposed text to read as follows:
110.74 Conductor Installation. Conductors installed in manholes and other enclosures intended for personnel entry shall be installed in accordance with 110.74 (A), (B), and (C), as applicable:
(A) Wire bending space for conductors operating at 600 volts or less shall be provided in accordance with the requirements of 314.28.
(B) Conductors operating at over 600 volts shall be provided with bending space in accordance with 314.71(A) and 314.71(B), as applicable.
(C) All conductors shall be cabled, racked up, or arranged in an approved manner that provides ready and safe access for persons to enter for installation and maintenance.
Exception: Where 314.71(B) applies, each row or column of ducts on one wall of the enclosure shall be calculated individually, and the single row or column that provides the maximum distance shall be used.
Panel Statement: The panel supports renaming and subdividing 110.74. The panel editorially modified the proposal to further subdivide requirements for 600 V or less and over 600 V.
The revised wording increases clarity and usability and addresses the concerns of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BARRIOS, L.: Reword (B) to "Wire bending space for conductors operating over 600 volts shall be provided in accordance with the requirements of 314.71(A) and 314.71(B), as applicable." The change is editorial in nature to make the statements in (A) and (B) parallel in structure.
MCMAHILL, L.: Article 110, Part V, is applicable to manholes and other electrical enclosures intended for personnel entry. Section 110.74 is specific to bending space for conductors in these locations. As such, there is no need to repeat this information in the bending space for conductors requirement. The panel should continue to accept this proposal in principle, however, the section should be revised as follows:
110.74 Bending Space for Conductors. Bending space for conductors shall be provided in accordance with the following:
(1) Conductors operating at 600 volts or less shall be in accordance with 314.28.
(2) Conductors operating at over 600 volts shall be in accordance with 314.71(A) and 314.71 (B), as applicable.
(3) Conductors shall be cabled, racked up, or arranged in an approved manner that provides ready and safe access for persons to enter for installation and maintenance.

1-261 Log #2749 NEC-P01 **Final Action: Reject**
(110.74 Exception No. 2 (New))

Submitter: Jerry Woodward, Thomas & Betts Corp.
Recommendation: Add a new exception as follows:
Exception 2: Where the conductors are terminated with a listed ninety degrees style electrical connector, values less than as required by 110.74 can be used.
Substantiation: There are listed connectors intended to reduce bending space for conductors. These connectors can be effectively used in much smaller areas. Attached is an overview of the application.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposal uses the word "can" which is in conflict with 3.1.1 of the NEC Style Manual.
NEC Article 110, Part V, is applicable to manholes and other electrical

enclosures intended for personnel entry. 110.74 requires that the conductors in such spaces be provided with bending space. 312.6(B) is applicable to wire-bending space at terminals.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ANTHONY, M.: With its focus process, the panel has overlooked a significant innovation in wiring method and missed an opportunity to diffuse such innovation for Part V installations. Ninety-degree connectors should be recognized at least as a Fine Print Note (soon to be an Advisory Note).

1-262 Log #2252 NEC-P01 **Final Action: Reject**
(110.76(B))

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Revise text to read as follows:
... from the outside~~, or in the case of normally locking by padlock, the locking arrangement shall be such that the padlock can be closed on the locking system to prevent locking from the outside.~~
Substantiation: Plenty of effort has been put into Article 110 to accommodate the safety of the personnel servicing electrical equipment. Looking at 110.76(B), it states that...that a person on the inside can exit when the access door is locked from the outside...One cannot exit an area if bolt locks or padlocks (with or without a locking system) has been set from the other side or perhaps latched due to other circumstances (wind, intentionally, etc.). That is the purpose for this deleted text, just to make a clear message that no closet, enclosure, room or vault door shall be locked from outside without being able to exit from the inside. See NFPA 5000 (11.2.1.5 Locks, Latches, and Alarm Devices.)
Panel Meeting Action: Reject
Panel Statement: The proposal does not substantiate the proposed removal of the provision.
The Section noted in NFPA 5000 is part of the building means of egress component.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 200 — USE AND IDENTIFICATION OF GROUNDED CONDUCTORS

5-29 Log #2714 NEC-P05 **Final Action: Reject**
(200.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(2) Grounded <u>circuit</u> conductors in premises wiring systems.
(3) Identification of grounded <u>circuit</u> conductors.
Substantiation: Edit. "Grounded" is defined in Article 100 as "connected to earth", which includes equipment grounding conductors and grounding electrode conductors which is not the intent but literally includes them because they are part of a premises wiring system.
Panel Meeting Action: Reject
Panel Statement: A system or circuit conductor that is intentionally grounded is defined in Article 100 as a "grounded conductor". The recommended text is redundant and does not improve clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-30 Log #3819 NEC-P05 **Final Action: Reject**
(200.1)

Submitter: Thomas J. Baker, Puget Sound Electrical Training
Recommendation: Add new text to read as follows:
200.1 Scope.
This article provides requirements for the following:
(1) Identification of terminals
(2) Grounded conductors in premises wiring systems
(3) Identification of grounded conductors
FPN <u>No. 1</u>: See Article 100 for definitions of Grounded conductor, ~~and~~ Grounding Conductor, <u>Neutral</u> and <u>Neutral Point</u>.
<u>FPN No. 2: A neutral conductor is always grounded, see 250.20. a grounded conductor may not be a neutral conductor.</u>
Substantiation: For most electricians, the white conductor is referred to as the neutral and not the grounded conductor. The 2008 NEC added a definition of neutral and neutral point, but it is not obvious when a grounded conductor is a neutral. The title of Article 200 remains as Use and Identification of Grounded Conductors, with no clear reference to a neutral conductor. Adding this FPN would help electricians understand what a grounded conductor is and its importance. Similar explanations have been made with 250.4 FPN, 250.20(D) FPN No.1 and 430.126(A)(4) FPN.
Panel Meeting Action: Reject
Panel Statement: "Grounded conductor" is defined in Article 100 as a system or circuit conductor that is intentionally grounded. The proposal does not add clarity to the scope of Article 200. The neutral conductor is not always a grounded conductor.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-30a Log #CP504 NEC-P05 **Final Action: Accept**
(200.1 FPN)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
FPN: See Article 100 for definitions of Grounded Conductor, <u>Equipment Grounding Conductor</u> and Grounding <u>Electrode</u> Conductor.
Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-31 Log #315 NEC-P05 **Final Action: Accept in Principle**
(200.2)

Submitter: Robert J. Walsh, City of Hayward
Recommendation: Revise text to read as follows:
All premises wiring systems, other than circuits and systems exempted or prohibited by 210.10, 215.7, 250.21, 250.22, 250.162, <u>430.21, 430.25,</u> 503.155, 517.63, 668.11, 668.21, and 690.41 Exception, shall have a grounded conductor that is identified in accordance with 200.6. The grounded conductor shall comply with 200.2(A) and (B).
Substantiation: Many loads do not require a neutral conductor such as electric Motors.
Panel Meeting Action: Accept in Principle
Revise the existing text of the 2008 NEC to read:
"All premises wiring systems, other than circuits and systems <u>specifically</u> exempted or prohibited by <u>other sections of this *Code*</u> ~~210.10, 215.7, 250.21, 250.22, 250.162, 503.155, 517.63, 668.11, 668.21, and 690.41, Exception,~~ shall have a grounded conductor that is identified in accordance with 200.6. The grounded conductor shall comply with 200.2(A) and (B)."
This action does not affect the existing text of 200.2(A) and 200.2(B).
Panel Statement: CMP-5 recognizes there are other sections than those included in the list or suggested text that are not required to have a grounded conductor.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 13 Negative: 3
Explanation of Negative:
DOBROWSKY, P.: This section should be deleted in its entirety. Modifying the language is not incorrect but it is now essentially useless and provides no guidance to the user. If a grounded conductor is required specific sections already address that, stating that one is always required- unless specifically exempted "somewhere" adds no value.
HARDING, G.: The panel action appears to only remove the list from this requirement and does not address the actual concerns of the submitter. The panel action should have included a new sentence to read as follows:
"For premises wiring systems, a grounded conductor shall not be required to be installed with the ungrounded conductors of a feeder or branch circuit where it is unnecessary based on the load served."
WILLIAMS, D.: This proposal should be a straight accept. The present section wording provides a number of sections where a grounded conductor is not required to be routed with branch circuits or feeder applications. The submitter has included two additional sections where a grounded conductor should not be required for a motor branch circuits and feeders. Since it was not referenced in this section a grounded conductor is required. The panels actions of removing the listed sections will now require a grounded conductor routed to all of the previously referenced sections unless specifically exempted in the code.
Comment on Affirmative:
JOHNSTON, M.: Continue to accept the revisions as proposed as a proactive approach in NEC development. The revision removes the list and results in a reference that is more likely to remain accurate in subsequent NEC cycles. The concerns of the submitter should be addressed by including clear text that relaxes the requirement for a grounded conductor to be installed with all circuits where it is unnecessary because of the type of load the circuit serves. A three-phase load should not always be required to include a grounded (neutral) conductor.

5-32 Log #4889 NEC-P05 **Final Action: Accept**
(200.2(B), FPN (New))

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Add a FPN after 200.2 (B) to reference 300.13(B) as follows:
FPN: See 300.13(B) for the continuity of grounded conductors used in multiwire branch circuits.
Substantiation: To reference a related section of this Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-33 Log #3793 NEC-P05 **Final Action: Reject**
(200.3 Exception)

Submitter: Laura Jenkins, NIETC
Recommendation: Revise text to read as follows:
Exception: Listed Utility-interactive inverters identified for use in distributed resource generation systems such as a photovoltaic ~~and fuel cell~~ systems, shall be permitted to be connected to premises wiring without a grounded conductor if the connected premises wiring or utility system includes a grounded conductor.
Substantiation: Article 690 has a section 690.35 Ungrounded Photovoltaic Power Systems that details what extra steps are necessary to have an ungrounded DC system installed safely. There is no section in Article 692 that mirrors those same concerns. You shouldn't include fuel cell systems in with Ungrounded PV systems.
Panel Meeting Action: Reject
Panel Statement: The inverters used for photovoltaic and fuel cell systems have been evaluated for safety in accordance with the applicable UL standards. Section 110.3(B) requires the installation to be in compliance with the instructions and labels provided with the product. The substantiation includes no technical arguments for the exclusion of fuel cell systems from the exception. The code does not prohibit the use of ungrounded systems supplied from fuel cells. Listed utility-interactive inverters provide a grounded conductor interconnection connection for distributed resource generation systems.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-34 Log #1489 NEC-P05 **Final Action: Accept**
(200.6(A))

Submitter: Darryl Hill, Wichita Electrical JATC / Rep. IBEW LU #271
Recommendation: Revise text as follows:
200.6 Means of Identifying Grounded Conductors.
(A) Sizes 6 AWG Or Smaller. An insulated grounded conductor of 6 AWG or smaller shall be identified by ~~a continuous white or gray outer finish or by three continuous white stripes on other than green insulation along its entire length. Wires that have their outer covering finished to show a white or gray color but have colored tracer threads in the braid identifying the source of manufacture shall be considered as meeting the provisions of this section. Insulated grounded conductors shall also be permitted to be identified as follows:~~ one of the following means:
(1) By a continuous white outer finish.
(2) By a continuous gray outer finish.
(3) By three continuous white stripes along its entire length on other than green insulation.
(4) Wires that have their outer covering finished to show a white or gray color but have colored tracer threads in the braid identifying the source of manufacture shall be considered as meeting the provisions of this section.
(5) The grounded conductor of a mineral-insulated, metal-sheathed cable shall be identified at the time of installation by distinctive marking at its terminations.
(6) A single-conductor,...no change to this text
(7) Fixture wire...no change in this text
(8) For aerial cable,...no change in this text
Substantiation: 200.6(A) should all be in a list item format. Currently, this text lists eight ways to identify an insulated grounded conductor 6 AWG and smaller but only lists out 4 of these. Also, 200.6(B) is currently in a list item type format, but 200.6(A) is not, yet it requires the same type of identification of the grounded conductor. With this change, it would help add clarity, uniformity, and usability to this Section. Another problem to this requirement is that in the original text it states... "by three continuous white stripes on other than green insulation along its entire length" when this should read "by three continuous white stripes along its entire length on other than green insulation."
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BRENDER, D.: Wire and Cable manufacturers should be consulted as to whether a colored thread is used inside an outer braid on conductor insulation to identify the manufacturer. This language may be archaic.

5-35 Log #1556 NEC-P05 **Final Action: Reject**
(200.6(A))

Submitter: Joseph E. Rossi, Township of Clinton
Recommendation: Revise text as follows:
An insulated grounded conductor of 6 AWG or smaller shall be identified by a continuous manufacteres white or gray outer finish or by three continuous white strips on other than green insulation along its entire length.
Substantiation: There is a lot of confusion about this section of the code. I have failed contractors many times because they will take the two ends of a black wire and tape them white. When I cite this section to them, they tell me about section 206.6(B). That is for larger than #6 wire. Therefore, by putting the word "manufactures" before the word "white" it would be a clearer definition of what needs to be done.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the code. The present code language addresses the submitter's concern as the conductors in sizes 6 AWG and smaller are required to have a "continuous white or gray outer finish."
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-36 Log #2758 NEC-P05 **Final Action: Reject**
(200.6(A) and (B))

Submitter: Rich Wolfe, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
(A) Sizes 10 ~~6~~ AWG or Smaller. An insulated grounded conductor of 10 ~~6~~ AWG or smaller shall be identified by a continuous white or gray outer finish or by three continuous white stripes on other than green insulation along its entire length. Wires that have their outer covering finished to show a white or gray color but have colored tracer threads in the braid identifying the source of manufacture shall be considered as meeting the provisions of this section. Insulated grounded conductors shall also be permitted to be identified as follows:
(B) Sizes Larger Than 10 ~~6~~ AWG. An insulated grounded conductor larger than 10 ~~6~~ AWG shall be identified by one of the following means:
Substantiation: Electricians have been using #8 Black insulated wire and taping ends with white and/or green tape. It has been accepted by many AHJs. Most electricians only carry white and green wire up to #10 AWG. The proposal is to reword the code article to reflect what is being done and accepted in the field.
Panel Meeting Action: Reject
Panel Statement: Conductors are readily available with white and gray insulation in sizes 6 AWG and smaller. Insufficient technical substantiation has been provided to reduce the provisions of this section.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
DOBROWSKY, P.: Conductors #8 AWG and larger can effectively be identified in the field by marking the terminations.
A similar change needs to be made in 250.119 to permit 8 and 6 AWG to be re-identified as equipment grounding conductors.

5-37 Log #3249 NEC-P05 **Final Action: Reject**
(200.6(A)(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
"or covered" after "insulated" in the first sentence.
Substantiation: Edit. Where covered conductors are used (310.2(A) Exception) the requirement should apply.
Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to require cable assemblies where the grounded conductor is covered by the outer sheath, such as SE cable, to now have that sheath (covering) colored white or gray or have three white stripes along the length. There is no evidence this grounded (neutral conductor) has been misidentified. Section 310.2(A) Exception cited by the submitter only applies where specifically permitted by the code. Section 200.6(A) and (B) do not permit covering as a substitute for insulation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-38 Log #1490 NEC-P05 **Final Action: Accept**
(200.6(B))

Submitter: Darryl Hill, Wichita Electrical JATC / Rep. IBEW LU #271
Recommendation: Revise text as follows:
(B) Sizes Larger Than 6 AWG. An insulated grounded conductor larger than 6 AWG shall be identified by one of the following means:
(1) By a continuous white ~~or gray~~ outer finish
(2) By a continuous gray outer finish
(3) By three continuous white strips along its entire length on other than green insulation.
(4) At the time of installation,...no changes to remaining text.

Substantiation: 200.6(B) is currently in a list item type format and this listing only lists 3 ways or methods to identify the grounded conductor when in fact there are 4 different means to identify a grounded conductor larger than 6 AWG. To separate the white outer finish and the gray outer finish into their own list item would clear up this requirement and make it more user friendly.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-39 Log #3914 NEC-P05 **Final Action: Reject**
(200.6(B))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text as follows:
(B) Sizes 4 AWG or Larger ~~Than 6 AWG~~. An insulated grounded conductor ~~larger than 6 AWG~~ 4 AWG or larger shall be identified by one of the following means:
Substantiation: This section has been misread over the years by many installers and has created code violations that could have been eliminated if the wording was changed. The proposed wording clarifies the size of conductors that are referenced in this section.
Panel Meeting Action: Reject
Panel Statement: The proposed wording does not have the same meaning as the existing code language because it omits 5 AWG covered in Table 610.14(A). There is insufficient technical substantiation provided to support the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
PORTER, C.: I agree with the submitter's substantiation. If the panel's concern for not changing the requirement to "4 AWG and larger" is merely to ensure inclusion of the 5 AWG size, then the requirement should be changed to state "5 AWG or larger" to satisfy the intent of the submitter.

5-40 Log #2292 NEC-P05 **Final Action: Reject**
(200.6(B)(3))

Submitter: Joseph E. Rossi, Township of Clinton
Recommendation: Revise text to read as follows:
This marking shall encircle the conductor or insulation at each end and at every point where the conductor is accessible.
Substantiation: Currently, an electrician can put a 1/16 in. piece of white tape around a #250 kcmil wire and technically meet the code. The section of this article states: "shall encircle the conductor." However, it does not state how much of the conductor, which can cause inconsistency with inspection. Therefore, the reading of 250.199 and 200.6 should read the same.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not support the proposed change. The substantiation addresses the size or adequacy of the marking where the proposed change is for locations in the system where the markings are to be required. It is noted that there is no Section 250.199 and the panel concludes the submitter intended Section 250.119.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-41 Log #2154 NEC-P05 **Final Action: Reject**
(200.6(D))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(D) Grounded Conductors of Different Systems. Where the premises wiring system has grounded conductors of different systems ~~are installed in the same raceway, cable, box, auxiliary gutter, or other type of enclosure~~, each grounded conductor shall be identified by system. Identification that distinguishes each system grounded conductor shall be permitted by one of the following means:
Substantiation: This will match the language in 210.5 and 215.12. Existing code would allow a white grounded conductor for a 120/208 and a 277/480 as long as they didn't share the same raceway, etc. The above change would make the language similar with all the other conductor identification sections and clarify the intent to clearly identify each conductor of each system on a premises.
Panel Meeting Action: Reject
Panel Statement: The proposal broadens the requirement to all systems on a property (inside and outside), including those in multiple separate buildings on the same property without adequate substantiation of a problem. This proposed revision makes the requirement impractical for full compliance in many cases and is overly restrictive, especially where there are multiple systems on the same premises (which could mean systems of overhead conductor spans overhead). No substantiation has been provided that indicates a need for this requirement to be extended beyond enclosures. The number of systems on the premises (inside and outside) could be excessive, making compliance and enforcement difficult. The purpose of 200.6(D) is to improve safety for workers that have to access enclosures that contain multiple grounded conductors from different systems. That is where distinguishing between them is an important safety concern and necessitates differentiation by identification.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
WILLIAMS, D.: This proposal should be accepted.The requirement for identifying the grounded conductors where there are different systems installed in a building should be the same for the grounded conductors as it is for the ungrounded conductors. This is an important safety requirement for the people working on the system and to the occupants to ensure that the grounded conductors of one system are not connected to another system. The wording of section 210.5 and 215.2 are identical and section 200.6(D) should mirror those requirements. The sections being worded differently allows for the enforcement of the circuit identification requirement to be misapplied.
Comment on Affirmative:
JOHNSTON, M.: Continue to reject this proposal for the reasons provided in the panel statement. The proposed changes would result in unintended restrictions that are not substantiated.

5-42 Log #3517 NEC-P05 **Final Action: Reject**
(200.6(D))

Submitter: Randy Hunter, City of Las Vegas
Recommendation: Revise text to read as follows:
(D) Grounded Conductors of Different Systems. Where the premises wiring system has grounded conductors of different systems ~~are installed in the safe raceway, cable, box, auxiliary gutter, or other type of enclosure~~, each grounded conductor shall be identified by system. Identification that distinguishes each system grounded conductor shall be permitted by one of the following means:
Substantiation: This will match the language in 210.5 and 215.12. Existing code would allow a white grounded conductor for a 120/208 and a 277/480 as long as they didn't share the same raceway, etc. The above change would make the language similar with all the other conductor identification sections and clarify the intent to clearly identify each conductor of each system on a premise.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-41.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-51 Log #2258 NEC-P05 **Final Action: Accept in Principle**
(200.6(D))

Submitter: Russell LeBlanc, Helio Electric Inc.
Recommendation: Add additional wording and revise the last sentence following section (3).
This means of identification shall be permanently posted at each (~~branch-circuit~~) panelboard and switchboard, (or shall be documented in a manner that is readily available).
Substantiation: The means of identification for grounded conductors must also be provided at feeder panelboards and switchboards in addition to "branch-circuit" panelboards. This is an effect to coordinate marking of grounded conductors with ungrounded conductors. See 210.5(C) and 215.12(C).
Panel Meeting Action: Accept in Principle
Revise the last sentence of 200.6(D) to read:
The means of identifications shall be documented in a manner that is readily available or shall be permanently posted where the conductors of different systems originate.
Panel Statement: CMP-5 recognizes that the revision was proposed to Section 200.6(D) rather than 200.60 and accepts the recommended concept and has revised the recommendation to not limit the identification requirement to panelboards and switchboards only.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-43 Log #3602 NEC-P05 **Final Action: Reject**
(200.7 Exception (New))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add new text to read as follows:
200.7 Use of Insulation of a White or Gray Color or with Three Continuous White Stripes.
(A) General. The following shall be used only for the grounded circuit conductor, unless otherwise permitted in 200.7(B) and (C):
(1) A conductor with continuous white or gray covering
(2) A conductor with three continuous white stripes on other than green insulation
(3) A marking of white or gray color at the termination
(B) Circuits of Less Than 50 Volts. A conductor with white or gray color insulation or three continuous white stripes or having a marking of white or

gray at the termination for circuits of less than 50 volts shall be required to be grounded only as required by 250.20(A).

(C) Circuits of 50 Volts or More. The use of insulation that is white or gray or that has three continuous white stripes for other than a grounded conductor for circuits of 50 volts or more shall be permitted only as in (1) through (3).

(1) If part of a cable assembly and where the insulation is permanently reidentified to indicate its use as an ungrounded conductor, by painting or other effective means at its termination, and at each location where the conductor is visible and accessible. Identification shall encircle the insulation and shall be a color other than white, gray, or green.

(2) Where a cable assembly contains an insulated conductor for single-pole, 3-way or 4-way switch loops and the conductor with white or gray insulation or a marking of three continuous white stripes is used for the supply to the switch but not as a return conductor from the switch to the switched outlet. In these applications, the conductor with white or gray insulation or with three continuous white stripes shall be permanently reidentified to indicate its use by painting or other effective means at its terminations and at each location where the conductor is visible and accessible.

(3) Where a flexible cord, having one conductor identified by a white or gray outer finish or three continuous white stripes or by any other means permitted by 400.22, is used for connecting an appliance or equipment permitted by 400.7. This shall apply to flexible cords connected to outlets whether or not the outlet is supplied by a circuit that has a grounded conductor.

FPN: The color gray may have been used in the past as an ungrounded conductor. Care should be taken when working on existing systems.

Exception to (A), (B), and (C): Identification of the grounded conductor of an isolated power circuit shall be as required in 517.160(A)(5).

Substantiation: Correlation issue. Devices connected to isolated power circuits in accordance with 517.160(A)(5) conflict with existing 200.7 requirements.

Panel Meeting Action: Reject

Panel Statement: The proposed exception is not needed. An isolated power circuit, as described in 517.160 (A)(2), has no grounded conductor. The requirements in Article 200 do not apply to the conductors referred to in 517.160(A)(5).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-44 Log #2938 NEC-P05 **Final Action: Accept in Principle**
(200.7(C))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

(C) Circuits of 50 Volts or More. The use of insulation that is white or gray or that has three continuous white stripes for other than a grounded conductor for circuits of 50 volts or more shall be permitted only as in (1) and (2) ~~through (3)~~.

(1) If part of a listed cable assembly that has ~~and where~~ the insulation ~~is~~ permanently reidentified to indicate its use as an ungrounded conductor~~,~~ by phase-taping, painting, or other effective means at its termination~~,~~ and at each location where the conductor is visible and accessible. Identification shall encircle the insulation and shall be a color other than white, gray, or green.

(2) ~~Where a cable assembly contains an insulated conductor for single-pole, 3-way or 4-way switch loops and the conductor with white or gray insulation or a marking of three continuous white stripes is used for the supply to the switch but not as a return conductor from the switch to the switched outlet. In these applications, the conductor with white or gray insulation or with three continuous white stripes shall be permanently reidentified to indicate its use by painting or other effective means at its terminations and at each location where the conductor is visible and accessible.~~

~~(3) Where~~ A ~~a~~ flexible cord, having one conductor identified by a white or gray outer finish or three continuous white stripes or by any other means permitted by 400.22, that is used for connecting an appliance or equipment permitted by 400.7. This shall apply to flexible cords connected to outlets whether or not the outlet is supplied by a circuit that has a grounded conductor.

FPN: The color gray may have been used in the past as an ungrounded conductor. Care should be taken when working on existing systems.

Substantiation: The provisions of this section should clearly apply to "listed" cable assemblies as included in the NEC and not to a field-fabricated cable assemblies. Phase taping is perhaps the most common method of identifying conductor insulation in the field and should be added to this section.

Section 200.7(C)(2) is not required due to the provisions of (C)(1). Section 210.7(C)(1) allows the white or gray insulated conductor to be reidentified and used as an ungrounded conductor for supplying equipment such as motors, water heaters and space heaters. If this reidentification is considered to be safe for these circuits, the same provision should be considered safe for switch legs and travelers for switch loops.

Other changes are intended to be editorial or to comply with Section 3.3.4 of the NEC Style Manual which states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle

In the recommendation for 200.7(C)(1) delete the term "listed" and revise "phase-taping" to "marking tape". Accept the rest of the recommendation as submitted.

Panel Statement: The submitter has not provided technical substantiation to support the listing requirement of cables. The revision of "phase-taping" to "marking tape" uses terminology that is consistent with other marking requirements in the code.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

HARDING, G.: Continue to accept the proposal in principle. Installers need to be informed regarding code accepted methods to re-identify white or gray conductors as ungrounded conductors.

JOHNSTON, M.: Continue to accept in principle. The panel should retain the clear guidelines for installers and maintenance personnel as to accepted methods and practices of re-identifying white or gray conductors as ungrounded conductors at accessible locations. The balance of the revisions proposed should be accepted.

5-45 Log #3507 NEC-P05 **Final Action: Accept in Principle**
(200.7(C)(2))

Submitter: George Moore, Golden, CO

Recommendation: Revise text to read as follows:

Where a cable assembly contains an insulated conductor for single pole, 3-way or 4-way switch loops and the conductor with white or gray insulation or a marking of three continuous white stripes is used as supply to the single pole, 3-way or 4-way switch, or as 3-way or 4-way travelers but not as a return conductor from the switch to the switched outlet.

Substantiation: Some jurisdictions interpret the current wording to mandate using the reidentified conductor as supply to the switch. The rewording clarifies that the reidentified conductor can be used as supply of travelers in 3-way and 4-way switches.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 5-44.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-46 Log #3863 NEC-P05 **Final Action: Accept in Principle**
(200.7(C)(2))

Submitter: Cedric D. Johnson, Denver, CO

Recommendation: Revise text as follows:

Where a cable assembly contains an insulated conductor for single pole, 3 way or 4 way switch loops, and travelers, and the conductor with white or gray insulation or a working of three continuous white stripes is used for the supply to the switch but not as a return conductor from the switch to the switched outlet.

Substantiation: Because of not having the two words and travelers in the paragraph it is somewhat confusing to the electricians wire 3-ways since switch loops are not defined clearly thus leaving it up to the AHJ to whether or not you can use the white wire as travelers.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 5-44.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-47 Log #4773 NEC-P05 **Final Action: Accept in Principle**
(200.7(C)(2))

Submitter: Jeff Fitzloff, State of Idaho Division of Building Safety

Recommendation: Add text to read as follows:

200.7 Use of Insulation of a White or Gray Color or with Three Continuous White Stripes.

(C) Circuits of 50 Volts or More.

(2) Where a cable assembly contains an insulated conductor for single-pole, 3-way or 4-way switch loops and the conductor with white or gray insulation or a marking of three continuous white stripes is used for the supply to the switch but not as a return conductor from the switch to the switched outlet or between 3-way and 4-way switches as travelers. In these applications, the conductor with white or gray insulation or with three continuous white stripes shall be permanently reidentified to indicate its use by painting or other effective means at its terminations and at each location where the conductor is visible and accessible.

Substantiation: This change will clarify that the white conductors can not be switched when used as travelers.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 5-44.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-48 Log #798 NEC-P05 **Final Action: Reject**
(200.7(C)(4) (New))

Submitter: John O'Hara, Westford, MA
Recommendation: Add a new (C)(4) as follows:
(4) An insulated white conductor as part of a cable assembly shall be permitted to be permanently re-identified as a gray conductor for use with a 480/277 Volt system.
(See companion Proposal for 200.6(A) for new Exception).
Substantiation: Presently, for example, if a two-wire 12 AWG cable assembly originating in a 480/277 volt panelboard was to be used to supply a single 277 volt luminaire; the conductors would be required to be two-wire brown and gray, orange and gray, or yellow and gray. The 12 AWG ungrounded conductor can be re-identified, but the grounded conductor cannot as it is smaller than 6 AWG. Typically, two-wire cable assemblies are insulated black and white and to demand other color combinations is cost prohibitive.
Panel Meeting Action: Reject
Panel Statement: The provision of 200.7(A)(3) already permits the recommended application.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:

5-49 Log #3644 NEC-P05 **Final Action: Accept in Principle**
(200.8 (New))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Add new text to read as follows:
200.XX Common Neutral Conductors. Common neutral conductors shall not be used unless specifically permitted elsewhere in this code.
Substantiation: It appears that CMP 2 is attempting to prohibit the use of common neutral conductors by specifically permitting them in 215.4(A) and 225.7(B). There is no reasonable reading of the words "shall be permitted" that can lead the code user to the conclusion that these words actually prohibit the use of common neutral conductors in other cases. The act of specifically permitting something in no way prohibits something else. Section 3.1.2 in the NEC Style Manual says that the words "shall be permitted" are to be used to permit an alternate installation method. The words "shall not" are required to be used to prohibit an installation method per 3.1.1 of the Style Manual. This change will make the wording in 215.4 and 225.7 comply with the style manual rules. Also the prohibition of the use of common neutrals should rest with CMP 5 as they have control of Article 200, Use and Identification of Grounded Conductors and not with CMPs 2 and 4.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
200.4 Neutral Conductors. Neutral conductors shall not be permitted to be used for more than one multiwire branch circuit or for more than one set of ungrounded feeder conductors unless specifically permitted elsewhere in this *Code.*
Panel Statement: CMP-5 revised the proposal to more specifically apply to multiwire branch circuits and feeders.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposed revision as amended by the action of CMP-5. This additional section provides clarity to users about how neutral conductors should be used and coordinates with the newly defined terms neutral conductor and neutral point. Additional uses of the term common conductor are not necessary and the NEC should migrate to removal of the term as it is undefined and can cause inconsistency in enforcement.

5-50 Log #3603 NEC-P05 **Final Action: Reject**
(200.10(B)(1))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
200.10 Identification of Terminals.
[200.10(A) unchanged by this Proposal]
(B) Receptacles, Plugs, and Connectors. Receptacles, polarized attachment plugs, and cord connectors for plugs and polarized plugs shall have the terminal intended for connection to the grounded conductor identified as follows:
(1) Identification shall be by a metal or metal coating that is substantially white in color or by the word *white* or the letter *W* located adjacent to the identified terminal or by an insulated conductor identified as required in 200.7 and 200.9.
[remainder of 200.10(B) and 200.10 unchanged by this Proposal]
Substantiation: Receptacles, plugs and connectors with wire leads (conductors) as terminals have been manufactured and listed for decades. Devices with integral leaded terminals and associated terminal identification, however, are not specifically recognized here. Intentionally not worded as in 200.10(D) for screw shell devices (lampholders) because additional identification methods permitted by 200.7 and 200.9 have been employed in listed receptacles, plugs and connectors.
Panel Meeting Action: Reject
Panel Statement: A wire type lead is not a "terminal". The wire type lead is required to be properly identified by white or gray or three white stripes from the product safety standards for proper installation. Section 200.7 applies to this identification requirement.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

ARTICLE 210 — BRANCH CIRCUITS

2-28 Log #1503 NEC-P02 **Final Action: Reject**
(210)

Submitter: William Q. Cellini, Jr., Ardmore, PA
Recommendation: Add new text to read as follows:
(●) General Purpose (GP) Branch-circuit
(●) General Purpose (GP) Outlet (GPO)
(●) General Purpose (GP) Receptacle (GPR).
Substantiation: Addition of these terms will enhance, facilitate, and clarify their use.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(C) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-29 Log #4417 NEC-P02 **Final Action: Accept**
(Table 210.2)

TCC Action: The Technical Correlating Committee understands that the reference to Code-Making Panel 19 in the panel statement should refer to Code-Making Panel 13.
Submitter: Mark C. Ode, Underwriters Laboratories Inc.
Recommendation: Add new text to read as follows:
Add "445.20" into Table 210.2.
Substantiation: This is a companion proposal for a new section 445.20 dealing with GFCI protection for 15 kW and smaller generators so a reference to Table 210.2 recognizing this new section provides proper cross reference where a branch circuit is supplied from a generator.
This proposal was developed by a Task Group composed of Task Group Chairman Paul Casparro and Chair of Panel 3 (NJATC); Jim Wiseman at Square D Schneider-Electric and Panel 15 (NEMA); John R. Kovacik with Underwriters Laboratories, Panels 10, 13 and the NEC TCC (UL); Richard Owen with City of St Paul, Minnesota, Panel 3, and the NEC TCC (IAEI); and Mark C. Ode with Underwriters Laboratories, Panels 3, 13, and the NEC TCC (UL).
Panel Meeting Action: Accept
Panel Statement: Panel recommends that the TCC correlates the action on this proposal and Section 445.20 under the purview of CMP-19.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
PAULEY, J.: The reference is not appropriate for Table 210.2. The proposed reference deals with GFCI protection of receptacles that are part of a generator. Table 210.2 covers specific purpose branch circuit requirements that are in addition to the requirements of Article 210. The reference in 445 would not be relevant to branch circuits.

2-30 Log #2326 NEC-P02 **Final Action: Reject**
(210.4(A))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Add a new last sentence as follows: **210.4 Multiwire Branch Circuits; (A) General.** Branch circuits recognized by this article shall be permitted as multiwire circuits. A multiwire circuit shall be permitted to be considered as multiple circuits. All conductors of a multiwire branch circuit shall originate from the same panelboard or similar distribution equipment. Multiwire circuits shall be permitted only in supervised industrial installations as defined in 240.2.
Substantiation: The potential hazards presented by multiwire branch circuits to both equipment and personnel are well understood by those experienced in the electrical industry. Over the years, changes to this part of the code have attempted to address those concerns with the latest revision being the new requirement for simultaneous disconnection of all ungrounded conductors of multiwire branch circuits. However, there is now an unintended or unforeseen consequence of that new provision that actually increases the danger to electrical workers. This new increased hazard, along with the other potential problems arising from the use of multiwire branch circuits now suggest that it be used only in limited situations.
The supporting reasons for the proposed addition of a new last sentence to section 210.4(A) to restrict the use of multiwire branch circuits to industrial installations with qualified personnel as defined in 240.2 are as follows.
1) With the new requirement for multi-pole circuit breakers to supply

multiwire branch circuits, the level of safety is indeed increased for those who choose to disconnect the power before working on the circuit. However, especially in the office setting where computers are in common use, maintenance workers are LESS LIKELY to turn off the circuit to do such things as replace receptacles and switches. The disruption of office-worker productivity for two or three times as many affected workers is a disincentive to electrical-worker safety, which will probably result in more incidental exposure of energized circuits to personnel while performing routine maintenance on electrical systems.

2) As the years go by, apprentices become journeymen, and the once-accepted practice of protecting multiwire branch circuits with single-pole devices (circuit breakers or fuses) becomes long forgotten, the likelihood of a worker turning off a single-pole circuit breaker to work on what is assumed to be an individual circuit (non-multiwire) increases -- along with the danger to that worker where the 1-pole circuit breaker is actually part of a multi-wire branch circuit and the worker opens the neutral conductor (shock hazard and possible equipment damage). Of course, this scenario depends somewhat on the eventual increased popularity of multiwire branch circuits now and in the future.

3) Multiwire branch circuits, whether protected by single- or multi-pole devices, have always presented a potential over-voltage hazard to the equipment connected to those circuits any time there is a disruption in continuity to the common neutral conductor. A loose neutral or a neutral wire accidentally removed at its source panel termination could result in the destruction of sensitive or high-impedance electrical equipment due to the sudden rise in voltage (above the rating of the connected equipment) where there is a resulting series connection of that equipment with other equipment on the other phase or leg.

4) With the ever growing proliferation of electronics and the solid-state switching power in electrical equipment, especially in the non-residential setting, the occurrence of nonlinear-load conductor heating is a growing concern. In fact, this is pointed out by the fine print note following section 240.4(A), as well as other sections such as 220.61(C)(2), 310.15(B)(4)(c), 400.5(B), 450.3 FPN: No. 2, and others. The resulting added heat in the neutral conductor is dependent not only on the load current and the other usual considerations of ambient temperature and conductor bundling but also the frequency of the harmonic currents imposed on the neutral (common) conductor, which technology seems to be forever increasing.

5) Multiwire branch circuits are already given “special consideration” in sections 590.4(D), 590.4(E), 605.6, and 605.7, and are NOT ALLOWED (other than by “exception”) in sections 501.40, 502.40, 505.21, and 506.21 of the code. These code sections have evolved with the recognition of the potential hazards posed by multiwire branch circuits installed in specific circumstances, and the code panels have acted to diminish those risks. It is now time to act further in reducing the future installation of multiwire branch circuits covered by the NEC.

Panel Meeting Action: Reject

Panel Statement: Installers in residential occupancies need to be qualified when working on or around energized circuits whether multiwire or individual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-31 Log #452 NEC-P02 **Final Action: Reject**

(210.4(B))

Submitter: Lanny G. McMahill, Phoenix, AZ

Recommendation: Delete text to read as follows:

~~(B) Disconnecting Means. Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates.~~

Substantiation: Delete item (B). The intent of this change in the ’08 NEC was well meant. Unfortunately, it may have the opposite effect by creating potential unsafe conditions for the electrical mechanics in the field. As an example, where luminaries are supplied by multiiwire branch circuits, and a luminaire circuit needs to be serviced, most mechanics will not disconnect all the branch circuits as it could leave a given area in total darkness. Via discussions with electrical mechanics, several have raised concerns with this requirement and have advised that they will simply remove the energized conductor from the branch circuit overcurrent device that needs to be serviced. Obviously, this is not a good work practice, but many have advised that disconnecting all circuits may not be an option. In the interest of work person safety, it is recommended to delete item “B” and continue with the requirements as noted on Section 210.7(B). Section 210.7(B) is specific to multiple branch circuits serving devices or equipment on the same yoke. This makes sense.

Where it is necessary to require disconnection of all multiwire branch circuits, such as is noted in Section 605.6 and 7, this makes sense too. Requiring the disconnection of all multiwire branch circuits does not make sense and, again, may have the opposite effect of simply impacting worker safety!

Panel Meeting Action: Reject

Panel Statement: The submitter’s substantiation is anecdotal and lacks any technical data to support his claim. The proposed deleted text would create a greater hazard to those required to service equipment that is supplied by a multiwire branch circuit. The present text assists the qualified person servicing equipment supplied by multiwire branch circuits in identifying and safely de-energizing all current carrying conductors of the circuit. Removing this language would increase the hazard to all personnel working on multiwire branch circuits. As described by the submitter 2-pin luminaires are now required to have individual disconnecting means installed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-32 Log #598 NEC-P02 **Final Action: Reject**

(210.4(B))

Submitter: Herbert S. Pharo, Cape May, NJ

Recommendation: Revise text as follows:

Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors nearest ~~At~~ the point where the branch circuit originates.

Substantiation: The problem is that the point where the branch circuit originates is at the overcurrent protective device. Nearest as used in 230.70(A)(1).

The new word will make it clear that the disconnect need not be overcurrent protective device.

Panel Meeting Action: Reject

Panel Statement: The term “nearest” is vague and unenforceable. The present language is clear and enforceable by the authority having jurisdiction.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-33 Log #790 NEC-P02 **Final Action: Reject**

(210.4(B))

Submitter: Charles Petri, Petri Electric, Inc.

Recommendation: Delete Item 210.4(B) and replace with the following:

“On new installations, all multiwire branch circuits shall be provided with an individual grounded conductor on each circuit”.

Substantiation: If the reason that this was put into the Code was to reduce shock hazard that exists when disconnecting neutral conductor on sheared neutral multiwire branch circuit, the following must be considered:

1. When doing remodel or tenant finish work in an existing office building, in which the premises wiring system was a multiwire branch system with a common neutral conductor, we are now required to add a 3-pole circuit breaker to control the branch circuits. Three 277v lighting circuits may control all the lighting on a floor; therefore, when a ground fault exists, all three circuits will be tripped and the whole floor will be without light. Now, the building maintenance person or electrical contractor will be called to fix the problem. To troubleshoot, they probably will remove the panel cover and deadfront, by flashlight, disconnect two circuits from circuit breaker, then reset breaker. If breaker holds, they will disconnect remaining circuit, connect one of the other circuits and repeat the sequence until they determine the shorted circuit. This would expose them to possible arc flash hazard if circuit breaker flashes. If circuit breaker performs OK, then they will probably leave the circuit breaker “on” so that 2/3 of the offices have light, and troubleshoot the bad circuit. This puts them back in the original position of working on a circuit that has current flowing in the neutral.

2. In connecting circuits to modular furniture, if the circuits come from the same panel, on overload or ground-fault on one of the “dirty” circuits will also shut off power to computers, possibly causing loss of data. In some instances, the isolated ground computer circuit comes from a UPS system which is separate from the “dirty power” system.

210.4(A) does not allow this multiwire system.

Panel Meeting Action: Reject

Panel Statement: The proposed text conflicts with the definition of a multiwire branch circuit.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-34 Log #1484 NEC-P02 **Final Action: Reject**

(210.4(B))

Submitter: Daniel L. Wilt, Springfield Acme Electric

Recommendation: Add new text as follows:

Exception: When multiwire branch circuits are used to feed office fixtures/furniture with factory furnished attachment whips, common trip breakers or breaker ties, shall not be required.

Substantiation: Modern office fixtures/furniture often utilize a multiwire connection whip offering 3 circuits with a common neutral and equipment ground, in addition to provision for an isolated ground circuit. Disruption of 1 circuit under existing article would cause loss of power to entire block of cubicles. Exception No. 1 is not very clear on “one utilization equipment.”

Panel Meeting Action: Reject

Panel Statement: Previous substantiation for 210.4(B) cited electrical incidents associated with the absence of a requirement for simultaneous disconnect of ungrounded conductors in a multiwire circuit. Adding this exception will reintroduce this same potentially hazardous condition. Section 605.6 already addresses simultaneous disconnect of multiwire branch circuits where they supply fixed type partitions.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-35 Log #3248 NEC-P02 **Final Action: Reject**
(210.4(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Each multiwire branch circuit shall be provided with <u>an identified</u> means that simultaneously disconnects... (remainder unchanged).
Substantiation: "Identified" will require the means (not specified) to be suitable.
Panel Meeting Action: Reject
Panel Statement: The present text is clear and the submitter's recommended text does not add any clarity to the code. Identification is covered in 408.4 of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-36 Log #4859 NEC-P02 **Final Action: Reject**
(210.4(B))

Submitter: John Steinke, Amish Electric
Recommendation: Delete this section.
Substantiation: In specific situations, such as where the multi-wire branch circuit (MWBC) supplies different circuits to devices sharing a common yoke, the NEC already requires a common disconnecting means.
In other situations - such as an office where the lighting is distributed over two or three circuits - requiring a common disconnecting means both complicates troubleshooting, and introduces other hazards.
In many cases, the breaker is the only disconnecting means; either there are no individual switches, or the switches incorporate motion sensors, etc., and may not be relied upon as a disconnection means.
Leaving the entire office in the dark not only increases the inconvenience to all when performing maintenance, it also creates a hazard. Should one circuit fail, people are left to flounder in the dark. Maintenance will be performed by flashlight - inherently more dangerous - or by working live (against all rules).
Likewise, a 'common trip' will negate the very purpose of many separate circuits: to prevent one piece of equipment from failing when another does.
MWBC's, as a practice, have both their detractors and their advocates. Such is a design choice, and probably beyond the scope of the NEC (See Article 90.1) If it is the intent of the NEC to ban MWBC's, it should do so directly, and not by adding multiple strictures on them.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation for the removal of the requirement for simultaneous disconnecting means. See Panel Statement on Proposal 2-34.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-37 Log #3874 NEC-P02 **Final Action: Accept**
(210.4(B), FPN (New))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the panel action on this proposal and consider deleting the mandatory phrase "required by this section" to comply with 3.1.3 of the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Michael J. Farrell, III, Lucas County Building Regulations
Recommendation: Add new Fine Print Note (FPN) following text of 210.4(B) Disconnecting Means
FPN: See 240.15(B) for use of single pole circuit breakers as the disconnect means required by this section.
Substantiation: Placement of a FPN will direct the code reader to all of the requirements for proper application of this article. It would prevent some of the confusion in applying the disconnect requirements for multiwire branch circuits.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-38 Log #2225 NEC-P02 **Final Action: Reject**
(210.4(B) Exception (New))

Submitter: Allen Forbes, L & A Electric, Inc.
Recommendation: Add new text to read as follows:
Exception: A single branch circuit supplying a building or structure with lighting outlets.
Substantiation: With an overcurrent trip, all lighting outlets are off. This change will allow lighting outlets to remain on when there is an overcurrent trip.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation addresses a design issue that is outside the scope of the NEC. The present text provides for minimum requirements for the safe installation and use of equipment supplied by multiwire branch circuits. The NEC is not an instruction manual for untrained persons and therefore cannot circumvent minimum safe installation requirements to account for unsafe work practices performed by improperly trained personnel.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-39 Log #1275 NEC-P02 **Final Action: Reject**
(210.4(C))

Submitter: Stephen Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
210.4 Multiwire Branch Circuits.
~~**(C) Line to Neutral Loads.** Multiwire branch circuits shall supply only line-to-neutral loads.~~
~~*Exception No. 1: A multiwire branch circuit that supplies only one utilization equipment.*~~
~~*Exception No. 2: Where all ungrounded conductors of the multiwire branch circuit are opened simultaneously by the branch-circuit overcurrent device.*~~
FRN: See 300.13(B) for continuity of grounded conductor on multiwire circuits.
Substantiation: Since exception #2 to 210.4(C) shall be always met by application of 210.4(B), the requirements of 210.4(C) can never be strictly enforced.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is incorrect. The provision to limit multiwire branch circuits to line-to-neutral loads only is important and independent of 210.4(B). The first exception permits a single utilization equipment to be supplied that may be other than only line to neutral connected (e.g., a 120/240V range). The second exception permits multiple pieces of utilization equipment that may be line to line connected to be supplied, but only where the overcurrent device is common trip.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-40 Log #256 NEC-P02 **Final Action: Reject**
(210.4(C) Exception No. 2)

Submitter: Pete Baldauf, City of Vandalia
Recommendation: Delete Exception No. 2 to 210.4(C) in its entirety.
Substantiation: Exception No. 2 to 210.4(C) is redundant in light of the fact that 210.4(B) already requires all ungrounded conductors of a multi-wire branch circuit to be simultaneously disconnected at the point where the branch circuit originates.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-39.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-41 Log #3850 NEC-P02 **Final Action: Reject**
(210.4(C) Exception No. 2)

Submitter: Bill McGovern, City of Plano
Recommendation: Delete text as follows:
~~Exception No. 2: Where all ungrounded conductors of the multiwire branch circuit are opened simultaneously by the branch circuit overcurrent device.~~
Substantiation: Exception No. 2 is no longer needed as all multiwire branch circuits now require simultaneous disconnection.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-39.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-42 Log #224 NEC-P02 **Final Action: Accept in Part**
(210.4(D))

TCC Action: The Technical Correlating Committee understands that the panel action on this proposal modifies the panel action on Proposal 2-43.
Submitter: Pete Baldauf, City of Vandalia
Recommendation: Revise as follows:
The ungrounded and grounded conductors of each multi-wire branch circuit shall be grouped by ~~wire ties or similar means~~ <u>approved means</u> in ~~at least one location~~ <u>each location that terminations, connections or splices are made.</u>
Substantiation: Grouping only at the point of origin does not take junction boxes, wireways, etc. into consideration. These other locations also present the same possibility to have an energized grounded conductor as contemplated by the original submitter for 210.4(D).
Panel Meeting Action: Accept in Part
Revise text to read as follows:
"The ungrounded and grounded conductors of each multi-wire branch circuit shall be grouped by wire ties or similar means at each location that terminations, connections, or splices are made."
Panel Statement: The panel accepts the deletion of the phrase "at least one

location" and the addition of the phrase "each location that terminations, connections or splices are made." The panel rejects the deletion of the phrase "wire ties or similar means" and the addition of the phrase "approved means" because no substantiation has been provided to warrant this change. See panel action on proposal 2-43, which further modifies the text as accepted in this proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
PAULEY, J.: The extension of the grouping requirement to each termination and splice point is not justified. The grouping provision was added in the 2008 NEC to allow the installer to readily identify the conductors of the multi-wire branch circuit in the panelboard and be able to select the correct conductors for circuit isolation purposes. Grouping the conductors at a splice or junction point does not serve this same purpose. The reason for the grouping will not be readily evident by an electrician other than the original installer. In addition, it will not be evident to the electrical inspector as to whether the conductors are grouped properly at a splice or junction point.
Comment on Affirmative:
KING, D.: The panel action on this proposal has increased the level of safety for qualified persons required to access boxes and enclosures that contain splices and terminations. Grouping of multiwire branch circuits will assist the qualified person in identifying grounded conductors that may present a shock or electrocution hazard due to all of the ungrounded conductors of the multiwire branch circuit not being safely deenergized.

2-43 Log #2055 NEC-P02 **Final Action: Accept**
(210.4(D))

TCC Action: The Technical Correlating Committee understands that the panel actions on Proposals 2-42 and 2-48 modify the panel action on this proposal.
Submitter: Timothy P. McNeive, Thomas & Betts Corporation
Recommendation: Editorially revise 210.4(D) as follows:
(D) Grouping. The ungrounded and grounded conductors of each multiwire branch circuit shall be grouped by ~~wire~~ cable ties or similar means in at least one location within the panelboard or other point of origin.
Substantiation: "Cable ties" is the term used throughout the NEC. There is no other use of the term "wire ties". The term "steel tie wires" is used in 250.52(A)(2)(3), but that is an obvious reference to the device used to bind reinforcing rods.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-44 Log #2329 NEC-P02 **Final Action: Reject**
(210.4(D))

Submitter: Michael L. Last, Na'alehu, HI
Recommendation: Add new text as follows:
Grouping. The ungrounded and grounded conductors of each multiwire branch circuit shall be grouped by wire ties or similar means and identified as such in at least one location within the panelboard or other point of origination. The means of identification shall be permanent by tagging or similar methods.
Substantiation: The fact that three (or more) conductors are bundled within a panelboard is not indicative that the conductors so bundled constitute a multiwire branch circuit. It is not unusual for numerous circuit conductors to be grouped per discretion of the installing party. The requirement of grouping all conductors of each multiwire branch circuit WITHOUT (further) IDENTIFICATION could lead to the negating of the intent of existing 210.4(D). With identification of a group of conductors marked, "multiwire branch circuit", it would quickly and definitively establish that the conductors so bundled constitute the reason for grouping; and lacking such identification, other bundles of conductors would indicate that the conductors were grouped for some other purpose.
Panel Meeting Action: Reject
Panel Statement: The grouping requirement is sufficient to identify the grounded conductor that is associated with the ungrounded conductor of a multiwire branch circuit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
KING, D.: The Submitter of this Proposal has identified a common installation practice that in many cases compromises this important safety requirement. I disagree with the panel statement that "the grouping requirement is sufficient." The submitter has clearly substantiated that grouping alone is not sufficient and proposes an effective and practical means to ensure that the intent of 210.4(D) is met. The Panel should give this proposal further consideration.

2-45 Log #3666 NEC-P02 **Final Action: Accept in Principle**
(210.4(D))

Submitter: Mark Smythe, Smythe Electric Inc. / Rep. Minnesota State Contract Electrical Inspector
Recommendation: Revise text as follows:
210.4(D) Grouping. The ungrounded and grounded conductors of each multiwire branch circuit shall be grouped by wire ties or similar means in at least one location within the panel board or other point of origination, and in each junction or splice box through out the entire branch circuit where more than one set of multiwire circuits are present.
Substantiation: The safety reasons for grouping the grounded conductors with the ungrounded conductors of multiwire circuits in a panel board should also apply to the entire branch circuit. Extending a circuit from an existing junction box where more than one set of multi wire circuits are present would present the problem of identifying the correct grounded conductor with the proper ungrounded conductor. There would be a potential safety hazard by creating an "open neutral: situation while working on the circuit.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-42, which satisfies the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-46 Log #4151 NEC-P02 **Final Action: Accept in Principle**
(210.4(D))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(D) Grouping. The ungrounded and grounded conductors of each multiwire branch circuit shall be grouped by wire ties or similar means in at least one location within the panelboard or similar distribution equipment and other enclosures where more than one multiwire branch circuit is present. ~~or other point of origination.~~
Substantiation: The grouping of the ungrounded and grounded conductors is just as important in other enclosures as it is in panelboards or switchboards. Damage to equipment may result if the wrong neutral is connected when extensions or alterations are made to the circuits.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-42, which satisfies the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-47 Log #4754 NEC-P02 **Final Action: Accept in Principle**
(210.4(D))

Submitter: Robert K. Smith, City of WInston-Salem / Rep. Winston-Salem County Inspections Division
Recommendation: Add revised text to read as follows:
The ungrounded and grounded conductors of each multiwire branch circuit shall be grouped by wire ties or similar means in at least one location within the panelboard or similar distribution equipment and other enclosures, where more than one multiwire branch circuit is present.
Substantiation: The grouping of the ungrounded and grounded conductors is just as important in distribution equipment, junction boxes and other enclosures, as it is in panelboards.
Damage to equipment could result if the wrong neutral is used when extensions are made from these circuits.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-42, which satisfies the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-48 Log #3250 NEC-P02 **Final Action: Accept in Part**
(210.4(D) and Exception (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with respect to the addition of the word "circuit".
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
The ungrounded and grounded circuit conductors of each multiwire circuit shall be grouped by ~~wire~~ cable ties, tape, or other approved means in at least one location within the panelboard or other point of origination.
Exception: The requirement for grouping shall not apply where the multiwire circuit is supplied from a single circuit breaker or fused switch in an enclosure identified for only one circuit breaker or switch.
Substantiation: Identification should not be necessary where only one circuit is involved. Tape can be a means of identification as permitted in other sections.
Panel Meeting Action: Accept in Part
Revise text as follows:

"The ungrounded and grounded circuit conductors of each multiwire circuit shall be grouped by cable ties, tape, or other approved means in at least one location within the panelboard or other point of origination.

The remainder of the proposed text is rejected.

Panel Statement: The panel accepts the deletion of the word "wire" and the addition of the word "cable" and rejects the remaining proposed text because it does not add any clarity to this section.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-49 Log #552 NEC-P02 **Final Action: Reject**

(210.4(D) Exception)

Submitter: David E. Shapiro, Safety First Electrical Contracting, Consulting, and Safety Education

Recommendation: Add new text to read as follows:

"...circuit, at a location unique to the circuit, that makes...".

Substantiation: Duplex connectors: When a multiwire circuit enters a cabinet through one of these, the identification inherent in having its own cable often is lost. Adding this wording will eliminate arguments about "obvious" in these-common-cases. Photos are available, should they be of any value. (The photos were not provided to NFPA).

Panel Meeting Action: Reject

Panel Statement: The Submitter's proposed text does not add clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-50 Log #2888 NEC-P02 **Final Action: Reject**

(210.4(D) Exception)

Submitter: Joseph Bellantoni, Rivers Electrical

Recommendation: Revise text to read as follows:

The requirement for grouping shall not apply if the circuit enters from a cable ~~or raceway unique to the circuit that makes the grouping obvious~~ terminating in a single connector.

Substantiation: Conductors can be added to raceways after the initial installation of the original circuit conductors. If a multiwire branch circuit installed in a raceway is grouped at the time of installation then the integrity of the circuit is sure to be maintained. In addition, when cables enter a panelboard via a duplex style connector it can be difficult to differentiate the grouping of the conductors, if the cable of a multiwire branch circuit enters through a single connector there is no question about grouping.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-49.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-51 Log #3558 NEC-P02 **Final Action: Reject**

(210.5(C))

Submitter: James T. Dollard, Jr., IBEW Local 98

Recommendation: *Note: The following proposal is a suggested rewrite of 210.5(C). It is editorial in nature and is not written in legislative format for ease of reading and clarity.*

(C) Identification of Ungrounded Conductors.

(1) Method of Identification. An insulated ungrounded conductor, whether used as a single conductor or in multiconductor cables, shall be finished to be clearly distinguishable from grounded and grounding conductors in accordance with (a) and (b).

(a) Multiple Nominal Voltage Systems. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, the ungrounded conductors of each nominal voltage system shall be clearly distinguished from the ungrounded conductors of other nominal voltage systems at all termination, connection, and splice points in accordance with (1) and (2) as applicable:

(1) Each ungrounded conductor size 6 AWG and smaller shall be identified by system using a continuous color along its entire exposed length.

(2) Each ungrounded conductor larger than 6 AWG shall be identified by system using color coding, marking tape, tagging, or other approved means.

(b) Phase or Line Identification. Where an enclosure contains ungrounded conductors supplied by more than one phase or line, each ungrounded conductor shall be clearly distinguished from all other phase or line conductors using separate color coding, marking tape, tagging, or other approved means.

(2) Posting of Identification Means. The method utilized for identification for conductors originating within a branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a manner that is readily available or shall be permanently posted at that branch-circuit panelboard or similar branch-circuit distribution equipment.

Substantiation: The proposed revision to 210.5(C) is submitted in an attempt to provide clarity. As written the present text would require all 120-volt and 277-volt circuits to be identified by phase and system. I believe that the intent of this requirement is twofold.

(1) The first is to document or mark the branch circuit panelboard or other distribution equipment to alert installers and maintainers that more than one nominal voltage system exists.

(2) The second is to use that documented/posted marking method at all termination, connection, and splice points to alert the installer maintainer to identify the nominal voltage.

A typical installation in a commercial setting may involve a 208/120-volt and 480/277-volt systems. The present text in the 2008 NEC can be interpreted to mandate that every 120-volt branch circuit be identified by phase and system requiring for example black, red or blue conductors or marking for all single phase 120-volt circuits. Where a cable assembly such as MC cable is employed, 12/2 will always have circuit conductors in black (ungrounded) and white (grounded.) The black conductor in such a single phase branch circuit is sufficient to identify the system. However a branch circuit with more than one phase or line would be required to be identified by phase and system.

I do not believe that the intent of CMP-2 was to have every 120-volt branch circuit in an MC cable installation re-identified from black to red or blue if "B" or "C" phase are employed. I do believe that where more than one ungrounded conductor exists, the conductors should be identified by phase/line and system.

Panel Meeting Action: Reject

Panel Statement: The proposal introduces new requirements not supported by the substantiation. The new requirements are: the ungrounded conductor shall be finished to be clearly distinguished and ungrounded conductors smaller than 6 AWG shall be identified by a continuous color along its entire exposed length. The panel continues to maintain the position that conductors may be identified by marking tape, tagging or other approved means. See panel action on Proposal 2-52, which addresses restructuring of the present text.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

KING, D.: The Submitter of this proposal incorporates in his proposed text a requirement that is already in many cases a common industry standard. Incorporating this method of identification as a minimum requirement in this section will assist the qualified person in safely identifying the system they are working on. A comment on this proposal with additional substantiation would allow the panel to give this proposal further consideration.

2-52 Log #3749 NEC-P02 **Final Action: Accept**

(210.5(C))

Submitter: Jim Pauley, Square D Company/Schneider Electric

Recommendation: Revise text as follows:

(C) Identification of Ungrounded Conductors.

(1) Application. Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit shall be identified by phase or line and system at all termination, connection, and splice points.

(2) Means of Identification. The means of identification shall be permitted to be by separate color coding, marking tape, tagging, or other approved means.

(3) Posting of Identification Means. The method utilized for conductors originating within each branch-circuit panelboard or similar branch-circuit distribution equipment shall be documented in a manner that is readily available or shall be permanently posted at each branch-circuit panelboard or similar branch-circuit distribution equipment.

Substantiation: This proposal is to revise 210.5(C) to split up the paragraph and create some subsections with titles. This should improve the readability of the section. There are no changes to the technical requirements established by the current language.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-53 Log #3807 NEC-P02 **Final Action: Reject**

(210.5(C))

Submitter: Gary Sixel, Sixel & Schwinn, Inc.

Recommendation: Delete text as follows:

(C) Ungrounded Conductors. Where the premises wiring system has branch circuits supplied from more than one nominal, voltage system, each ungrounded conductor of a branch circuit shall be identified by ~~phase or line and~~ system at all termination, connection, and splice points.

Substantiation: Identifications of conductors by phase or line on branch circuits present many problems.

Upon rough in wiring, loads may be unknown, requiring circuits to be transferred to a different phase or line to balance the system. When rewiring, loads change, and it may also be necessary to transfer loads to a different phase to balance the system. Transferring a load to another phase would require remarking or changing the wire color throughout the conduit run, which could be very labor intense, very costly and impractical to do on long-branch circuits supplying many outlets or fixtures.

Three phase motor rotation would need to be changed at the motor terminals in order to keep the colors continuous throughout the system. In some cases power may not be available when motors are initially wired. When power becomes available changing rotations at the motor leads can be a major undertaking, especially with multiple larger horse power motors.

With arc flash becoming an issue, the motor junction box should have the cover installed before applying power, especially in hazardous locations. Changing rotation at the starter or disconnect switch is a more reasonable solution.

With submersible water pump motors, the motor leads are factory installed. If the rotation is incorrect there is no way to change the wire color coming out of this motor.

Where three-phase motors are controlled through a reversing starter, the reversing starter changes the phases so when this motor runs in one direction the conductors will be correctly identified. When the motor is reversed and the phases are switched by the starter it is impossible to have the phase marking follow through.

In the perfect electrical marking world, marking conductors sounds o.k. In rework or maintenance projects, the entire circuit would have to be traced to check or adjust conductor markings. Many times the junction boxes or excess points are unknown. This would mean as time goes on the conductor markings will not be accurate. Incorrect markings are more of a hazard than no markings.

Panel Meeting Action: Reject

Panel Statement: Identifying phase conductors helps installers identify what phase or line they are working on. Identification of phases and lines will help prevent the overloading of the grounded conductor.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-54 Log #4371 NEC-P02 **Final Action: Reject**

(210.5(C))

Submitter: Dale Voss, Specht Electric

Recommendation: 210.5 (C) UNDERGROUNDED CONDUCTOS *(Return to 2005 NEC wording)*

Where the premises wiring system has branch circuits supplied from more than one nominal voltage system, each ungrounded conductor of a branch circuit, <u>WHERE ACCESSIBLE</u>, shall be identified by ~~phase or line and system at all termination, connection, and splice points~~ <u>SYSTEM</u>. The means of identification shall be permitted to be by separate color coding, marking tape, tagging or other approved means. ~~The method utilized for conductors originating within each branch-circuit panel board or similar branch-circuit distribution equipment shall be documented in a manner that is readily available or~~ <u>AND</u> shall be permanently posted at each branch-circuit panel board or similar branch-circuit distribution equipment.

Substantiation: Color coding would be in conflict when a forward and reversing starter switches around two of the phase conductors to change motor rotation.

When establishing three-phase motor rotation, varying from fractional to thousand horsepower motors, one possible application would be to use a phase rotation meter which would be connected to the motor leads. By manually turning the motor shaft, which would establish the electrical rotation of the motor lead and by establishing the rotation of the supply leads to the motor would then give a correct rotation to that particular application.

The problem is that the motor mechanical connection might not be that easily disconnected to be able to use the motor phase rotation meter on the motor leads. At this time, it is possible that the actual motor rotation will not be known or the machine is unable to be run from lubrication, cooling requirements, etc.

It may be hard to get the wiring to the motor; and as construction is completed, may make it even harder to verify or modify connection rotation.

As the motors get bigger, the lead connections are harder to make up and the temporary separation of leads at higher voltage become more difficult. To apply power to verify rotation presents an Arc Flash condition from a safety standpoint and a barrier distance requirement to safely conduct the test to verify the rotation of the motor.

Why can't the last load terminations, either in a starter disconnect combination, an MCC or the disconnect located by the motor be the starting point where the leads are taken to the motor where no color marking is needed. Rotation can easily and safely be changed by switching two of the motor leads. Also depending on the phase colors, one of those colors could be used on all three leads to establish the motor voltage.

Panel Meeting Action: Reject

Panel Statement: The panel continues to affirm that the phase and line identification is an essential safety consideration. The panel considers identification at all termination, connection, and splice points to be the locations where the marking is necessary. It is not the objective of the panel to detail every possible identification scenario. The substantiation does not support the proposal to revise this requirement for all installations. See panel statement on Proposal 2-53.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-55 Log #4505 NEC-P02 **Final Action: Reject**

(210.5(C))

Submitter: Steven F. Wydeveld, Village of Homer Glen / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

210.5(C) The method utilized for conductors originating within each branch-circuit panelboard or similar branch circuit distribution equipment shall be documented in writing in a<u>n</u> ~~manner that is readily available~~ approved manner or shall be permanently posted at each branch-circuit panelboard or similar branch circuit distribution equipment.

Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.

The term "manner that is readily available" is unclear and subjective, which is unnecessary because it is to be in an approved manner by the AHJ. An AHJ requires that all documentation be in writing and the addition of 'approved manner' allows the AHJ the flexibility on where and how the identification shall occur.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with the addition of the wording "in writing" and change to "in an approved manner". Documentation is typically in writing. The documentation does not have to be posted on the panel board just available similar to documentation for a cable numbering system. Submitter's proposal removes the "readily available" requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

KING, D.: This proposal should have been accepted in part. I agree with the panel that the requirement for the documentation to be "readily available" should not be deleted. But disagree with the rest of the statement. Requiring the documentation to be in writing adds clarity and is easier to enforce by the authority having jurisdiction. The addition of the word "approved" would ensure that the method is acceptable to the Authority Having Jurisdiction.

2-56 Log #4301 NEC-P02 **Final Action: Reject**

(210.6(2))

Submitter: Robert Kopelman, Rockville Centre, NY

Recommendation: Add new text as follows:

210.6 Branch-Circuit Voltage Limitations.

All outlets shall have thermal protection including GFI combination thermal outlets.

(2) Cord-and-plug-connected loads 1440 volt-amperes, nominal, or less than 1/4 hp

The term similar occupancies in 210.6(A) refers to sleeping rooms in dormitories, fraternities, sororities, nursing homes, and other such facilities. This requirement is intended to reduce the exposure of residents in dwellings and similar occupancies to electric shock hazards when using or servicing permanently installed luminaires and cord-and-plug-connected portable lamps and appliances.

Substantiation: There is a major problem called a glowing connection. As UL 1699 Scope states — AFCIs "1.3 These devices are not intended to detect glowing connections". Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. I have provided documents showing that an AFCI starts to detect Arcs at 5 amps. Also provided are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But, take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time due to the differential of expansion and contraction of the metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connection.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: Product is currently listed as a receptacle with no evaluation of its ability to enhance the safety of wiring devices. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-57 Log #4302 NEC-P02 **Final Action: Reject**

(210.6(A))

Submitter: Robert Kopelman, Rockville Centre, NY

Recommendation: Add new text as follows:

(A) Occupancy Limitation. In dwelling units and guest rooms or guest suites of hotels, motels, and similar occupancies, the voltage shall not exceed 120 volts, nominal, between conductors that supply the terminals of the following <u>(The outlets in these areas shall be thermally protected).</u>

The term similar occupancies in 210.6(A) refers to sleeping rooms in dormitories, fraternities, sororities, nursing homes, and other such facilities. This requirement is intended to reduce the exposure of residents in dwellings and similar occupancies to electric shock hazards when using or servicing permanently installed luminaires and cord-and-plug-connected portable lamps and appliances.

Substantiation: There is a major problem called a glowing connection. As UL 1699 Scope states — AFCs "1.3 These devices are not intended to detect glowing connections". Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. I have provided documents showing that an AFCI starts to detect Arcs at 5 amps. Also provided are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But, take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time due to the differential of expansion and contraction of metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connections.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-56.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-58 Log #2299 NEC-P02 **Final Action: Accept in Principle**
(210.6(C)(1))

Submitter: John Marshall, Underwriters Laboratories Inc.

Recommendation: Article 210.6(C)(1) – Revised to read

"Listed electric-discharge <u>or light emitting diode type</u> luminaires."

Substantiation: LED luminaires will also be powered from 277 V circuits.

Panel Meeting Action: Accept in Principle

Revise Section 210.6(C)(1) text as follows:

"Listed electric-discharge or listed light emitting diode type luminaires."

Panel Statement: The panel has clarified that "light emitting diode type luminaries" shall be listed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

ORLOWSKI, S.: It may be preferable to list these two different types of light methods in separate lines as are the other different types of methods listed in the section.

2-59 Log #2978 NEC-P02 **Final Action: Accept**
(210.7)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

~~210.7 Branch-Circuit Requirements for Device Connections and Locations.~~
<u>210.7 Multiple Branch Circuits</u>
~~(A) Receptacle Outlet Location. Receptacle outlets shall be located in branch circuits in accordance with Part III of Article 210.~~
~~(B) Multiple Branch Circuits.~~
Where two or more branch circuits supply devices or equipment on the same yoke, a means to simultaneously disconnect the ungrounded conductors supplying those devices shall be provided at the point at which the branch circuits originate.

Substantiation: 210.7(A) serves no purpose, as compliance with Part III of the article is not an option. The title of this section does not lend to the requirement of existing subsection (B), making the requirement difficult to find for newer Code users. This proposal makes the Code a more user friendly document.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-60 Log #3673 NEC-P02 **Final Action: Reject**
(210.7(B))

Submitter: Mark Smythe, Smythe Electric Inc.

Recommendation: Delete 210.7(B) in its entirety.

Substantiation: 210.7(B) is redundant as new 2008 210.4(B) does already encompass the intent of 210.7(B).

210.4(B) Disconnecting Means. "Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates."

Panel Meeting Action: Reject

Panel Statement: Multiple branch-circuits are different than multiwire branch circuits in that they do not need a line to neutral connection. Removing this section from the code would greatly increase the hazard of electric shock or electrocution to qualified persons servicing these systems.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-61 Log #4580 NEC-P02 **Final Action: Reject**
(210.7(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Delete the words "at the point at which" and replace them with "within or immediately adjacent to the panelboard or other location where."

Substantiation: This proposal clarifies that a double pole snap switch operated in accordance with 404.8(C) and located immediately adjacent to a panelboard could serve as the disconnecting means for two branch circuits supplying equipment on a common device yoke. Without such permission, fusible panelboards cannot be used to supply such equipment, which is excessive. It is also the only option where two circuits leave a panel from two different locations therein or are of two different amperages, as frequently occurs where 210.52(B)(1) Exception No. 1 is used in a dining room. Assuming the switch is installed in accordance with the marking requirement in 110.22(A), it will meet the safety objectives of this section of the NEC. This rule must be distinguished in intended application from the simultaneous disconnecting requirement in 210.4(C) Exception No. 2, where the intent is to disallow any possibility of single-pole disconnection for electrical as distinguished from maintenance reasons. The section at issue in this proposal addresses the safety of those who would maintain multi-circuited equipment, and who will be visiting the panelboard to disconnect power. A simultaneous trip is not required, only the evident availability of safe disconnection.

Panel Meeting Action: Reject

Panel Statement: The submitter's proposed text is vague and unenforceable. The present text is clear and provides the AHJ with prescriptive requirements in which to determine what is a practical and safe installation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-62 Log #4865 NEC-P02 **Final Action: Reject**
(210.7(B))

Submitter: John Steinke, Amish Electric

Recommendation: Add: Where, in a single phase system, a device has both a two-pole and a single-pole outlet on the same yoke, a three-pole disconnect will be used.

A companion proposal has been submitted to 408.36(C).

Substantiation: There exist combination devices that, for example, have a 240v receptacle and a 120v receptacle mounted on the same yoke. One ought to have these both become disconnected at the same time, as with a multi-wire branch circuit.

Yet, 408.36(C) would seem to prohibit this practice. I do not believe that was the intent of 408,36 as that section addresses an obsolete device that was used to 'create' limited three phase power from a single phase source.

210.4(C) appears to address this issue, and even to allow one 'leg' of the two-pole circuit to also supply the single-pole device, but I believe the NEC needs to be more specific.

Panel Meeting Action: Reject

Panel Statement: The present text already addresses the submitter's concerns. Simultaneous disconnection is currently required for multiple branch circuits supplying a single contact device.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-63 Log #471 NEC-P02 **Final Action: Reject**
(210.8)

Submitter: Lanny G. McMahill, Phoenix, AZ

Recommendation: Revise the Section as follows:

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

FPN: See 215.9 for ground-fault circuit-interrupter protection for personnel on feeders.

(A) ~~Dwelling Units~~ <u>All Occupancies</u>. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (8) shall have ground-fault circuit-interrupter protection for personnel.

(1) Bathrooms.

(2) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use.

(3) Outdoors.

Exception <u>No. 1</u> to (3): Receptacles that are readily accessible and are supplied by a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed in accordance with 426.28.

<u>*Exception No. 2 to (3): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with GFCI protection.*</u>

(4) Crawl spaces — at or below grade level.

(5) Unfinished basements — for purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms and limited to storage areas, work areas, and the like.

Exception to (5): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

FPN: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Receptacles installed under the exception to 210.8(A)(5) shall not be considered as meeting the requirements of 210.52(G).

(6) Kitchens — where the receptacles are installed to serve the countertop surfaces.

(7) ~~Laundry, utility, and wet bar~~ <u>Sinks</u> — where the receptacles are installed

within 1.8 m (6 ft) of the outside edge of the sink.

Exception No. 1 to (7): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection.

Exception No. 2 to (7): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.

(8) Boathouses.

~~**(B) Other Than Dwelling Units.** All 125 volt, single-phase, 15 and 20 ampere receptacles installed in the locations specified in (1) through (5) shall have ground fault circuit interrupter protection for personnel:~~

~~(1) Bathrooms~~

~~(2) Kitchens~~

~~(3) Rooftops~~

~~(4) Outdoors~~

~~*Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied from a dedicated branch circuit for electric snow melting or deicing equipment shall be permitted to be installed without GFCI protection.*~~

~~*Exception No. 2 to (4): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with GFCI protection.*~~

~~(5) Sinks - where receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.~~

~~*Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection.*~~

~~*Exception No. 2 to (5): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.*~~

(~~C~~B) Boat Hoists. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

Substantiation: This is an effort to consolidate and clarify the requirements for GFCI protection for Dwelling Units (A) and Other than Dwelling Units (B). There is no intent to change the primary requirements.

Logically, the shock hazards are the same for the given areas, so the personnel protection requirements should be the same too. This proposed change is intended to make the requirements easier to understand and enforce — there is no intent to change the requirements. To clarify:

The title of subsection (A) has been changed to “All Occupancies”. The words “Laundry, utility, and wet bar” have been removed from the requirements for Sinks — the requirement should apply to all sinks. If necessary, a note could be included after Sinks to indicate that sinks include “Laundry, utility, and wet bar” sinks. The Exceptions for Roofs and Outdoors have been maintained; however, the word Roofs has been removed from the main rule as a roof is generally an outdoor location. This is intended to eliminate confusion as to the difference between a roof and an outdoor location. Regardless, the word Roofs could be included in the requirement if necessary. The Exceptions for sinks have also been maintained, and the Exception to Outdoors for snow melting and deicing equipment has been maintained with the reference to Section.

Again, there is no intent to change the primary requirements of the subsections; only an effort to consolidate and clarify the requirements.

Panel Meeting Action: Reject

Panel Statement: The proposal has changed the requirements for dwelling units and non-dwelling units without any substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-64 Log #485 NEC-P02 **Final Action: Reject**
(210.8)

Submitter: Chris B. Boettcher, Primary Electric, Inc.

Recommendation: Add new text as follows:

Add an exception to state GFCI not required on sump pump cord and plug connected as long as a single yoke receptacle or locking type receptacle is used.

Substantiation: Will prevent false tripping of GFCI which could cause the sump pump not to run.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 2-73.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-65 Log #3598 NEC-P02 **Final Action: Reject**
(210.8)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add new text to read as follows:

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel. Where ground-fault circuit interrupter protection for personnel is supplied by plug-and-cord-connection, it shall be listed as portable GFCI protection or provide a level of protection equivalent to a portable GFCI, whether assembled in the field or at the factory.

FPN: See 215.9 for ground-fault circuit-interrupter protection for personnel on feeders.

[remainder of 210.8 unchanged by this Proposal]

Substantiation: “Portable GFCIs” are required by the trinational *Standard for Ground-Fault Circuit-Interrupters, NMX-J-520-ANCE-2006* 1, *CSA C22.2 No. 144.1-06* 2, *ANSI/UL943-2005* 3, Clause 6.7.2.1, and construction-site portable power-distribution equipment is similarly required by standard *Portable Power-Distribution Equipment, UL1640* 3, Clauses 53.3 - 53.5 and 63.3 - 63.4, additionally to de-energize the “load” output contacts and terminals when one or more of the following defects occurs:

the grounded conductor to the power supply is opened

the grounded conductor is transposed with an ungrounded conductor to the power supply

one of the ungrounded conductors to the power supply on a polyphase system or on a single-phase, 3-wire system is opened

When Underwriters Laboratories (in UL product category KCXS) and CSA International (in CSA product class 1451-81) list such products, both certifiers specifically identify these as “portable GFCIs” to differentiate them from other GFCIs. Listed portable GFCIs can be embodied not only as GFCI plugs and in-line GFCI cord sets but even some GFCIs for permanent wiring such as SOME faceless GFCI receptacles can be additionally Listed and identified as portable GFCIs.

[1] Asociación de Normalización y Certificación (Association of Standardization and Certification),

[2] Canadian Standards Association

[3] Underwriters Laboratories Inc.

When conventional GFCIs intended for permanent, inspected hard-wiring are used in what should be portable GFCI applications, where the any of the indicated defect conditions occur, the ground-fault-detection circuitry is NOT powered and the GFCI protection cannot operate but power is nonetheless delivered UNinterrrupted EVEN IN THE PRESENCE OF A GROUND-FAULT. Any GFCI protection the user assumes is present is in fact UNAVAILABLE.

Amongst those NOT directly involved in GFCI manufacture who are nonetheless involved with this *Code*, there is a significant misperception that GFCI protection of personnel will provide a panacea against ALL causes of lethal electric shock. Due to their misunderstanding of the differences between GFCIs for permanent installation and portable GFCIs, a significant number of cord reel manufacturers unwittingly extrapolated their Listings for portable (cord-and-plug-connected) cord reels [having ordinary receptacles as outlet components] and their Listings for HARD-WIRED cord reels acceptably having GFCI receptacles as outlet components, without the overt knowledge of at least two major certifiers, to incorrectly encompass portable (cord-and-plug-connected) cord reels having GFCI receptacles (no open neutral protection) as outlet components where portable GFCI protection (with open neutral protection) was warranted.

It is also common to find cord-and-plug-connected field assemblies employing GFCI receptacles (no open neutral protection) as outlet components rather than portable GFCI protection (with open neutral protection) of the outlets. Some times, these are field repairs misperceived as safety upgrades where conventional receptacles in plug-and-cord-connected equipment are replaced with conventional GFCI receptacles. Furthermore, field repairs of plug-and-cord-connected equipment are occasionally encountered where portable GFCIs (faceless-receptacle-type) have been field-replaced with more-readily available, conventional GFCI receptacles under the mistaken belief that they are equivalent. In either situation, where the indicated defects occur, the user has a false sense of security because power is still delivered.

Companion proposals have been made to 100 “Ground-Fault Circuit Interrupter (GFCI), *Portable (as applied to ground-fault circuit interrupters)*” [NEW], to 215.9, to 518.3(B)†, and to 590.6.

† NOTE: That 518.3(B) proposal regarding portable GFCI protection is separate from another proposal I submitted for 518.3(B) involving GFCI protection required elsewhere in the *Code*.

Panel Meeting Action: Reject

Panel Statement: 210.8 currently requires receptacles that are installed at the outlet to have GFCI protection. This requirement cannot be met with a portable GFCI device.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

ORLOWSKI, S.: In addition to the Panel Statement, the proposed provision seems to apply more to temporary wiring such as that used on a job site covered under Article 590 - Temporary Installations. Federal OSHA regulations already cover this use of these types of devices.

2-66 Log #4330a NEC-P02 **Final Action: Reject**
(210.8)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 18 for action in Article 406.
This action will be considered by the panel as a public comment.
Submitter: Steven Orlowski, National Association of Home Builders
Recommendation: Revise Text:
406.11 Tamper-Resistant Receptacles in Dwelling Units.
In all areas specified in ~~210.52~~ 210.8, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.
Add New Section:
210.8 Tamper Resistant Receptacles Protection for Children.
(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles shall be tamper-resistant where the receptacle is located within 44 inches of the finished floor in the habitable rooms of the dwelling unit. Tamper resistant receptacles shall no be required in the following locations specified in (1) through (7).
(1) Bathrooms
(2) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(3) Outdoors
(4) Crawl spaces — at or below grade level
(5) Unfinished basements — for purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms and limited to storage areas, work areas, and the like
(6) Kitchens where the receptacles are installed to serve the countertop surfaces or appliances
(7) Laundry, utility, and wet bar sinks
(Renumber subsequent sections)
A companion proposal has been sent to CMP-18 for action on the 406.11 portion of this proposal.
Substantiation: Currently the code requirement for tamper-resistant receptacles is too broad in scope and requires tamper-resistant receptacles in areas of the home that should not pose a threat to, or are inaccessible to, young children. This proposal lists several locations within the dwelling where there is no need to provide safeguarding for unattended children. Receptacles that are not readily accessible or that are dedicated for equipment should not be required to be tamper resistant. Examples of these areas that tamper-resistant receptacles should not be required are those found in attics, crawlspaces, mechanical rooms, behind equipment such as dishwasher, stoves, refrigerators, countertops, etc. To require tamper-resistant receptacles in these and other areas, not accessible to children under the age 5, shows a lack of forethought for this code requirement. Regarding last cycle, there were some members of the committee who felt it was best to require all the receptacles within the dwelling to be protected so the installer would not mistakenly miss a location. This belief is unfounded and may reflect a misunderstanding on the abilities of the electrician. For years now, along with all of the other NEC requirements one needs understand, installers have the knowledge to know which circuits are required to be connected to AFCI and which receptacles require GFCI protection. With proper training and clearly identifying the required locations for tamper resistant receptacles within the NEC, the installer will not be confused.
Panel Meeting Action: Reject
Panel Statement: Many of the locations described in the submitter's substantiation are accessible to children.
The panel recommends to the TCC that this proposal be sent to CMP-18 for consideration for action in Article 406.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-67 Log #4327 NEC-P02 **Final Action: Reject**
(210.8(5)() Exception)

Submitter: Steven Orlowski, National Association of Home Builders
Recommendation: Add new text to Exception 210.8(5)
Exception to (5): A receptacle supplying only a permanently installed sump pump, fire pump, fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.
Substantiation: Based on the importance of these life safety and property protection systems, which are required by the building and life-safety codes, the proposed additional protection systems should be included in this Exception to insure these are provide with an uninterrupted power supply in an emergency situation. The life safety protection afforded by sump pumps and fire pumps provide the same level of property and life safety protection as do fire alarms and burglar alarm system. By not including these devices, the loss of power to any of these devices could pose a substantial loss to the building occupants or property owner.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 2-73. The panel rejects the addition of fire pumps. Installation requirements for fire pumps is covered in Article 695.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-68 Log #310 NEC-P02 **Final Action: Reject**
(210.8(A))

Submitter: Joel A. Rencsok, Scottsdale, AZ
Recommendation: Delete item 2. titled Garages.
Delete item 8. titled Boathouses.
Substantiation: These two items do not belong in dwelling units.
See definition of dwelling unit; Garages and Boathouses are not included in this definition.
Definition: A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking and sanitation.
Panel Meeting Action: Reject
Panel Statement: The panel disagrees with the submitter that the present definition of a dwelling unit does not cover dwelling unit garages and boathouses. The phrase "facilities for living" includes storage, garage, outdoor spaces, and boathouses that are accessories of the dwelling unit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-69 Log #670 NEC-P02 **Final Action: Reject**
(210.8(A))

Submitter: Les Amburgey, Ambark Electrical Service
Recommendation: I would like to see a GFI receptacle with an alarm built in. The alarm can monitor current before providing the GFI protection. So if no current is detected over a period of 3 hours, an alarm sounds, alerting the homeowner. The 3 hour period should allow for the auto defrost, however, it would be nice if the time limit was programmable.
Substantiation: The problem with GFI receptacles on a residential refrigerator is not that the GFI won't work, but that the GFI will kick out at some point due to various reasons and the home owners will lose food. This occurs in the extra freezer or refrigerator in the garage or basement more than in the kitchen.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(C) of the NFPA Regulations Governing Committee Projects. The wording to be added, revised, and how revised, or deleted is not specified in the recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-70 Log #689 NEC-P02 **Final Action: Reject**
(210.8(A))

Submitter: Keith M. Whitesel, Whitesel Electric
Recommendation: Reinstate the exceptions for dedicated space equipment to the GFCI requirement for 210.8(A) from the 2005 NEC.
Substantiation: While I agree that sump pump motors and refrigerators or freezers do not cause nuisance tripping, the nuisance tripping still occurs. This can cause a great deal of damage to the property.
I live in a flood zone and if my sump pump were to be connected to a GFCI (which it was) and the GFCI were to nuisance trip (which it did) my basement would flood every time it rained more than 1 in.
GFCIs in my area trip many times during lightning storms. My freezer would have thawed numerous times had it been connected to a GFCI. This would have caused hundreds of dollars in lost food.
The purpose of the code as stated in 90.1 is the protection of people AND property.
By removing the exceptions for GFCI protection on ALL receptacles in basements/garages, you clearly have the potential to cause damage to the property when nuisance tripping occurs.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(C) of the NFPA Regulations Governing Committee Projects. The wording to be added, revised, and how revised, or deleted is not specified in the recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-71 Log #2422 NEC-P02 **Final Action: Reject**
(210.8(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified

that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If Power Safe Protector is accepted in 210.8 only, a definition will be needed. There is a proposal for Article 100 also.
Panel Meeting Action: Reject
Panel Statement: The panel action on Proposal 2-72 precludes the need for a definition in this article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-72 Log #2423 NEC-P02 **Final Action: Reject**
(210.8(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
210.8 ~~Ground-Fault Circuit-Interrupter~~ Power Safe Protector Protection for Personnel.
(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (8) shall have ~~ground fault circuit-interrupter~~ power safe protector protection for personnel.
Substantiation: The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a “Power Off” safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There are no product requirements for PSP protection. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC.
The requirements for delivery of power and thermal sensing are associated with the receptacle itself and should be reviewed by CMP-18.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-73 Log #3750 NEC-P02 **Final Action: Reject**
(210.8(A))

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: After item (8) in 210.8(A) add the following Exception:
Exception to (3), (4) and (5): It shall be permitted to omit GFCI protection for a receptacle installed to provide power to a cord and plug connected sump pump or sewage lift pump where the receptacle is a single receptacle and supplied from an individual branch circuit.
Substantiation: The deletion of the exceptions in 210.8(A) for the 2008 NEC cycle has met with some opposition from local authorities because of the application of GFCI to sump pumps or sewage lift pumps. For the record, it is recognized that these pumps are indeed compatible with GFCI protection in that their leakage current is limited by the product standards to.75 mA. However, even with this compatibility there is still significant reservation with GFCI application in both of these applications.
This proposal is to provide some relief, but with very specific limitations.
1) It is specific to sump pumps and sewage lift pumps. I would certainly agree that the panel should not add back in a general exception for appliances. These two applications are very specific.
2) The exception requires that a single receptacle be installed which would limit the connection of other devices.
3) The exception would require an individual branch circuit be installed. If the power continuity considerations are so significant that there is concern for having GFCI protection, then it would make sense that one of the trade offs be that the circuit only supply that application. This would support the stated concern for continuity of power by limited what other connected loads could potentially result in power failure.
Although I do not have significant concern in having GFCI protection in these applications, the objective is to try and satisfy some of the concerns expressed by AHJs.
The best placement of the exception is somewhat difficult to determine based on the layout of 210.8(A). Since the exception is intended to apply to three of the items in the list, it seemed to make the most sense to located it at the end and indicate which of the items in the list it applies to. Alternatively, the panel could add the exception to each of the three items in the list, but that seemed to be too redundant.
Panel Meeting Action: Reject
Panel Statement: The panel continues to maintain the position that this equipment is compatible with GFCI. Instructions provided with many listed sump pumps require or recommend GFCI protection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-74 Log #2426 NEC-P02 **Final Action: Reject**
(210.8(A), (B), (C), and (D))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
210.8 ~~Ground-Fault Circuit-Interrupter~~ Power Safe Protector Protection for Personnel.
(A) DEFINITION: A Power Safe Protector (PSP) device is designed to keep the power off until a circuit check can assure that any connected appliance or equipment are free of ground faults, or short circuits, and that the connected appliance or equipment has actually been switched on. Only then will the PSP device be energized. It will continue to protect from ground faults, series arc-faults and overheating of the supply wire connections while energized by turning the PSP device off when there is a problem. The PSP device will then sound an audible sound and flash a red indicator light to call attention to the problem. The PSP device will automatically reset when problem is cleared. The PSP device will illuminate a steady green indicator light when energizing any appliance or other equipment.
(B) ~~(A)~~ Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (8) shall have ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel.
(C) ~~(B)~~ Other Than Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (5) shall have ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel:
(1) Bathrooms
(2) Kitchens
(3) Rooftops
(4) Outdoors
Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied from a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed without ~~GFCI~~ PSP protection.
Exception No. 2 to (4): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with ~~GFCI~~ PSP protection.
(5) Sinks - where receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.
Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without ~~GFCI~~ PSP protection.
Exception No. 2 to (5): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), ~~GFCI~~ PSP protection shall not be required.
(D) ~~(C)~~ Boat Hoists. ~~GFCI~~ PSP protector protection shall be provided for outlets not exceeding ~~240~~ 125 volts that supply boat hoists installed in dwelling unit locations. 240 volt hoist shall have GFCI protection.
Substantiation: The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a “Power Off” safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-72.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-75 Log #311 NEC-P02 **Final Action: Reject**
(210.8(A) Exception to (5))

Submitter: Forrest R. Currier, Currier Electric
Recommendation: Revise text to read as follows:
~~A~~ Receptacles supplying ~~only a~~ permanently installed fire alarm, or burglar alarm systems, or that is dedicated solely for the condensate pump of a heating system shall not be required to have ground-fault circuit-interrupter protection.
Substantiation: Forced hot air heating units are being used in concert with air conditioning requiring a condensate pump to expel moisture from the system, also some forced hot water heating units are now being installed that come from the manufacturer with a prewired receptacle for the condensate pump as well. Requiring this outlet to be ground-fault circuit-interrupter protected could on a false trip prevent the pump to work and cause damage to the heating unit as well as personal properties.
I would also add that 210.63 mandates a receptacle within 7.5 m (25 ft) and on the same level as the heating unit for servicing of the equipment which must not be connected to the load side of the equipment disconnecting means, whereas the receptacle for the condensate pump in the manufactured units are connected to the load side.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any substantiation to indicate that listed condensate pumps for heating and air conditioning systems are not compatible with listed GFCI devices.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-76 Log #4712 NEC-P02 **Final Action: Reject**
(210.8(A) Exception No. 1 to (5))

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Designate existing Exception #2 as Exception (1) to (5) Single receptacles not readily accessible for sump pumps and sewer ejector pumps.
Substantiation: Many complaints have been received when GFCI tripped out creating additional hazards.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 2-73.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-77 Log #1735 NEC-P02 **Final Action: Accept in Principle in Part**
(210.8(A)(2))

Submitter: Jared Boone, Wichita Electrical JATC
Recommendation: Revise text to read as follows:
210.8(A)(2) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use. The test/reset function in these locations shall be in a readily accessible location.
Exception to (2): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.
Substantiation: This proposal is the work of a task group formed by the 2nd Year Apprenticeship Class 2B of 2008. Jared Boone, Darrious Davis, Kyle Davis, Christopher Dennis, Bryan Harvey, Clayton Horsch, David Poland, Corey Smet, Robert Thurman, Caleb Wiechman, and Darryl Hill. This task group has concluded the following Substantiation:
In the case that there may be receptacles in garages and similar areas that may not be readily accessible and because it is recommended that GFCIs be tested monthly, we feel that these devices may never be tested and reset because of their location. We realize homeowners probably do not have a regular program for testing their GFCIs, but they may check them occasionally. GFCIs not in a readily accessible location, will most likely never be tested because of the extra effort to access their location. We feel that the location of the test/reset function should be in a location that is readily accessible to the occupant of the dwelling unit.
The second part of this proposal is extracted from the exception for unfinished basements. The proposed exception addresses the possibility of fire alarm and home security systems being installed where this code elsewhere requires GFCI protection. We feel that the builder or homeowner should have the option of using a device that is not GFCI protected. If the power supply requirements per other sections in the code exempt these systems from being GFCI protected and these systems were to be installed in accessory buildings or a detached garage, then we should have this exception for this requirement also.
Panel Meeting Action: Accept in Principle in Part
Add a new second sentence to the main paragraph of 210.8(A) and 210.8(B) to state, "The ground-fault circuit-interrupter shall be installed in a readily accessible location."
Reject the remainder of the proposal.
Panel Statement: The panel agrees that the GFCI should be readily accessible location.
The panel did not add the proposed exception since the installation of fire and/or burglar alarm control panels in garages is uncommon.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-78 Log #2766 NEC-P02 **Final Action: Reject**
(210.8(A)(2))

Submitter: Vern Hertz, North Dakota State Electrical Board
Recommendation: Add new text to read as follows:
Exception to (2): GFCI protection shall not be required if a single receptacle is installed for garage door openers.
Substantiation: There are garages without a means of egress and if outlet tripped there would be no way to get into the building. Also, many school kids and families use key codes as a way to enter the home if the key is lost or do not have a key with them. By a single receptacle, it would eliminate people plugging in additional items such as, cord reels, ceiling lights, etc.
Panel Meeting Action: Reject
Panel Statement: The submitter of this proposal has not submitted any substantiation to support his statement that listed GFCI devices are not compatible with listed garage door openers. Electric garage door openers are required to have an emergency release cord for manual operation of the door during a power outage.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-79 Log #3497 NEC-P02 **Final Action: Reject**
(210.8(A)(2))

Submitter: Steven Stier, Stier Electric Co., Inc.
Recommendation: Add text to read as follows:
Exception to (2): Garage door opener receptacles which are located at least 8 ft above ground.
Substantiation: Prevent homeowners from being unable to raise garage door in rainy/wet weather.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree with exempting receptacles at elevated locations from GFCI protection. These receptacles may supply equipment that is located in a readily accessible location of a garage that should require GFCI protection. There is insufficient substantiation provided to indicate that GFCIs are incompatible with garage door openers. See panel statement on Proposal 2-78.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-80 Log #3588 NEC-P02 **Final Action: Reject**
(210.8(A)(2))

Submitter: Peter Hoekstra, Technical Consultant for the Association of Home Appliance Manufacturers
Recommendation: Add new text to read as follows:
Exception to (2): A single receptacle or a duplex receptacle for two appliances located within the dedicated space for each appliance that, in normal use, is not easily moved from one place to another and is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).
Receptacles installed under the exception to 210.8(A)(2) shall not be considered as meeting the requirements of 210.52(G).
Substantiation: This exception was deleted in the 2008 NEC. Deviations from the 2008 NEC have been issued by individual states adopting the NEC.
The 2008 NEC requires refrigerators and freezers in garages to be located on GFCI circuits. While the extension of GFCI protection is applauded and supported by the industry of appliance manufacturers, manufacturers continue to observe problems with these appliances plugged into GFCI circuits. The issues are:
1. While there have been improvements to GFCI's to reduce unwarranted tripping, it still does occur. UL 843 Ground Fault Circuit Interrupters Section 6.8.4 b) allows the GFCI to trip 3 in 10 times when operated in adverse conditions and in 6.8.5 a) allows the GFCI to trip 3 in 100 times in normal use.
2. Garages may be unattended areas for long periods of time. This increases the possibility that users will not notice refrigerator or freezer appliances are off for a long period of time and the possibility that foodstuffs will be spoiled through no fault of the appliance. Manufacturers continue to experience service calls and consumer complaints for "nuisance" failures of GFCI's. The hazards of spoiled foodstuffs, potential food-borne diseases, and mold growth have much greater probability than the risk of electric shock.
3. There have been no electric shock incidents reported to CPSC for the last 10 years for refrigerators or freezers. All of these appliances are grounded.
4. While appliance manufacturers continue to lower leakage currents on new appliance products for increased safety, the shift in field population to new products takes more than 25 years.
5. No technical substantiation was provided for removal of this exception from the 2005 NEC.
6. Many manufacturers continue to stipulate in their owner's use and operation manuals that the appliance is not to be connected to a GFCI-

protected outlet.

7. GFCI protected circuits for refrigerators and freezers which are not easily moved may not be visible for inspection. The tripping of a GFCI may not be easily identified and may mislead the appliance user into initiating an unnecessary service call or cause the risk of injury from unnecessarily moving the appliance to reset a GFCI. This exception was deleted in the 2008 NEC. Deviations from the 2008 NEC have been issued by individual states adopting the NEC.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided sufficient substantiation to support his recommendation to remove the requirement for GFCI protection from all appliances. The panel maintains its position that equipment is compatible with GFCI.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-80a Log #CP200 NEC-P02 **Final Action: Reject**

(210.8(A)(2) and 210.8(A)(4))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" based on the lack of a proposal to Code-Making Panel 1 to define "Finished Ground Level."

Submitter: Code-Making Panel 2,

Recommendation: Revise text to read as follows

(2) Garages, and also accessory buildings that have a floor located at or below the finished ground level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(4) Crawl spaces — at or below the finished ground level.

Substantiation: The panel has developed a proposal to replace "grade" with a new defined term "finished ground level". The panel recognizes that if the definition of "finished ground level" is not accepted by CMP-1 then this proposal should be reported as Reject by the TCC.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-81 Log #796 NEC-P02 **Final Action: Reject**

(210.8(A)(2) and (5))

Submitter: David C. Hintermeister, Community Electric Inc.

Recommendation: Add new text to read as follows:

A single receptacle installed so as to be inaccessible, for the use of a refrigerated food storage appliance.

Substantiation: Freezers and refrigerators in basements and garages are no more dangerous than those in kitchens which are not required to be GFCI protected.

Panel Meeting Action: Reject

Panel Statement: The panel continues to maintain the position that this equipment is compatible with GFCI. The panel disagrees that refrigerators in "basements and garages are no more dangerous than those in kitchens. " The hazards associated with the use of electricity in damp and wet locations is well documented by CMP-2.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-82 Log #3450 NEC-P02 **Final Action: Reject**

(210.8(A)(2), Exception to (2))

Submitter: Larry Logan, Township of Princeton

Recommendation: Add text to read as follows:

Exception to (2): Single receptacles that are not readily accessible and supply power for garage door openers only.

Substantiation: It is a very common practice for women and older people to use the garage as a safe way to enter the house, thus, not subjecting themselves to burglars or rapists. It is also a very common practice for contractors to provide GFI protection to several outlets both inside the garage and outdoors by the use of one (1) device. If this device is tripped by a landscaper or worker who does not have access to the house, then this level of safety and security has been taken away. I also believe that no demonstrated hazard has been reported for a ground fault from a garage door opener.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-79.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-83 Log #797 NEC-P02 **Final Action: Reject**

(210.8(A)(2) Exception (New))

Submitter: David C. Hintermeister, Community Electric Inc.

Recommendation: Add Exception to read as follows:

Exception: A receptacle installed in an inaccessible location for an overhead door opener.

Substantiation: A residential door opener is typically a cord and plug appliance installed on the ceiling of a garage, and is normally inaccessible to anyone. Having it on a GFCI does nothing to promote public safety, and nuisance tripping can cause a security risk, as the garage door is typically the main family entrance to the home.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-79.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-84 Log #1399 NEC-P02 **Final Action: Reject**

(210.8(A)(2) Exception)

Submitter: Jayson Ouillette, Rep. IBEW Local 252

Recommendation: Add new text as follows:

Exception to (2): A receptacle supplying only a permanently installed fire alarm or burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.

Substantiation: Many homes have fire alarm or burglar alarm systems installed in garages. THESE systems need to be exempt from GFCI protection to function reliably. The exception already exists for basements and needs to be extended to other areas where these systems are likely to be installed.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-77.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-85 Log #4704 NEC-P02 **Final Action: Reject**

(210.8(A)(2) Exception (New))

Submitter: Nicholas Neumann, Bridges Electric

Recommendation: Add new exception to (2)as follows:

Exception: Garage door openers shall not be GFCI protected if a single receptacle is installed.

Substantiation: If the GFCI receptacle trips when you are not home, you can still open the garage door and drive in.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-78.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-86 Log #4714 NEC-P02 **Final Action: Reject**

(210.8(A)(2) Exception (New))

Submitter: Robert P. McGann, City of Cambridge

Recommendation: Add new text as follows:

(2) Exception Single receptacles not readily accessable for garage doors, sump pumps or sewer ejector pumps.

Substantiation: Many complaints have been received when GFCI has tripped out on the above mentioned creating additional hazards.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 2-73. The panel rejects an exception for receptacles supplying garage door openers because the submitter has not provided adequate substantiation as to the greater hazard that could exist on these circuits.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-87 Log #1587 NEC-P02 **Final Action: Reject**

(210.8(A)(2) Exception to (2))

Submitter: Wilbur Davis, Davis Machine & Electric Service

Recommendation: Add new text to read as follows:

Exception to (2) A dedicated 15 or 20 ampere branch circuit that is for the sole purpose of supplying power to a refrigerator, freezer, or any type unit that is designed for the sole purpose of preserving food in a residential garage shall not be required to have GFCI protection, but the branch circuit supplying power to the above equipment shall have a 15 or 20 ampere twist lock receptacle installed.

Substantiation: Reason for this code exception: Many people go on vacation, or they may not frequent their freezer often, and have no idea the power is off in the garage. In the summer time, especially when there are many thunder storms, lightning can strike great distances from a residence and cause a GFCI to trip. A surge from the power company can also cause a GFCI to trip. A faulty piece of equipment on the same branch circuit can cause a trip.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel continues to maintain the position that this equipment is compatible with GFCI.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-88 Log #2168 NEC-P02 **Final Action: Accept**
(210.8(A)(3))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
Exception to (3): Receptacles that are not readily accessible and are supplied by a ~~dedicated~~ branch circuit dedicated to ~~for~~ electric snow-melting, ~~or~~ deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28, or 427.22, as applicable.
Substantiation: Dedicated branch circuit is not defined, and is often confused with the term “individual branch circuit”. With the confusion, it can be easily argued that the circuit for the snow melting or deicing equipment must supply only one outlet [Article 100], which is not the requirement.
Pipeline and vessel heating systems also contain provisions for GFPE protection, which should also be permitted in lieu of GFCI protection.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-89 Log #2293 NEC-P02 **Final Action: Reject**
(210.8(A)(3))

Submitter: Thomas D’Agostino, BSafe Electric, Inc.
Recommendation: It is proposed that 210.8(A) Dwelling Units) ((3) Outdoors) of Article 210 (Branch Circuits), which provides an exception for certain equipment from being required to be protected by either a ground-fault circuit-interrupter or an arc-fault circuit-interrupter, be revised to require additional protection as follows.
Chapter 1 General - Article 100 Definitions
Add an additional definition as follows:
Receptacle with an Integral Thermal Circuit-Interrupter
A receptacle with an integral thermal circuit-interrupter is a contact device, installed at the outlet for the connection of an attachment plug, that senses a temperature rise within the receptacle to a specified level and that interrupts electricity flow to the receptacle if the specified temperature is exceeded.
Chapter 2 Wiring and Protection - Article 210 Branch Circuits
210.8(A) Dwelling Units) ((3) Outdoors)
Change the Exception to (A)(3) to read as follows [New words underlined]
Exception to (3): Receptacles that are not readily accessible and are supplied by a branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed in accordance with 426.28. Each 15- or 20- ampere receptacle that is not a ground-fault circuit-interrupter installed in a 125 volt, single phase branch circuit shall be protected by either:
1. a listed arc-fault circuit interrupter breaker, or alternately
2. being a listed integral arc-fault circuit interrupter receptacle, or alternately
3. being a listed receptacle with an integral thermal circuit-interrupter
Substantiation: The proposed revision is intended to offer the public benefits that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. This would be accomplished by recognizing an advance in the art of safeguarding property or life that was previously unavailable to the public.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Product is currently listed as a receptacle with no evaluation of its ability to enhance the safety of wiring devices. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC. The panel rejects the definition because the Panel action on this proposal precludes the need for a definition.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-90 Log #2979 NEC-P02 **Final Action: Accept**
(210.8(A)(3))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
Exception to (3): Receptacles that are not readily accessible and are supplied by a ~~dedicated~~ branch circuit dedicated to ~~for~~ electric snow-melting, ~~or~~ deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28, or 427.22, as applicable.
Substantiation: Dedicated branch circuit is not defined, and is often confused with the term “individual branch circuit”. With the confusion, it can be easily argued that the circuit for the snow melting or deicing equipment must supply only one outlet [Article 100], which is not the requirement.
Pipeline and vessel heating systems also contain provisions for GFPE protection, which should also be permitted in lieu of GFCI protection.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-91 Log #720 NEC-P02 **Final Action: Reject**
(210.8(A)(3) Exception to No. (3))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text and add a new Fine Print Note to the *Exception* to read as follows:
210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.
(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (8) shall have ground-fault circuit-interrupter protection for personnel.
(3) Outdoors
Exception to (3): Receptacles that are not readily accessible and are supplied by a ~~dedicated~~ branch circuit identified in accordance with 408.4 as being solely for electric snow-melting or deicing equipment shall be permitted to be installed ~~in accordance with 426.28~~ without GFCI protection for personnel.
FPN: For receptacles supplying decorative lighting used for holiday lighting and similar purposes, see 590.6(A).
[remainder of 210.8 unchanged by this Proposal]
Substantiation: 426.28 that addresses ground-fault protection of EQUIPMENT would apply regardless of this Exception and has no bearing on GFCI protection of PERSONNEL encompassed by 210.8. This revision to 210.8(A)(3) *Exception to (3)* is identical to the revision to 210.8(B)(3) *Exception No. 1 to (3) and (4)* in the 2008 *NEC®*.
Clarification and the FPN are added to distinguish dedicated branch circuits used solely for electric snow-melting or deicing equipment from branch circuits used alternately for electric snow-melting or deicing equipment and then for decorative lighting and similar accessories for holiday lighting and similar purposes. Decorative lighting and holiday lighting accessories can extend downward to become accessible even though the receptacle from which they are supplied may not be accessible. Other than the usage of “dedicated branch circuit” in 210.8(A)(3) *Exception to (3)* and 210.8(B)(3) *Exception No. 1 to (3) and (4)*, the remainder of the *NEC®* addresses only dedicated SPACES requiring electricity, NOT electrical circuits. Other uses of “dedicated” in the *NEC®* as applied to specific equipment are for the NONelectrical attributes (structural, mechanical, ventilating, hydraulic, etc.).
Regarding the added FPN, roof-mounted snow-melting and deicing equipment (and the receptacles that supply it) is not accessible. Temporary installations of decorative lighting for holiday lighting typically hang substantially below the roofline and are frequently readily accessible.
Panel Meeting Action: Reject
Panel Statement: The requirements of 404.8 are already required and do not need to be referenced. The reference to 426.28 is necessary to clarify the exception. The panel rejects the addition of the FPN. It is the intent of this exception to allow for the connection of rooftop electric snow melting and deicing equipment only.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-92 Log #2294 NEC-P02 **Final Action: Reject**
(210.8(A)(5))

Submitter: Thomas D’Agostino, BSafe Electric, Inc.
Recommendation: It is proposed that 210.8(A) Dwelling Units) ((5) Unfinished Basements) of Article 210 (Branch Circuits), which provides an exception for certain equipment from being required to be protected by either a ground-fault circuit-interrupter or an arc-fault circuit-interrupter, be revised to require additional protection as follows.
Chapter 1 General - Article 100 Definitions
Add an additional definition as follows:
Receptacle with an Integral Thermal Circuit-Interrupter
A receptacle with an integral thermal circuit-interrupter is a contact device, installed at the outlet for the connection of an attachment plug, that senses a temperature rise within the receptacle to a specified level and that interrupts electricity flow to the receptacle if the specified temperature is exceeded.
Chapter 2 Wiring and Protection - Article 210 Branch Circuits
210.8(A) Dwelling Units) ((5) Unfinished basements))
Change the Exception to (A)(5) to read as follows:
Exception No. 1 to (5): A receptacle supplying only a permanently installed fire alarm ~~or burglar alarm~~ system shall not be required to have ground-fault circuit-interrupter protection. Each 15- or 20-ampere receptacle that is not a ground-fault circuit-interrupter installed in a 125 volt, single phase branch circuit shall be a receptacle with an integral thermal circuit-interrupter.
FPN: See 760.41(B) and 760.121(B)(2) for power supply requirements for fire alarm systems.
Add a new Exception to (A)(5) to read as follows:
Exception No. 2 to (5): A receptacle supplying only a permanently installed burglar alarm system shall not be required to have ground-fault circuit-interrupter protection. Each 15- or 20-ampere receptacle that is not a ground-fault circuit-interrupter installed in a 125 volt, single phase branch circuit, shall be protected by either:
1. a listed arc-fault circuit interrupter breaker, or alternately

2. being a listed integral arc-fault circuit interrupter receptacle, or alternately
3. being a listed receptacle with an integral thermal circuit-interrupter

Substantiation: The proposed revision is intended to offer the public benefits that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. This would be accomplished by recognizing an advance in the art of safeguarding property or life that was previously unavailable to the public.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-89.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-93 Log #3524 NEC-P02 **Final Action: Reject**
(210.8(A)(5))

Submitter: David Zinck, Newburyport Wiring Inspector

Recommendation: Renumber the existing exception 1 to (5) and add:

Exception 2 to (5) : Receptacles installed in accordance with 422.12 Exception 1.

Substantiation: The deletion of the exceptions to GFCI protection of receptacles in unfinished basements should never have been applied to the condensate outlet at the furnace or boiler. Nobody is going to GFCI protect the entire branch circuit for the heating system. At least nobody in the snow belt. A frozen pipe that bursts can reach $100K in damage. I have seen several.
The only solution is to provide GFCI protection for just the single receptacle at the heating system. You can not install a duplex receptacle at this location because it is a violation of 422.12. So the only solution is to use a faceless GFCI device and feed downstream to the single receptacle. This is more labor and stock intensive than most electricians want to get. One solution some are using is to cut the male plug off of the end and hardwire it into the junctions box with the disconnect switch. This not only violates the UL listing of the device but it makes the guy who has to replace that pump get into the wiring. He may not have any training and may not be qualified to do this. Besides, it should be able to be replaced by just plugging it in.

This problem is becoming rampant, it is worthy of an interim amendment.

Panel Meeting Action: Reject

Panel Statement: The submitter of this proposal has not provided technical substantiation to support his statement that listed GFCI devices are not compatible with listed condensate pump equipment. Section 422.12 Exception No.1 is permissive and does not require the heater circuit to be used with associated equipment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-94 Log #3589 NEC-P02 **Final Action: Reject**
(210.8(A)(5))

Submitter: Peter Hoekstra, Technical Consultant for the Association of Home Appliance Manufacturers

Recommendation: Revise text to read as follows:

Exception No. 1 *to (5): A receptacle supplying only a permanently installed fire alarm of burglar alarm system shall not be required to have ground-fault circuit-interrupter protection.*

Exception No. 2 to (5): A single receptacle or a duplex receptacle for two appliances located within the dedicated space for each appliance that, in normal use, is not easily moved from one place to another and is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).

Substantiation: This exception was deleted in the 2008 NEC. Deviations from this section of the 2008 NEC have been issued by individual states adopting the NEC.

The 2008 NEC requires refrigerators, freezers, and sump pumps in unfinished basements to be located on GFCI circuits. While the extension of GFCI protection is applauded and supported by the industry of appliance manufacturers, manufacturers continue to observe problems with these appliances plugged into GFCI circuits. The issues are:

1. While there have been improvements to GFCI's to reduce unwarranted tripping, it still does occur. UL 843 Ground Fault Circuit Interrupters Section 6.8.4 b) allows the GFCI to trip 3 in 10 times when operated in adverse conditions and in 6.8.5 a) allows the GFCI to trip 3 in 100 times in normal use.
2. Unfinished basements may be unattended areas for long periods of time. This increases the possibility that users will not notice refrigerator, freezer or sump pump appliances are off for a long period of time and the possibility that foodstuffs will be spoiled or basement areas flooded through no fault of the appliance. Manufacturers continue to experience service calls and consumer complaints for "nuisance" failures of GFCI's. The hazards of spoiled foodstuffs, potential food-borne diseases, mold growth and flood damage have much greater probability than the risk of electric shock.
3. There have been no electric shock incidents reported to CPSC for the last 10 years for refrigerators or freezers. All of these appliances are grounded.
4. While appliance manufacturers are always working to lower leakage currents on new appliance products for increased safety, the shift in field population to new products takes more than 25 years.
5. No technical substantiation was provided for removal of this exception from the 2005 NEC.
6. Many manufacturers continue to stipulate in their owner's use and operation manuals that the appliance is not to be connected to a GFCI-protected outlet.
7. GFCI protected circuits for refrigerators and freezers which are not easily moved may not be visible for inspection. The tripping of a GFCI may not be easily identified and may mislead the appliance user into initiating an unnecessary service call or cause the risk of injury from unnecessarily moving the appliance to reset a GFCI.

Panel Meeting Action: Reject

Panel Statement: The statement that no electric shock incidents associated with refrigeration equipment have occurred in the last 10 years is inaccurate. The panel has previously considered an electrocution incident associated with a refrigerator. The GFCI tripping tests referred to in the substantiation are not necessarily indicative of the likelihood of a GFCI tripping when used with refrigeration equipment. The substantiation makes general references to GFCI tripping and manufacturers' recommendations regarding GFCIs but does not provide sufficient detail to conclude that GFCIs are not compatible with refrigeration equipment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-95 Log #2400 NEC-P02 **Final Action: Reject**
(210.8(A)(5), Exception No. 2 to (5))

Submitter: Roger Zieg, Zieg Electric

Recommendation: Revise text to read as follows:

Exception No. 2 to (5): A single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance that, in normal use, is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).

Substantiation: This proposal calls for the restoration of the exception found in the 2005 NEC. There are many dwelling units, including apartment buildings, with basements which depend on sump pumps to keep the basements from flooding during thunderstorms. Having a GFCI only requirement for this location will cause many homes to not be protected from flooding due to the GFCI tripping during thunderstorms. Code Making Panel 19 added a similar exception to Article 547 in the 2008 NEC for dedicated equipment. Several jurisdictions have accepted the NEC 2008, but in doing so have exempted this section and returned to the exception in the 2005 NEC. The State of Iowa is one example.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-80.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-96 Log #795 NEC-P02 **Final Action: Reject**
(210.8(A)(5) Exception (New))

Submitter: David C. Hintermeister, Community Electric Inc.

Recommendation: Add Exception to read as follows:

Exception: A receptacle supplying a sump pump.

Substantiation: In areas where ground water is a problem, it is imperative that a sump pump remains running to protect property from water damage. Especially when the homeowner is away from home.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 2-73.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-97 Log #2466 NEC-P02 **Final Action: Reject**
(210.8(A)(5) Exception to (5))

Submitter: Jeffrey Waterman, Liberty Pumps, Inc. / Rep. Sump and Sewerage Pump Manufacturing Association

Recommendation: Revise text to read as follows:

Exception to (5): A receptacle supplying only a permanently installed ~~fire alarm or burglar alarm system~~ fire alarm system, burglar alarm system, or high-water flooding alarm system shall not be required to have ground-fault circuit-interrupter protection.

Substantiation: There is an undeniable potential for health and safety hazards which can result from basement flooding due to a multitude of issues including water pipe failure, groundwater intrusion, backup of storm or drain sewers, or sump or sewage pump failures. Flooded basements create a potential for shock hazards from non-GFCI protected circuits serving such items as furnace blowers and well pumps. Water backed up from sewers or sewage tanks has inherent health risks from the pathogens it potentially may carry. The resulting molds and bacterial growth from water damage can cause health problems long after the flooding itself has been addressed. It would seem reasonable that high water flooding alarms warrant the same consideration for reliability given to fire and burglar alarm systems, and, therefore, would be better served if not on a circuit protected by a ground-fault circuit-interrupter.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided substantiation to support his recommendation to exclude high water flooding alarm systems from the requirements of GFCI protection. CMP-2 maintains it's position that listed

equipment is compatible with listed GFCI devices.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
WOOD, T.: This proposal should be accepted.
I believe these 3 items should not be required to be GFCI protected, as they can be vital to the safety of life and property.

2-98 Log #4768 NEC-P02 **Final Action: Reject**
(210.8(A)(5) Exception No. 2 to (5) (New))

Submitter: Phillip Cullen, Cullen HVAC
Recommendation: Add text to read as follows:
Exception No. 2 to (5): A single receptacle that is an integral part of a listed utilization equipment, such as a heating furnace, for use of a condensate pump and not intended for personnel use.
Substantiation: Many times it is interpreted that a single receptacle that is an integral part of a listed heating furnace needs to be GFCI protected because the furnace is, generally, located in an unfinished basement. This is not practicable as (1) modifying the receptacle voids the manufacturers warrantee (and maybe the listing), (2) placing the entire circuit (including the furnace) on a GFCI branch-circuit breaker will void the installers warrantee (and maybe the manufacturers) and (3) a GFCI protected receptacle is required within 25 ft of HACR equipment for use by service personnel by 210.63.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-93.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-99 Log #2410 NEC-P02 **Final Action: Reject**
(210.8(A)(6))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Add: (6) Attics which are not intended for habitable rooms, but contain an appliance that requires service.
Substantiation: In unfinished attics that contain an appliance, such as an a/c unit, that requires service, the service technician will need to run an extension cord from the flloor that allows access to the attic and through the access panel which is in violation of 408.8(3).
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated the requirement to add GFCI to receptacles in attics. The panel notes that 210.63 would require a receptacle to be installed within 25 feet and on the same level.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-100 Log #2774 NEC-P02 **Final Action: Reject**
(210.8(A)(6) Exception No. 1 (New))

Submitter: Kerry G. Ginther, Conifer, CO
Recommendation: Add new text as follows:
Exception 1: Where countertop in the kitchen is between 38 in. and 32 in. from floor the countertop shall be considered a kitchen office space and GFCI protection of recepticles is not required.
Substantiation: This exception would allow the use of TVSS receptacles for sensitive computers or other sensitive office electronic components.
Panel Meeting Action: Reject
Panel Statement: The height in which a kitchen countertop is installed is a design consideration and does not define the countertop space as not being suitable for the connection of appliances.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-101 Log #55 NEC-P02 **Final Action: Accept in Principle**
(210.8(A)(7))

Note: This Proposal appeared as Comment 2-35 on Proposal 2-40 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 2-40 was:
Eliminate exception number 2 to (2) and eliminate exception number 2 to (5).
Submitter: Joseph A. Hertel, Rep. Safety and Buildings
Recommendation: Revise text to read:
(7) Laundry, utility, bedroom and wet bar sinks, where the receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.
Substantiation: Bedroom sinks are quite common in current construction where a vanity with sink is installed in addition to a bathroom for a master bedroom. It can be argued that the sink is in the bathroom area or can be used as a wet bar but the addition of the word bedroom would eliminate the question.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-103.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-102 Log #537 NEC-P02 **Final Action: Accept in Principle**
(210.8(A)(7))

Submitter: Dennis J. Cox, Elkhart County Building Dept. / Rep. IAEI
Recommendation: Add new text as follows:
Laundry, utility and ~~(wet bar sinks)~~ (all sinks) where the receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink (in any direction).
Substantiation: There seem to be some confusion with some electrical contractors on this matter. The definition of a wet bar sink is a bar or countertop with a sink and running water used for mixing alcoholic beverages. A kitchen sink meets this definition. By making this change, this would clear this up. 210.8(A)(6) requires countertop outlets to be GFCI in a kitchen but not 6 ft. away.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-103, which satisfies the submitters intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-103 Log #1610 NEC-P02 **Final Action: Accept in Principle**
(210.8(A)(7))

Submitter: David Shields, Keystone Electrical Inspectors, Inc.
Recommendation: Revise text to read as follows:
~~Laundry, utility and wet bar~~ Sinks - where the receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.
Substantiation: 1. This would make text consistent with text for “other than dwelling units” (Section 210.(B)(5)).
2. There is no reason to limit the use of GFCI protection within 1.8 m (6 ft) of any sink in a dwelling unit.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Sinks - for other than kitchens as covered in 210.8(A)(6), where receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink
Panel Statement: The panel has met the submitters intent. The panel has accepted the submitter’s concept and ensured that sinks in kitchens remain covered under 210.8(A)(6).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
PAULEY, J.: NEMA agrees with the panel action to include all sinks. However, the words added by the panel may create some confusion about how the kitchen sink should be treated. The wording as selected by the panel covers sinks other than kitchens as covered in 210.8(A)(6). However, since 210.8(A)(6) is specific to receptacles serving the countertop, some readers may interpret that this new wording covers receptacles within 6’ of the kitchen sink that do not serve the countertop (i.e. receptacles for the disposal and dishwasher). This was not the intent of the panel. Revising the words to eliminate the reference to 210.8(A)(6) may make the text clearer. Revise the words to read: “Sinks - located in areas other than kitchens, where receptacles are installed within 1.8m (6 ft) of the outside edge of the sink.”

2-104 Log #1707 NEC-P02 **Final Action: Accept in Principle**
(210.8(A)(7))

Submitter: David Barnhart, City of Portland
Recommendation: Revise text to read as follows:
~~Laundry, utility, and wet bar sinks~~ All sinks where the receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.
Substantiation: This change will cover all types of sinks in the dwelling including mop sinks.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-103.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-105 Log #299 NEC-P02 **Final Action: Accept in Principle**
(210.8(B))

Submitter: Christine Porter, Intertek
Recommendation: Add new text to read as follows:
(x) Wet Locations
Substantiation: Indoor locations such as car washes, food processing areas of facilities that manufacture food products, and other indoor wet locations have the same risks to users of portable appliances as outdoor locations. Expanding the requirement from outdoor locations to indoor wet locations has been a local requirement in the Washington State Amendments for the 2005 cycle without issues and should be a requirement in all areas that adopt the NEC.
Panel Meeting Action: Accept in Principle
Add new text to read as follows:

(6) Indoor wet locations.
Panel Statement: The panel added the term indoor because outdoor receptacles are already covered under 210.8(B)(4).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-106 Log #300 NEC-P02 **Final Action: Reject**
(210.8(B))

Submitter: Joseph V. Morrell, Jr., Wyeth Pharmaceuticals
Recommendation: Add new text as follows:
Proposal for "other than dwelling units" to require GFCI protection around eye washes and safety showers. Currently, there are no requirements for GFCI protection around these normally "dry" locations that may become wet locations in the event of an emergency. Use of GFCI protection in these areas will reduce electrocution and shock hazards to the user of this safety equipment in the event of an emergency. I recommend having all 15 amp and 20 amp 120 volt outlets within 6 ft of safety showers and eye washes (with drains) to be GFCI protected. I recommend having all 15 amp and 20 amp 120 volt outlets within 25 ft of safety showers and eye washes (without drains) to be GFCI protected. All other outlets within the 6 ft boundary should be protected by the weatherproof cover.
Substantiation: Use of safety showers and eye wash stations can create electrocution and shock hazards for the user with splashing water or water pooling on the floor. Safety showers and eye washes are often installed in normally dry locations with little regard to the surrounding electrical installations. Flow rate and water temperature are installation concerns while electrical concerns are often only considered when an eye wash or safety shower is installed outdoors and needs heat tracing. When performing risk analysis on plant eye wash and safety showers, it was noted in almost every installation that there were risks of shock and electrocution if the devices were activated for the required 15 to 20 minute period. The installation of GFCI receptacles and weatherproof covers will greatly reduce electrical hazards that may exist in the areas of operation.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(C) of the NFPA Regulations Governing Committee Projects. The wording to be added, revised and how revised, or deleted is not specified in the recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-107 Log #309 NEC-P02 **Final Action: Reject**
(210.8(B))

Submitter: Joel A. Rencsok, Scottsdale, AZ
Recommendation: Add item 2. titled Garages to section (B) of 210.8
Add item 8. titled Boathouses to section (B) of 210.8
Substantiation: These two items do not belong in dwelling units under section (A) and should be placed in section (B).
See definition of dwelling unit; Garages and Boathouses are not included in this definition.
Definition: A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking and sanitation.

Panel Meeting Action: Reject
Panel Statement: The panel disagrees with the submitter that the present definition of a dwelling unit does not cover dwelling unit garages and boathouses. The phrase "facilities for living" includes storage, garage, outdoor spaces, and boathouses that are accessories of the dwelling unit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-108 Log #2544 NEC-P02 **Final Action: Reject**
(210.8(B))

Submitter: Steve McNamara, Hastings, MN
Recommendation: Delete text as follows:
210.8(B) Other Than Dwelling Units. All 125-volt, singlephase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (5) shall have ground-fault circuit-interrupter protection for personnel:
(1) Bathrooms
(2) kitchens
(3) ~~Rooftops~~
~~(4)~~ Outdoors
Substantiation: I put a strike through deleted text.
The text is not needed. Rooftops are covered in outdoors.
Panel Meeting Action: Reject
Panel Statement: The panel recognizes that some rooftop areas may contain enclosures for the protection of equipment. The existing text clarifies that all receptacles installed at rooftops are to be GFCI protected, even those that may be considered to not be outdoors.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-109 Log #3223 NEC-P02 **Final Action: Accept in Principle**
(210.8(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as Proposal 2-77 addresses a different section with different text.
This action will be considered by the panel as a public comment.
Submitter: Jack E. Jamison, Jr., MEGCO Inspections, Inc. / Rep. WV Division Ohio Chapter
Recommendation: Revise text as follows:
210.8(B) Other than Dwelling Units all 125-volt, single-phase, 15- 20-ampere receptacles installed in the locations specified in (1) through (8) shall have readily accessible ground-fault circuit-interrupter protection for personnel.
The ground-fault circuit-interrupter operating device trip reset buttons shall be in a readily accessible location, either at the panelboard supplying the branch circuit, or the device itself.
Substantiation: Many GFCI receptacles are located behind large appliances, i.e. refrigerator, and are difficult to locate to test or reset.
This will mirror requirements of 680.71 for access to GFCI protection for hydromassage bathtubs.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-77.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-110 Log #4182 NEC-P02 **Final Action: Accept**
(210.8(B))

Submitter: Richard A. Janoski, Finleyville, PA
Recommendation: Add new text as follows:
(6) Locker Rooms - with adjacent showering facilities.
Substantiation: I think that a GFCI requirement is in order for locker rooms with adjacent showering facilities. The conditions that would warrant GFCI protection of receptacle outlets include, persons who are exiting the shower area walking in their bare feet, carrying wet clothes, and towels. They are entering a locker room which is constructed of tile flooring, which may be wet from other users of the showering facility, it would have a floor drain that serves to drain the wet floor. These persons could then be putting to use electrical appliances such as electric shavers, and electric hair driers. As per Section 210.8 (A)(1), Bathrooms are required to have GFCI protection for receptacles, and under the Article 100 definition of Bathrooms, the showering facilities would be covered, but the adjacent locker rooms would not be included, and a hazard exists.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-111 Log #2425 NEC-P02 **Final Action: Reject**
(210.8(B) and Exceptions)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
210.8 ~~Ground-Fault Circuit-Interrupter~~ Power Safe Protector Protection for Personnel.
(B) Other Than Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (5) shall have ~~ground fault circuit interrupter~~ power safe protector protection for personnel:
(1) Bathrooms
(2) Kitchens
(3) Rooftops
(4) Outdoors
Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied from a dedicated branch circuit for electric snow-melting or deicing equipment shall be permitted to be installed without ~~GFCI~~ PSP protection.
Exception No. 2 to (4): In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power is interrupted or having a design that is not compatible with ~~GFCI~~ PSP protection.
(5) Sinks - where receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink.
Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without ~~GFCI~~ PSP protection.
Exception No. 2 to (5): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), ~~GFCI~~ PSP protection shall not be required.
Substantiation: The Power Safe Protector (PSP) device overcomes these

limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.

2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-72.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-112 Log #650 NEC-P02 **Final Action: Reject**
(210.8(B), Exception No. 2 to (5))

Submitter: Jerry Steele, Lifepoint Hospitals, Inc
Recommendation: Delete the following text:
~~Exception No. 2 to (5): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.~~
Substantiation: This exception eliminates all GFCI receptacles in patient care areas including receptacles installed for use at the sink locations. With the removal of the exception, it will force design engineers to locate receptacles required for beds, exam tables, monitors and critical equipment, 6 ft from the sink. I have not seen a room where this would be unworkable. An exception could be written for dedicated receptacles for monitors within 6 ft on a sink if necessary. This exception has eliminated GFCI protection for the population that is in a weakened condition and more susceptible to electric shock.
Panel Meeting Action: Reject
Panel Statement: The exception is necessary to correlate with the jurisdiction that CMP-15 has in Article 517 for health care facilities.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-113 Log #2169 NEC-P02 **Final Action: Accept**
(210.8(B) Exception No. 1 to (3) and (4))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
Exception to (3) and (4): Receptacles that are not readily accessible and are supplied by a ~~dedicated~~ branch circuit dedicated to ~~for~~ electric snow-melting, ~~or~~ deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28, or 427.22, as applicable.
Substantiation: Dedicated branch circuit is not defined, and is often confused with the term "individual branch circuit". With the confusion, it can be easily argued that the circuit for the snow melting or deicing equipment must supply only one outlet [Article 100], which is not the requirement.
Pipeline and vessel heating systems also contain provisions for GFPE protection, which should also be permitted in lieu of GFCI protection.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-114 Log #2980 NEC-P02 **Final Action: Accept**
(210.8(B) Exception No. 1 to (3) and (4))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
Exception to (3) and (4): Receptacles that are not readily accessible and are supplied by a ~~dedicated~~ branch circuit dedicated to ~~for~~ electric snow-melting, ~~or~~ deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28, or 427.22, as applicable.
Substantiation: Dedicated branch circuit is not defined, and is often confused with the term "individual branch circuit". With the confusion, it can be easily argued that the circuit for the snow melting or deicing equipment must supply only one outlet [Article 100], which is not the requirement.
Pipeline and vessel heating systems also contain provisions for GFPE protection, which should also be permitted in lieu of GFCI protection.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-115 Log #838 NEC-P02 **Final Action: Reject**
(210.8(B) Exception No. 1 to (5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In industrial and commercial laboratories receptacles used to supply equipment or processes where unscheduled ~~removal~~ loss of power ~~would~~ is likely to introduce a ~~greater~~ hazard shall be permitted to be installed without GFCI protection.
Substantiation: The provision should cover commercial locations where a hazard is likely to occur. It may be difficult to determine if a GREATER hazard will occur. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: Industrial facilities have less public access and electrical installations are more likely to be supervised by an engineer. The submitter of this proposal has not provided adequate substantiation to support his recommendation to relax the requirement for GFCI protection in commercial facilities.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-116 Log #2862 NEC-P02 **Final Action: Reject**
(210.8(B)(2))

Submitter: David H. Platt, PA State Certified Electrical Inspector
Recommendation: Add a new Exception as follows:
Exception No. 1 to (2): Receptacles that are not readily accessible and are supplied from a dedicated branch circuit supplying food refrigeration equipment connected to a single outlet at the dedicated location of said food refrigeration equipment.
Substantiation: This would allow for safe operation of kitchen food refrigeration equipment that cause nuisance tripping of ground fault protection resulting in the spoilage and unsafe keeping of refrigerated products, while still requiring ground fault protection of all other readily accessible receptacles for personnel protection.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not provide sufficient information to conclude that GFCIs are incompatible with refrigeration equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-117 Log #3634 NEC-P02 **Final Action: Reject**
(210.8(B)(2) Exception (New))

Submitter: Greg Chontow, Hopatcong, NJ
Recommendation: Add new text to read as follows:
Exception: Receptacles that are not readily accessible and are supplied from a dedicated branch circuit for refrigeration equipment.
Substantiation: Present wording does not exempt GFCIs for refrigeration equipment. This should be exempted to avoid lost product with nuisance tripping.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-116.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-118 Log #3761 NEC-P02 **Final Action: Reject**
(210.8(B)(3))

Submitter: Jebediah J. Novak, Cedar Rapids Electrical JATC / Rep. Int'l Brotherhood of Electrical Workers
Recommendation: Delete text to read as follows:
(B) Other Than Dwelling Units.
~~(3) Rooftops~~
Substantiation: With the recent change making all 125-volt, single-phase, 15- and 20-ampere receptacles installed in outdoor locations required to have GFCI protection, list item three is redundant and should be deleted.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-108.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-119 Log #721 NEC-P02 **Final Action: Reject**
(210.8(B)(3) and (4) Exception No. 1 to (3) and (4))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text and add a new Fine Print Note to the *Exception* to read as follows:
210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

(B) Other Than Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles installed in the locations specified in (1) through (5) shall have ground-fault circuit-interrupter protection for personnel~~:~~.

(3) Rooftops

(4) Outdoors

Exception No. 1 to (3) and (4): Receptacles that are not readily accessible and are supplied by a ~~dedicated~~ branch circuit identified in accordance with 408.4 as being solely for electric snow-melting or deicing equipment shall be permitted to be installed without GFCI protection.

FPN: For receptacles supplying decorative lighting used for holiday lighting and similar purposes, see 590.6(A).

[remainder of 210.8 unchanged by this Proposal]

Substantiation: Clarification and the FPN are added to distinguish dedicated branch circuits used solely for electric snow-melting or deicing equipment from branch circuits used alternately for electric snow-melting or deicing equipment and then for decorative lighting and similar accessories for holiday lighting and similar purposes. Decorative lighting and holiday lighting accessories can extend downward to become accessible even though the receptacle from which they are supplied may not be accessible. Other than the usage of "dedicated branch circuit" in 210.8(A)(3) *Exception to (3)* and 210.8(B)(3) *Exception No. 1 to (3) and (4)*, the remainder of the *NEC®* addresses only dedicated SPACES requiring electricity, NOT dedicated electrical circuits. Other uses of "dedicated" in the *NEC®* as applied to specific equipment are for the NONelectrical attributes (structural, mechanical, ventilating, hydraulic, etc.).

Regarding the added FPN, roof-mounted snow-melting and deicing equipment (and the receptacles that supply it) is not accessible. Temporary installations of decorative lighting for holiday lighting typically hang substantially below the roofline and are frequently readily accessible.

Panel Meeting Action: Reject

Panel Statement: The requirements of 408.4 are already required and do not need to be referenced. The reference to 426.28 is necessary to clarify the exception. The Panel rejects the addition of the FPN. It is the intent of this exception to allow for the connection of rooftop electric snow melting and deicing equipment only.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-120 Log #2295 NEC-P02 **Final Action: Reject**

(210.8(B)(5))

Submitter: Thomas D'Agostino, BSafe Electric, Inc.

Recommendation: It is proposed that 210.8(B) Other Than Dwelling Units) ((5) Sinks) of Article 210 (Branch Circuits), which provides an exception for certain equipment from being required to be protected by either a ground-fault circuit-interrupter or an arc-fault circuit-interrupter, be revised to require additional protection as follows.

Chapter 1 General - Article 100 Definitions

Add an additional definition as follows:

Receptacle with an Integral Thermal Circuit-Interrupter. A receptacle with an integral thermal circuit-interrupter is a contact device, installed at the outlet for the connection of an attachment plug, that senses a temperature rise within the receptacle to a specified level and that interrupts electricity flow to the receptacle if the specified temperature is exceeded.

Chapter 2 Wiring and Protection - Article 210 Branch Circuits

210.8(B) Other Than Dwelling Units) ((5) Sinks)

Change Exception No. 1 to (5) to read as follows:

Exception No. 1 to (5): In industrial laboratories, receptacles used to supply equipment where removal of power would introduce a greater hazard shall be permitted to be installed without GFCI protection. They shall, however, be listed receptacles with an integral thermal circuit-interrupter.

Substantiation: The proposed revision is intended to offer the public benefits that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation. This would be accomplished by recognizing an advance in the art of safeguarding property or life that was previously unavailable to the public.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-89.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-121 Log #2939 NEC-P02 **Final Action: Reject**

(210.8(B)(5))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

(5) Sinks — those ~~where~~ receptacles ~~are~~ installed within 1.8 m (6 ft) of the outside edge of the sink.

Exception No 1 to (5): In industrial, university, and research laboratories, receptacles shall be permitted to be installed without GFCI protection if used to supply equipment that requires continuous ~~where removal of~~ power for procedures being performed or the process involved ~~would introduce a greater hazard shall be permitted to be installed without GFCI protection~~ provided the area is staffed with persons who have documented safety training to recognize and avoid the hazards involved.

~~Exception No 2 to (5): For receptacles located in patient care areas of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.~~

Substantiation: Some of the changes proposed to the requirement in (5) and Exception No. 1 are intended to be editorial and bring the text into compliance with the NEC Style Manual. Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Similar or identical work is done in research and university laboratories as is done in industrial laboratories so the Exception should apply to those laboratories as well. The exception should apply only if the persons working in the area without GFCI protection have been trained on the hazards involved. This concept is included in the definition of "Qualified Person" in Article 100. The training needs to be documented for the protection of the person, the owner and the AHJ. The relocation of the phrase "shall be permitted to be installed without GFCI protection" is intended to improve the sentence structure. The phrase "would introduce a greater hazard" is very subjective and the phrase "requires continuous power for procedures being performed or the process involved" is suggested as being more prescriptive.

Exception No. 2 is proposed for deletion since the organization of the NEC in 90.3 indicates the requirements in Chapters 1 through 4 apply generally and changes or modifications can be made in Chapter 5. The Code Panel responsible for Article 517 should take action they feel appropriate.

Panel Meeting Action: Reject

Panel Statement: The proposed change does not add additional clarity. Documented safety training is not described or defined sufficiently to allow determination of compliance.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-122 Log #4178 NEC-P02 **Final Action: Accept**

(210.8(B)(5) (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 14 for comment.

Submitter: Timothy D. Curry, Curry Electric, Inc.

Recommendation: Add new text as follows:

Garages, service bays, and similar areas.

Substantiation: In commercial and industrial buildings, we frequently see an "area" that is used for a wide variety of tasks, including, to perform routine servicing of the companies vehicles. During these maintenance procedures, it would not be uncommon for liquids to be spilled onto the floor (usually concrete). Art. 511 is typically not invoked, because, during plan review, or even inspection, it would simply appear that this is an area with an overhead door to allow vehicles to drive into, or out of, the building, for whatever purpose. Furthermore, Art. 511 does not apply to a **strictly** diesel facility, since the scope of Art. 511 uses the words "VOLATILE" flammable liquids and diesel fuel is not a "volatile" liquid. Yet, the same hazards exist with diagnostic equipment, electrical hand tools, or portable lighting equipment, the potential for spilled fluids, and multiple paths to ground. With this change, you would eliminate a loop hole that has, to date, exempted quite a few areas from GFCI protection.

Panel Meeting Action: Accept

Panel Statement: The panel recognizes that the new subdivision should be (B)(6). The panel recommends for correlation purposes that the TCC refers to CMP-14 for comment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

PAULEY, J.: It should be noted that this new provision creates a more stringent requirement than that currently contained in 511.12 since this provision would apply to ALL 15 and 20 ampere 125V receptacle outlets regardless of what they supply. Although this may be appropriate, it does create a conflict with garages that are covered by Article 511. The TCC will have to determine an appropriate correlation path with CMP 14 to avoid the conflict.

2-123 Log #3846 NEC-P02 **Final Action: Accept**

(210.8(B)(5) Exception No. 2 to (5))

Submitter: Bill McGovern, City of Plano

Recommendation: Revise text as follows:

For receptacles located in patient ~~core areas~~ bed locations of general care or critical care areas of health care facilities other than those covered under 210.8(B)(1), GFCI protection shall not be required.

Substantiation: Numerous comments were returned from health care professionals at the comment stage of the previous edition (ROC 2-57) expressing concern with hand washing sinks located in hospitals typically being located within 6 ft of the patient bed. Substantiation was given that receptacles serving patient care life support, monitoring, and other portable patient care equipment would now require GFCI protection. There was fear that interruption of electrical power caused by the tripping of a GFCI device may severely jeopardize the patient's life and/or the treatment being rendered. The code making panel's statement addressed the submitter's concern that receptacles at the bedside that may be supplying critical equipment not be included in the requirements for GFCI protection.

The term receptacles located in the patient care areas of health care facilities is a very large umbrella covering many different types of facilities. While the submitter's concerns were addressed by the Exception No. 2 to (5) many more receptacles were now exempt GFCI protection. Receptacles located within 1.8 m (6 ft) of sinks in dentist and doctors examination rooms were now not required to have GFCI protection. These types of health care facilities would normally not be providing any type of critical patient care, life support or monitoring equipment. Addressing the patient bed locations of general care and critical care areas of health care facilities places this exception now only in hospitals and ambulatory health care occupancies. These areas would also be required to be served by the critical branch of the essential electrical system to which electrical life support equipment may be connected.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-124 Log #298 NEC-P02 **Final Action: Reject**
(210.8(B)(6))

TCC Action: The Technical Correlating Committee refers Code-Making Panel 2 to the action taken on Proposal 17-34.
Submitter: David B. Perry, Signal, MT
Recommendation: Add new text to read as follows:
(6) Electric Drinking Fountains
Substantiation: This will correspond with 422.52.
Panel Meeting Action: Reject
Panel Statement: Section 422.52 already covers this requirement and it is not necessary to repeat it here.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-125 Log #711 NEC-P02 **Final Action: Reject**
(210.8(B)(6))

Submitter: Alberto D. Miranda, LDG Inc.
Recommendation: Add (6) Elevator Rooms and Elevator Pits.
Substantiation: None given.
Panel Meeting Action: Reject
Panel Statement: The proposal does not provide any substantiation as is required by 4.3.3(C) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-126 Log #527 NEC-P02 **Final Action: Reject**
(210.8(C))

Submitter: Sarah Ibarra, Metro Wastewater Reclamation District
Recommendation: Revise text to read as follows:

Boat Hoists. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

Substantiation: This boat hoists section/paragraph should be in the Dwelling Units section/paragraphs.
Panel Meeting Action: Reject
Panel Statement: Subsection (A) covers 125 volt 15 and 20 ampere receptacles. The requirements in subsection (C) extend GFCI protection to branch circuits rated up to 240 volts with higher ampacities. This section also covers boat hoists that are directly connected.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-126a Log #2772 NEC-P02 **Final Action: Reject**
(210.8(C))

Submitter: Angela Beargeon, Denver, CO
Recommendation: Delete text and relocate.

Boat Hoist

GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

Substantiation: This code concerns dwelling units this should show up under 210.8(A).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-126.

2-127 Log #557 NEC-P02 **Final Action: Reject**
(210.8(C))

Submitter: Joe Riley, City of Arlington
Recommendation: Revise text as follows:

210.8 ~~(C)~~ (A) Dwelling Units. (9) Boat Hoist. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

Substantiation: The subsection as written should be relocated under 210.8(A) Dwelling Units as (9) Boat Hoists, for the simple reason it is referring to boat hoists installed in dwelling unit locations.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-126.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-128 Log #1719 NEC-P02 **Final Action: Reject**
(210.8(C))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Move 210.8(C) to 210.8(A) and create new 210.8(A)(9) for boat hoists.

~~210.8(C) Boat Hoists. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.~~

210.8(A)(9) Boat Hoists. GFCI protection shall be provided for outlets not exceeding 240 volts that supply boat hoists installed in dwelling unit locations.

Substantiation: Traditionally 210.8(A) has contained GFCI requirements for dwelling units; 210.8(B) has been reserved for other than dwelling units. The 2005 NEC broke with that convention by adding 210.8(C) for boat hoists in dwelling unit locations.

It's much easier to explain to students of the Code that 210.8(A) contains the requirements for dwelling units, and 210.8(B) contains the general rules for other than dwelling units; for the sake of clarity and their understanding, we should try to keep it that way.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-126.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-129 Log #2424 NEC-P02 **Final Action: Reject**
(210.8(C))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:

210.8 ~~Ground-Fault Circuit-Interrupter~~ Power Safe Protector Protection for Personnel.

(C) Boat Hoists. ~~GFCI~~ PSP protector protection shall be provided for outlets not exceeding ~~240~~ 125 volts that supply boat hoists installed in dwelling unit locations. 240 volt boat hoist shall have GFCI protection.

Substantiation: The Power Safe Protector (PSP) device overcomes these limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.

2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-72.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-130 Log #542 NEC-P02 **Final Action: Reject**
(210.8(D))

TCC Action: The Technical Correlating Committee refers Code-Making Panel 2 to the action taken on Proposal 17-34.
Submitter: Mark A. Ciarrocca, Cheatham & Associates, P.A.
Recommendation: Add new text to read as follows:

210.8(D) Electric Drinking Fountains

Electric drinking fountains shall be protected with ground-fault circuit interrupter protection.

Substantiation: This proposal is submitted with a sister proposal to delete the same text in 422.52. Inclusion of the text in 210.8 will serve to consolidate GFCI protection requirements in a common location.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 2-124. The panel recommends for correlation purposes that the TCC refers to CMP-17 for comment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-131 Log #3119 NEC-P02 **Final Action: Reject**
(210.8(D) (New))

Submitter: Paul S. Hamer, Chevron Energy Technology Company
Recommendation: Add 210.8(D) as follows:
(D) Three-Phase Ground-Fault Circuit-Interrupter System Protection for Personnel.
(1) Supplying Lighting Outlets. All branch circuits that supply lighting outlets and operate at a voltage exceeding 150 volts to ground shall be three phase, and shall be protected by a three-phase ground-fault circuit-interrupter system (GFCIS-3Ph). The power supply source shall be a separately derived system and each branch circuit shall be included as part of the GFCIS-3Ph. Upon detection of a ground fault, the GFCIS-3Ph shall initiate disconnection of all three phases of the faulted branch circuit. The branch circuits shall meet the requirements of 210.4. The requirements of this section shall become effective January 1, 2014.
(2) Supplying Other Than Lighting Loads. Three-phase branch circuits that supply loads other than lighting outlets shall be permitted to be protected by a GFCIS-3Ph. If a GFCIS-3Ph is implemented for these branch circuits, the power supply source shall be a separately derived system and each branch circuit shall be included as part of the GFCIS-3Ph. Upon detection of a ground fault, the GFCIS-3Ph shall initiate disconnection of all three phases of the faulted branch circuit. The branch circuits shall meet the requirements of 210.4.
FPN: Segregation of the power supply on a separately derived system facilitates proper application of the three-phase ground-fault circuit-interrupter system on all of the branch circuits.
Substantiation: Introduction
There are many electrocutions that occur on three-phase 480 volt systems, particularly 277 volt branch circuits that supply lighting outlets. Ground-fault circuit-interrupters (GFCIs) have saved many lives on 120 volt and 120-240 volt single-phase systems since being introduced to the NEC in 1971. Application of GFCIs at voltages higher than 120 volts has not progressed due to fact that the higher system voltages to ground result in higher capacitive charging current of branch circuits or feeders, which in turn can lead to “nuisance trips.” This proposal describes a Three-Phase Ground-Fault Circuit-Interrupter System (GFCIS-3Ph) that overcomes nuisance tripping by a novel approach to current sensing and tripping logic. It is initially proposed as a requirement for branch circuits that supply lighting outlets due to the historical risk of these circuits, but the GFCIS-3Ph is also applicable to all three-phase circuits and this proposal allows its application as an option for all three-phase branch circuits. Application of the proposed GFCIS-3Ph technology has the potential to almost eliminate electrocutions for persons who make direct contact between an energized phase conductor and ground on three-phase systems rated below 1000 volts, phase-to-phase.
The Problem
In order to avoid a shock hazard, the first-priority activities expected of qualified electrical workers are to exercise safe work practices, to de-energize and “lock out” any circuit to be worked on, to put into practice a “test before touch” habit, and to use shock-protective personal protective equipment. But – a mistake, oversight, accidental contact, or contact with defective wiring or fixtures by even a qualified person should not result in his or her death. In a number of cases, electrocutions of both qualified electrical workers and non-electrical employees have resulted from contact with damaged or improperly installed lighting fixtures or branch circuits, or during work within the limited space above a suspended ceiling that disturbs or detaches the wiring systems of luminaires. In many light-industrial and commercial enterprises, it is an unfortunate fact that many lighting circuits and fixtures are serviced by non-qualified persons. Applicable OSHA accident reports document at least 90 electrocutions that have occurred on 277 volt lighting circuits dating back to the 1980’s (see summary descriptions in the attached Appendix 1). Another 41 people have died from electrocution where the specific system voltage was not listed in the accident report. (The OSHA accident data base does not appear to have been updated comprehensively since approximately 2000.) The OSHA accident report listings demonstrate that inadvertent contact with energized parts happens far too often on low-voltage systems – over half of the documented electrocutions (69 of the 131) being non-qualified persons (i.e., those people described as an “employee,” helper,” “apprentice,” or other non-electrician descriptions in the accident report details). An electrical shock does not need to result in a fatality. The proposed three-phase ground-fault circuit-interrupter system can prevent most electrocutions that occur due to contact with energized circuit parts on 480 or 600 volt three-phase systems. Introduction of this concept as a requirement for three-phase lighting feeder and branch circuits is a first, and important, step toward the implementation of this life-saving technology. This is the fundamental reason for this proposal.
Ground-fault circuit-interrupters, as applied to 120 volt single-phase circuits, have saved many lives since requirements were introduced in the 1971 NEC. Almost 40 years later, it is appropriate to extend ground-fault circuit-interrupter requirements to higher voltage systems – building on the pioneering work done by Charles F. Dalziel, which led to the development of the ground-fault circuit-interrupter in the 1960’s. The revolutionary approach of the system described in this proposal has the potential to almost eliminate electrocutions for persons who make direct contact between an energized phase conductor and ground on three-phase systems rated below 1000 volts, phase-to-phase.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Working technology has not been demonstrated and is not available for evaluation. The NEC does not currently prohibit the installation of such a system.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-132 Log #3796 NEC-P02 **Final Action: Reject**
(210.8(D) (New))

Submitter: John A. Schultz, St. Paul, MN
Recommendation: Add text to read as follows:
<u>(D) Location of Device. Devices that provide ground-fault circuit-interrupter protection shall be readily accessible. Where located within a structure, access to the interior of the structure shall be provided by a personnel door.</u>
Substantiation: In many instances, dwelling garages and similar structures are constructed without personnel doors and rely on a vehicle door for interior access. In these instances and where vehicle doors are provided with power openers supplied by circuits provided with ground-fault circuit-interrupter protection and the devices are located within the structure and the device trips, there is no way to access the device to reset it without damaging the structure or vehicle door. Deleting Exception 1 to section 210.8(A)(2) in the 2005 NEC has created this issue.
Panel Meeting Action: Reject
Panel Statement: The submitter’s recommendation is a design consideration and is not in the purview of Panel 2. The scenario described in the submitter’s substantiation would occur with any power loss to the circuit supplying a garage door opener and is not specifically related to GFCI protection. There is no substantiation that listed GFCI receptacles are not compatible with listed garage door openers.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-133 Log #2879 NEC-P02 **Final Action: Reject**
(210.9, FPN (New))

Submitter: William Gross, Electric Service of Clinton
Recommendation: Add new FPN as follows:
Branch circuits shall not be derived from autotransformers unless the circuit the supplied has a grounded conductor that is electrically connected to a grounded conductos of the system supplying the autotransformer.
<u>FPN: See 450.4 Autotransformers 600 Volts or Less.</u>
Substantiation: Reference to 450.4 is necessary to apply and correctly install branch circuits for autotransformers.
Panel Meeting Action: Reject
Panel Statement: The FPN is unnecessary. Article 450 applies to transformers as a general application of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-134 Log #4779 NEC-P02 **Final Action: Reject**
(210.9 Exception No. 2)

Submitter: Charles M. Trout, Maron Electric Co. Inc.
Recommendation: Delete this Exception in its entirety.
Substantiation: This exception permits installation of electrical equipment in a manner not considered safe by the requirements of 210.9 based on the hypothetical presence of a qualified person. Without prescriptive requirements to provide the assured presence of a qualified person this exception is a contradiction to the purpose of the Code.
Panel Meeting Action: Reject
Panel Statement: The authority having jurisdiction has the responsibility to evaluate whether persons responsible for the supervision and maintenance are qualified before permitting such installations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
KING, D.: I agree with the submitter, the exception allows for an installation that is less than safe. An exception that permits a reduction in safety should include clear prescriptive language for proper interpretation by both the electrician and the authority having jurisdiction. Since there is no requirement for documentation that would provide evidence to the AHJ that a qualified person actually exists, this could lead to inconsistent and improper application of this section.
WOOD, T.: This proposal should be accepted.
For too long, a special group has been able to use the Code when and where they like, while hiding under the presence of a so called “qualified person.”

2-135 Log #494 NEC-P02 **Final Action: Reject**
(210.10(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 9 for action.
This action will be considered by the panel as a public comment.
Submitter: Rodger L. Moore, Moore Electrical Contracting, Inc.
Recommendation: Add new text to read as follows:
Photoelectric switching devices used to switch lighting or power circuits that contain 2 ungrounded conductors on a grounded system (i.e., 208V, 240V, 480V) shall be required to switch all ungrounded conductors at the same time.
Exception: A 3 wire photoelectric cell may switch a contactor that switches all the ungrounded conductors at the same time.
Substantiation: When a standard 3 wire photoelectric cell is used to control a circuit with 2 ungrounded conductors, as in a 480V lighting circuit, it only switches one pole of the circuit. This is a very common application in area lighting where 2 or more fixtures are installed on a light pole, a single pole-top PE cell is used. This creates a situation where during the daylight hour or if the PE cell is defective, voltage read across the field terminals in the fixture will read 0 volts, even though both terminals have a potential of 277V to ground. Someone servicing the fixture could be in trouble. Requiring the PE cell to switch both ungrounded conductors will eliminate this situation. If the PE cell is part of the integral wiring of the fixture, the voltage on the field terminals will read 480V, the serviceman would know the fixture is energized. Although I used area lighting as an example, a similar problem would occur when ever a 2 pole circuit is switched with a PE cell.
Panel Meeting Action: Reject
Panel Statement: The situation described in the substantiation does not appear to be in compliance with the present text of 210.10, which requires that the switching device be in each ungrounded conductor of the tapped circuit. In addition, the panel recommends that this proposal be forwarding to CMP-9 for possible action with respect to the photoelectric cell being used as a switching device in general. The arrangement in the proposed exception is not prohibited in the current NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-136 Log #3804 NEC-P02 **Final Action: Reject**
(210.10(A)(2))

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add language in 210.10(A)(2) as follows: “(2) Garages, and also other rooms within the dwelling and/or accessory buildings that have a floor located...” (remaining text unchanged)
Substantiation: The problem is that a grade level workshop (not in a basement) often has a concrete floor and unfinished walls, but there is no NEC requirement to provide GFCI protection for the receptacle outlets in these areas. In my area, we have Levit style homes, and these workshops are commonplace. If the shop is in a basement or in an accessory building, then we need GFCI protection. If I put the same shop in a grade-level unfinished room that is attached (part of) the dwelling, then suddenly there is no need for GFCI protection. These workshop rooms often double as storage and a place to obtain power for outdoor equipment, the floor often is damp from the yard, and GFCI protection should be mandated.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any substantiation to expand the requirements for GFCI protection to all finished rooms at or below grade level. The substantiation only addresses unfinished workshop areas. The panel recognizes that this proposal addresses 210.8(A)(2).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-137 Log #4383 NEC-P02 **Final Action: Reject**
(210.10(A)(2))

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add language in 210.10(A)(2) as follows:
(2) Garages, and also other rooms within the dwelling and/or accessory buildings that have a floor located…(remaining text unchanged)
Substantiation: The problem is that a grade level workshop (not in a basement) often has a concrete floor and unfinished walls, but there is no NEC requirement to provide GFCI protection for the receptacle outlets in these areas. In my area, we have Levit style homes, and these workshops are commonplace. If the shop is in a basement or in an accessory building, then we need GFCI protection. If I put the same shop in a grade-level unfinished room that is attached (part of) the dwelling, then suddenly there is no need for GFCI protection. These workshop rooms often double as storage and a place to obtain power for outdoor equipment, the floor often is damp from the yard, and GFCI protection should be mandated.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any substantiation to expand the requirements for GFCI protection to all finished rooms at or below grade level. The substantiation only addresses unfinished workshop areas. The panel recognizes that this proposal addresses 210.8(A)(2).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-138 Log #340 NEC-P02 **Final Action: Accept**
(210.11(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Delete the words “per” in the first sentence and revise the sentence to read as follows: “…volt-amperes/square meter or volt-amperes/square foot, the wiring system…”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. It is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-139 Log #3275 NEC-P02 **Final Action: Reject**
(210.11(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Where the load is calculated on the basis of volt-amperes per sq. meter or per sq. ft the wiring system from the source of supply covered by this Code to the outlets shall be provided and rated to serve not less than the calculated load. This load shall be evenly proportioned as much as practical among branch circuits of the same rating which are not individual circuits. Overcurrent devices shall be installed to serve the calculated load.
Exception No. 1: The load shall not be required to be evenly proportioned for a dedicated circuit(s) intended to supply only a limited area or outlets for a specific use.
Exception No. 2: The load shall not be required to be evenly proportioned for the circuit(s) required by 210.11(C)(3).
Substantiation: “From the source of power to the outlets” is more specific and includes the branch circuits (not included in present text). The “load” of this section is the amount of area served. The “evenly proportioned” present requirement doesn’t apply, for example, where on “outlet” (see definition) supplies more than one receptacle. Proposal exempts individual circuits from the evenly proportioned requirement. Present literal text requires an even load proportion (area served) between 15-ampere circuits which may serve an area of 1800 sq. ft. and 20-ampere circuits which may serve an area of 2400 sq. ft. which restricts the 20-ampere circuit to 1800 sq. ft. where 15-ampere circuits are also installed. A requirement for overcurrent devices should not be limited to branch circuits which may be supplied by a feeder. The exceptions are proposed to allow a dedicated circuit which supplies a specific area or load such as a bathroom, computer stations, entertainment centers, ham radio equipment, or office equipment, etc. to be exempt from the balanced load requirement (equal area). “Connected” load is not defined; it may be deemed to not include a computed (watt/sq. ft.) load where no actual load is connected.
Panel Meeting Action: Reject
Panel Statement: The addition of the words “from source of supply covered by this code to the outlets” is unnecessary and confusing. The current text clearly states that the wiring system and the branch circuit panelboards must be able to serve the calculated load.
The current text dealing with “..evenly proportioned among multi-outlet branch circuits in the panelboard” does not prohibit the proportioning among branch circuts of different sizes. The proportioning can take into account the size of the branch circuit device.
The panel also notes that the submitter has not pointed out any issue with the application of the rule in the field.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-140 Log #2981 NEC-P02 **Final Action: Reject**
(210.11(C))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(C) Dwelling Units.
(1) Small-Appliance Branch Circuits. In addition to the number of branch circuits required by other parts of this section, two or more 20-ampere, 120 volt, small-appliance branch circuits shall be provided for all receptacle outlets specified by 210.52(B).
(2) Laundry Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one additional 20-ampere, 120 volt, branch circuit shall be provided to supply the laundry receptacle outlet(s) required by 210.52(F). This circuit shall have no other outlets.
(3) Bathroom Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one 20-ampere, 120 volt, branch circuit shall be provided to supply bathroom receptacle outlet(s). Such circuits shall have no other outlets.
Exception: Where the 20-ampere circuit supplies a single bathroom, outlets for other equipment within the same bathroom shall be permitted to be supplied in accordance with 210.23(A)(1) and (A)(2).

FPN: See Examples D1(a), D1(b), D2(b), and D4(a) in Annex D.
Substantiation: It can be argued that a 240V circuit satisfies the requirements of 210.11(C), although this obviously is not the intent. Specifying the voltage in the requirement helps to eliminate such an argument, and provides consistency with many other code rules.
Panel Meeting Action: Reject
Panel Statement: The reference to voltage is unnecessary. 210.52 already states that the receptacle requirements are for 125-volt, 15- and 20-ampere outlets.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-141 Log #3274 NEC-P02 **Final Action: Reject**
(210.11(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add the following:
The rating of receptacle(s) shall be 20-amperes.
Substantiation: The majority of receptacles will be multiple type (duplex). The maximum load is limited to 15 amperes for such receptacles. Many portable electric space heaters and hair blow dryers have ratings which exceed 12 amperes. If such loads could be ascertained prior to final inspection, a 20-ampere receptacle would be required. While listing agencies do not limit multiple 15 ampere receptacles to a maximum 12 ampere load, the Code does even though compliance is unlikely as the AHJ would have to be present to enforce the rule. The proposal is no more of a “what if” kind than 422.16(B)(4) which requires an individual branch circuit for what might be installed in the future.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided substantiation that devices with 20 ampere attachment caps are dominating the residential market in such a manner that would drive the need for 20 ampere T-slot receptacles. Duplex receptacles intended for the connection of 15-ampere rated plugs are tested for a combined total load of 20 amperes. The panel also notes that the submitter’s reference to 422.16(B)(4) is a section on cord and plug connecting a range hood which is not a “what if” scenario.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-142 Log #4923 NEC-P02 **Final Action: Reject**
(210.11(C))

Submitter: Robert Kopelman, Rockville Centre, NY
Recommendation: Revise text to read as follows:
Branch Circuit, Appliance. A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance.
Two or more 20-ampere small-appliance branch circuits are required by 210.11(C)(1) for dwelling units. Section 210.52(B)(1) requires that these circuits supply receptacle outlets located in such rooms as the kitchen, pantry, and so on. These small-appliance branch circuits are not permitted to supply other outlets or permanently connected luminaires.(<u>These outlets are to be thermally protected</u>)(See 210.52 for exact details.)
Substantiation: The above can be accomplished by using GFI circuit breakers in the electric panel or using a combination GFI with thermal sensing. There is a major problem called a glowing connection. As UL 1699 Scope states – AfCI’s “ 1.3 These devices are not intended to detect glowing connections” Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. Attached are documents showing that an AFCI starts to detect Arcs at 5 amps. Also attached are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time do to the differential of expansion and contraction of the metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connections.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: These products are currently listed as a receptacle with no evaluation of its ability to enhance the safety of wiring devices. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC. In addition, if the submitter is proposing a specific feature to a receptacle, the proposal should be forwarded to CMP-18 since they have responsibility for receptacle construction requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-143 Log #3892 NEC-P02 **Final Action: Reject**
(210.11(C)(1))

Submitter: Alan Padilla, E Light Electric Services
Recommendation: Revise text as follows:
In addition to the number of branch circuits required by other parts of this section, two or more dedicated 20-ampere branch circuits shall be provided for all receptacle outlets specified by 210.52(B). <u>Multiwire branch circuits shall not be permitted to comply with the provisions of this section.</u>
Substantiation: The neutral/grounded conductor loaded of a multiwire branch circuit can result in load differentials between the ungrounded conductor and the grounded conductor. The GFCI responds to this load differential.
By requiring dedicated circuits for these receptacles we help reduce nuisance tripping making the GFCI protection more effective.
Panel Meeting Action: Reject
Panel Statement: A multiwire branch circuit can be used and can be appropriately protected by using a 2-pole GFCI circuit breaker or by using GFCI receptacles after the point where the multi-wire branch circuit is divided to supply separate circuits. It is suggested that the submitter reference the GFCI manufacturers installation instructions for the proper application on multi-wire branch circuits.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-144 Log #4921 NEC-P02 **Final Action: Reject**
(210.11(C)(1))

Submitter: Robert Kopelman, Rockville Centre, NY
Recommendation: Add new text to read as follows:
Branch Circuit, Appliance. A branch circuit that supplies energy to one or more outlets to which appliances are to be connected and that has no permanently connected luminaires that are not a part of an appliance.
Two or more 20-ampere small-appliance branch circuits are required by 210.11(C)(1) for dwelling units. Section 210.52(B)(1) requires that these circuits supply receptacle outlets located in such rooms as the kitchen, pantry, and so on. These small-appliance branch circuits are not permitted to supply other outlets or permanently connected luminaires. (<u>These outlets are to be thermally protected</u>)(See 210.52 for exact details.)
Substantiation: The above can be accomplished by using GFI circuit breakers in the electric panel or using a combination GFI with thermal sensing. There is a major problem called a glowing connection. As UL 1699 Scope states – AfCI’s “ 1.3 These devices are not intended to detect glowing connections” Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. Attached are documents showing that an AFCI starts to detect Arcs at 5 amps. Also attached are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time do to the differential of expansion and contraction of the metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connections.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-142.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-145 Log #3276 NEC-P02 **Final Action: Reject**
(210.11(C)(1), (2) and (3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
(1) In addition to the number of branch circuits required by other parts of this section, <u>at least two</u> ~~or more~~ <u>20-ampere 2-wire 120-volt or one 20 ampere 120/240 volt multiwire circuits</u> shall be provided for all receptacle outlets specified by 2110.52(B).
(2) In addition to the number of branch circuits required by other parts of this section, at least one additional 20 ampere <u>120-volt 2-wire</u> branch circuit shall be provided for the laundry receptacle outlet(s) required by 210.52(F). This circuit shall have no other outlets.
(3) In addition to the number of branch circuits required by other parts of this section, at least one 20 ampere <u>120-volt</u> branch circuit shall be provided to supply bathroom receptacle outlet(s). Such circuits shall have no other outlets.
Substantiation: Editorial. A multiwire circuit (one circuit) should be explicitly permitted in (1). The 20 ampere circuits in (2) and (3) should be explicit as to voltage and number of conductors.
Panel Meeting Action: Reject
Panel Statement: 210.4 is already clear that a multi-wire branch circuit shall be permitted to be considered as multiple circuits. As such, permission to use a multi-wire branch circuit is unnecessary. The voltage limitation is unnecessary as it is already specified in 210.52. See panel statement on Proposal 2-140.
Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-146 Log #2071 NEC-P02 **Final Action: Reject**
(210.11(C)(2))

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text to read as follows:
In addition to the number of branch circuits required by other parts of this section, at least on additional 20 or 30 ampere branch circuit shall be provided to supply the laundry receptacle outlet(s) required by 210.52(F).
Substantiation: Most commonly used compact washer and dryer units require a 30 ampere branch circuit and a receptacle outlet.
Panel Meeting Action: Reject
Panel Statement: 210.52 specifies that the required receptacle outlets are 125-volt for all of the receptacle outlets in 210.52. If a 30A circuit is required, it must be in addition to the required 20A circuit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-147 Log #1727 NEC-P02 **Final Action: Reject**
(210.11(C)(3))

Submitter: Paul J. Kennedy, Jr., Kennedy Seminars
Recommendation: Revise the last sentence to read as follows:
Such circuit shall have no more than two bathrooms and shall have no other outlets.
Substantiation: I have had to go into houses that have had more than 2 bathrooms on one circuit and run an additional circuit to separate the amount of outlets that were on a single circuit which was causing the circuit breaker to overheat and trip. By limiting the number of bathrooms to no more than 2 on a single 20 amp circuit, this will eliminate any overheating/tripping problems and the fires that would result from these over heated circuits.
Panel Meeting Action: Reject
Panel Statement: The submitter's recommendation does not resolve the issued as claimed in the substantiation. The number of receptacle outlets within a single bathroom on a branch circuit is not limited. As such, the same claimed overloading could occur with a single bathroom. The submitter has not substantiated that a two bathroom limit would resolve the alleged problem. In addition, the panel does not agree with the substantiation that the unintended overloading a properly installed and protected circuit is creating a fire hazard. The overcurrent protection for the circuit would be opening before the conductors reached damaging temperatures.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
KING, D.: This Proposal should be given further consideration by Panel 2. Limiting the required circuits to two bathrooms as proposed by the submitter will reduce or eliminate circuit overloading in these areas.
Comment on Affirmative:
ORLOWSKI, S.: In Agreement with the Committee Reason and Statement for Rejecting this Proposal. No documentation whatsoever was submitted with this Proposal to support the contention that accepting the proposed change "will reduce or eliminate circuit overloading in these areas." In other words, what's the problem?

2-148 Log #3221 NEC-P02 **Final Action: Reject**
(210.11(C)(3))

Submitter: Paul J. Kennedy, Jr., Kennedy Seminars
Recommendation: Revise the last sentence to read as follows:
Such circuit shall have no more than two bathrooms and shall have no other outlets.
Substantiation: I have had to go into houses that have had more than 2 bathrooms on one circuit and run an additional circuit to separate the amount of outlets that were on a single circuit which was causing the circuit breaker to overheat and trip. By limiting the number of bathrooms to no more than 2 on a single 20 amp circuit, this will eliminate any overheating/tripping problems and the fires that would result from these overheated circuits.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-147.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
KING, D.: See my Explanation of Negative for Proposal 2-147.
Comment on Affirmative:
ORLOWSKI, S.: In Agreement with the Committee Reason and Statement for Rejecting this Proposal. No documentation whatsoever was submitted with this Proposal to support the contention that accepting the proposed change "will reduce or eliminate circuit overloading in these areas." In other words, what's the problem?

2-149 Log #3569 NEC-P02 **Final Action: Reject**
(210.11(C)(3))

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Revise text to read as follows:
(3) Bathroom Branch Circuits. In addition to the number of branch circuits required by other parts of this section, at least one 20-ampere branch circuit shall be provided to supply the bathroom receptacle outlet(s) required by 210.52(D). Such circuits shall have no other outlets.
Substantiation: A code-minimum installation calls for a receptacle installed within 3 ft of a bathroom sink, served by a circuit dedicated for that purpose. When someone adds a voluntary and permitted receptacle for lighting or other purposes in the bathroom above and beyond the minimum expectations of the NEC, there is no reason to consider them the required bathroom receptacles that are required to be served from the required circuit.
As the text currently stands, it can be interpreted that every circuit that serves a receptacle in the bathroom (regardless of the designer's intent for that circuit) must be served from a 20A circuit that serves only bathrooms.
This would have no impact on GFCI requirements as posed by other sections. It would serve to clarify the section and the minimum code-required receptacles it should be referencing. The proposed language would also serve to isolate the required receptacles from other loads away from the sinks, if this effect is undesirable an exception permitting other receptacles inside the bathroom to be served would counteract that. Additional receptacle outlets installed to meet design criteria need not meet the requirements of this article.
Panel Meeting Action: Reject
Panel Statement: The current rule permits the 20A bathroom circuit to supply all receptacle outlets installed in the bathroom, whether they are installed to meet 210.52(D) or are in addition to the ones required by 210.52(D). The submitters notation that every receptacle outlet in the bathroom must be supplied from a 20A bathroom branch circuit is correct and is intended by the panel. However, there is no limitation on the number of 20A branch circuits that can be used in the bathroom.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-150 Log #3617 NEC-P02 **Final Action: Reject**
(210.11(C)(3) Exception No. 2 (New))

Submitter: Terrence V. Wendt, City of Omaha
Recommendation: Add new text to read as follows:
Exception 2. In addition to the required receptacles specified in 210.11(C)(3) and lighting outlets required in 210.70(A)(1), General-purpose branch circuit receptacles shall be permitted.
Substantiation: Bathrooms are getting larger and turning into relaxation centers with televisions, rope light, and more. By allowing general purpose circuits to feed receptacles other than the basin outlets you can alleviate unnecessary load on the required 20 amp bathroom circuit.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that general purpose branch circuits should be used to supply receptacle outlets in the bathroom. The devices described in the substantiation can be supplied from the 20A branch circuit, or an additional 20A branch circuit can be installed to pick up these receptacles. In either case, the 20A circuit is required to be dedicated to the bathroom(s).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-151 Log #231 NEC-P02 **Final Action: Reject**
(210.11(C)(4) and 210.65)

Submitter: Timothy F. Terrell, America's Full Line Electrical Service, LLC
Recommendation: Add new text to read:
210.11(C)(4) Smoke Detector Circuit. In addition to the number of branch circuits required by other parts of this section, at least one 15-ampere branch circuit shall be provided to supply smoke detector outlet(s). Such circuit shall have no other outlets.
210.65 Smoke Detector Locations. Smoke Detectors shall be located within each habitable bedroom and within each adjoining hallway. All detectors shall have a battery back-up and shall be interconnected through the 120 volt wiring side. Location of detectors shall be in compliance with Table 210.65.1 and 210.65.2.
Substantiation: As an electrical contractor, in the residential market, it is placed on the electrical contractor to provide for smoke detectors since it is wired 120V with a battery back-up. However, there is no article defining locations, sizing, etc. for this condition. With the addition of the circuit under 210, then NFPA 72 can be applied to NFPA 70 defining placement, sizing, etc. I feel with the addition of solar PV systems, and back-up generators on residences, the separation of this circuit and the integrity demand for this circuit will continue to assist in life saving practices should main power service be lost, and some residential power be used and open candle flames utilized.
Panel Meeting Action: Reject
Panel Statement: The requirements for placement of smoke alarms are the responsibility of the NFPA 101 and NFPA 5000 committees. The requirements for the power supplies and interconnection of smoke alarms is the

responsibility of the NFPA 72 committees.

There is no basis for adding an NEC requirement for a dedicated branch circuit for smoke alarms. The panel notes that a dedicated circuit is not prohibited. In some designs, it is preferred to have the smoke alarms on a circuit with lighting or other loads to more readily identify the loss of power. The submitter has not substantiated creating a more restrict branch circuit requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-152 Log #497 NEC-P02 **Final Action: Reject**
(210.12)

TCC Action: The Technical Correlating Committee understands that the proposal number for the panel statement is Proposal 2-162, rather than Proposal 2-152.

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Insert a hyphen between "Circuit" and "Interrupter" in the title of (A) and in the text of (B).

Substantiation: To correlate with the title of 210.12.

Panel Meeting Action: Reject

Panel Statement: Item (A) has been deleted through the panel action on proposal 2-152. The usage of the term in item (B) is in accordance with the NEC Style Manual. When the term is used as a noun, only the first pair of words is hyphenated. When used as an adjective, both pairs of words are hyphenated.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: NAHB supports the position that the mandates for Arc-Fault Circuit Interrupters (AFCI's) should be removed from the National Electric Code. Not once in the entire development of the NEC has a Proposal to mandate AFCI's ever provided supporting information that there is a cost-benefit to society if these devices are installed. Quite the contrary. There is more data, documentation, and information that shows mandating these devices will cost billions of dollars to maybe save less than 30 million dollars of losses a year. This is unacceptable. Especially in this economy. Allowing manufacturer's to mandate the purchase and installation of their products through the NEC should be looked on the same as the practices by large corporations in misusing public funds. No jurisdiction should ever adopt any industry standard that does not consider the cost-benefits it will impose on that community.

2-153 Log #3485 NEC-P02 **Final Action: Reject**
(210.12)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Jack Wells, Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium

Recommendation: Revise text to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection.

(A) Definition: Arc-Fault Circuit-Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

FPN No. 1: For information on types of arc-fault circuit interrupters, see UL 1699-1999, *Standard for Arc-fault Circuit Interrupters.*

FPN No. 2: See 11.6.3(5) of NFPA 72®-2007, National Fire Alarm Code®, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

FPN No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

~~Exception No. 1: Where RMC, IMC, EMT or steel armored cable, Type AC, meeting the requirements of 250.118 using metal outlets and junction boxes is installed for the portion of the branch circuit between the branch circuit overcurrent device and the first outlet,~~ it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception No. 2: Where a branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, or steel armored cable, Type AC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.

Substantiation: This proposal is made on behalf of The Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium. The Consortium members are: Cooper Wiring Devices, Hubbell Incorporated (Delaware), Leviton Manufacturing Company, Inc., Pass and Seymour/ Legrand.

NEC 210.12 requires, in certain living areas, AFCI protection of outlets in NEW construction dwelling units. There is presently an unintentional barrier built into the wording of this article that inhibits the development of receptacle type AFCIs. Receptacle type AFCIs would be located closer to the probable arcing sources and be more sensitive to hazardous vs. normal arcing. The requirement of a metal conduit or metal-jacketed cable for the banch circuit between the branch circuit overcurrent device and the first (AFCI Receptacle) outlet is in many cases cost prohibitive. It is evident that some States are not adopting AFCI requirements. This proposal would work toward reducing objections by providing flexibility and alternatives, thus resulting in increased safety.

The primary intent of AFCI technology within a dwelling unit is to mitigate electrical fires due to arcing. As stated on NFPA website under Research and Reports, Fact Sheets, Electrical Safety in the Home; "Cords and plugs accounted for the largest share of the 2002-2005 home structure fire civilian deaths involving electrical distribution or lighting equipment." These electrical fires would be best mitigated by an AFCI device installed at the closest location to where these cords and plugs are most commonly used, a receptacle.

Additionally, wiring insulations have dramatically improved over the past (50) years. The Fire Protection Research Foundation Residential Electrical System Aging Research Project Technical Report dated April 2, 2008 and prepared by Underwriters Laboratories supports this statement. The following is taken directly from this report (page 20): "Thermoplastic insulated wires, typical of the 1950s vintage and later, generally continue to perform with excellent results, even after 50 years or more of service in the home. The electrical and mechanical characteristics of these wires appear to be exceeding even the original expectations of performance after aging and normal use."

Given the robustness of today's insulations over their predecessors the primary concerns of arcing would be in extension cords, televisions, heaters, electrical appliances and electrical connection/interfaces. Removing the above-mentioned barrier to the use of AFCI receptacles would result in the AFCI devices being installed closer to the more probable cause of hazardous arcing. The AFCI receptacle option would also take away some of the objections of AFCI adoption in the fact that the reset operation would be more accessible to the user.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

Exception No. 1: It shall be permitted to install a listed outlet branch circuit AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Panel Statement: The panel did not delete the subtitle "Exception No. 1" because the panel recognizes the submitters proposed text was intended for Exception No. 1. The panel has deleted the word "combination" and inserted the words "outlet branch circuit" because CMP-2 has documented the series arc protection benefit of this type of device on the line side of the receptacle outlet.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 6 Negative: 4 Abstain: 2

Explanation of Negative:

COLUCCIO, F.: Panel 2 is not recognizing the main reason why the wiring methods must be steel protected as debated last code cycle, by allowing non-metallic cable to be installed on 20% to 60% of a run for general purpose branch circuits and 100% on runs for individual branch circuits defeats the entire purpose of what is written in the 2008 NEC. The panel has no information on how the combination AFCI device will function when providing upstream protection, additional information is required to determine the performance of this device, I have concerns when ceiling outlets with attached various types of luminaires can be the first outlet.

LAROCCA, R.: We recognize and applaud the submitter's intention to make additional types of AFCI devices available. Looking at the technical issues alone and the substantiation supporting the proposal, CMP-2 has stated in previous code cycles that the requirements for AFCI protection apply to the entire branch circuit which begins at the final overcurrent protective device. The panel action would remove AFCI protection for parallel arcing faults from the first portion of the branch circuit without adding further limitations or mechanical protection. The submitter has failed to provide any technical substantiation or risk vs. benefit study to support this action. It is reasonable to assume that the same installer using the same installation techniques has installed the entire branch circuit. Also, the first portion of the branch circuit may be of significant length, especially in larger homes, where the service panel and the first outlet of some branch circuits may be located at far different ends of the house. The submitter provided no substantiation or data to suggest that damage from installation or penetration related events is less likely to occur to the first portion of the branch circuit versus that portion remaining after the first outlet or whether the first portion of the branch circuit is adequately protected against arcing faults by anything other than the AFCI function. The data reviewed by the panel to date is not specific enough to show whether fires that originated in fixed wiring occurred in the portion of the branch circuit before or after the first outlet, or whether the fault was a series arcing fault or a parallel arcing fault. Existing data that we are aware of does not permit us to draw any conclusion in support of this action.

PAULEY, J.: The panel has reduced the requirements for electrical safety from the level of the 2008 NEC. By allowing the AFCI to be installed at the first outlet without any protection of the wiring between the panel and the first outlet, the panel has effectively eliminated AFCI protection on 25% to 50% of the wiring that was previously covered by 210.12. The provision in 210.12 is for the branch circuit wiring itself and the panel has ignored the technical discussion and evidence that lead to the AFCI provisions to go into the code in the 1999 cycle. In addition, the panel has added a device - the outlet branch circuit AFCI - which is not part of the product standard and which has not had requirements developed with appropriate industry input. The panel has no information on how this device will perform or what its expected level of protection will be "upstream" of the AFCI itself.

WILKINSON, R.: The whole circuit should be protected.

Explanation of Abstention:

BOYNTON, C.: My reason for Abstaining is to further analyze the technical justification for reducing the branch circuit protection already provided for in the existing code.

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

Comment on Affirmative:

BECKER, R.: I agree with the proposal to have the circuit detection located in the first outlet. I agree with the substantiation statement that the premise wiring system is not subject to "arcing". I do not agree that substantiation has been provided that identifies the "arcing" condition that is to be detected.

KING, D.: I disagree with the NEMA comment to the negative submitted by Mr. Pauley, it is factually inaccurate in both it's characterization of CMP 2 actions and misleading with respect to the OBC type AFCI.

The statement "By allowing the AFCI to be installed at the first outlet without any protection of the wiring between the panel and the first outlet..." is factually incorrect. CMP 2 specified the "Outlet Branch Circuit" type which is tested for detection of series arcing on the home run and for series and parallel arcing downstream. In fact AFCI protection continues to be required for the entire circuit.

The statement "...the panel has effectively eliminated AFCI protection on 25% to 50% of the wiring that was previously covered by 210.12" is factually incorrect. CMP 2 eliminated only parallel arcing protection on the home run. The 25% to 50% is undocumented and unsupportable. No data is available to indicate what percentage of the wiring system is represented by the home run, nor is any data available quantifying the percentage of series vs. parallel arcing on the home run.

The statement "The provision in 210.12 is for the branch circuit wiring itself and the panel has ignored the technical discussion and evidence that lead to the AFCI provisions to go into the code in the 1999 cycle" is merely one opinion of the CMP 2 discussion. Another is that the Panel fully discussed the issues and did not ignore the technical discussion nor the evidence that led to the 1999 as well as the 2008 provisions.

The statement "In addition, the panel has added a device – the outlet branch circuit AFCI – which is not part of the product standard and which has not had requirements developed with appropriate industry input. The panel has no information on how this device will perform or what its expected level of protection will be "upstream" of the AFCI itself" is incorrect. The Panel heard from UL that while there is not a standard covering OBC AFCIs there is an "outline of investigation" that is a public document and that UL is fully capable of listing such a product as it has in the past.

I agree with the Panel Action on this Proposal because it provides a more practical alternative for compliance with this section in many applications. The Panel action to revise the text to require "outlet type" AFCI protection provides series arc protection on the line side of the device eliminating the need for additional physical protection of the conductors to the first outlet. The Panel action on this Proposal allows for a more practical means of meeting the requirements of 210.12 and will extend this life saving technology to more branch circuit wiring than what is being protected by the present code text.

WEBER, R.: I applaud the Panel and its action to Accept in Principal this proposal. The AFCI protection means is critical to enhancing the electrical safety cause and provides the greatest good for the public. I will be the first to admit the listed branch circuit AFCI device type units are not the same as breaker type protection schemes. Both provide the same level of Series and Parallel arcing protection down stream from the first listed branch circuit AFCI device type unit; thus they are equal. But in the home run circuit from that first listed branch circuit AFCI device type unit back to the panel board, it has been misunderstood that the listed branch circuit AFCI device type units does not provide protection for that segment of the circuit, which is not true. In the home run circuit, the use of a breaker does provide Series and Parallel arcing protection; whereas listed branch circuit AFCI device type units only provide Series arcing protection means. Thus, they are not totally equal, but this statement then begs the question of the arcing faults that occur in the home run circuit how many are of a Series arcing in nature which I believe to be the predominate condition and then how many are of a Parallel arc fault. It is to my understanding that the most occurrences are from either the first receptacle outlet and cord appliance connection to it and then the next is the appliance or what ever piece of electrical utilization equipment that is energized by the circuit. Is there enough of a significance occurrence to negate the use of listed branch circuit AFCI device type units because of home run circuits problems; I do not believe that to be the case. The total acceptance of the AFCI protection means by many jurisdictions has, in my opinion, been from the fact that the designer, electrician/installer at present does not have a viable option of using devices versus breakers. With the present Exception No. 1, to 210.12(B) and the use of metal raceways or metal covered cables for that home run circuit, it is not a viable option or one that enhances the use of listed branch circuit AFCI device type units. Given economic consideration and comparisons between the use of the breaker and device type protection; we need to even the playing field and open up the competition for what is the most desirable use to meet the AFCI protection means and let the consumer decide. With this proposal utilizing listed branch circuit AFCI device type units protection and nonmetallic-sheathed cable in the home run circuits, I believe that has been accomplished via the action taken by the panel. Many electrical installations do not presently have circuit breakers and would then require a sub-panel board to be installed to meet the present code requirement whereas the device type would address that issue and for existing circuit extensions as well where we would have AFCI protection down stream from that point on the extension; which is another desirable aspect. If we truly want the AFCI protection scheme to be widely accepted and grow in use, this is a means to that end.

2-154 Log #3487 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: Jack Wells, Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium

Recommendation: Revise text to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection.

(A) Definition: Arc-Fault Circuit Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms. parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

FPN No. 1: For information on types of arc-fault circuit interrupters, see UL 1699-1999, *Standard for Arc-fault Circuit Interrupters*.

FPN No. 2: See 11.6.3(5) of NFPA 72®-2007, *National Fire Alarm Code®*, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

FPN No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

Exception No. 1: Where RMC, IMC, EMT, <u>RNC</u> or steel armored cable, Type AC, meeting the requirements of 250.118 using metal outlet and junction boxes is installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception No. 2: <u>Where a listed metal or nonmetallic conduit or tubing is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.</u>

Exception No. ~~2~~3: Where a branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, <u>RNC</u> or steel armored cable, Type AC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.

Substantiation: This proposal is made on behalf of The Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium. The Consortium members are: Cooper Wiring Devices, Hubbell Incorporated (Delaware), Leviton Manufacturing Company Inc., Pass and Seymour/Legrand.

Exception No. 1 and proposed No. 3 was revised to add RNC (Rigid Nonmetallic Conduit, Articles 352 and 355) as an approved wiring method for the protection of cables and conductors. Sections 300.4(D) Exception No. 1 and 300.4(F) Exception No. 1 shows that Rigid Nonmetallic Conduit is an approved method to protect cables and conductors from the penetration of nails and screws and can be used either exposed or concealed. Referencing Proposal 3-36 and Comment 3-29 for the 1999 NEC, Panel 3 rejected the use of Type AC Cable as an approved method from preventing nail or screw penetrations where as RNC has always been an approved method. The intent of this proposal is not to remove the Type AC Cable but to permit other proven wiring methods for the protection of conductors and cables from the penetration of nails and screws.

A new Exception (proposed Exception No. 2) was added to allow all types of conduits and tubings to be used where encased in concrete. Several Sections of the NEC such as 518.4 or 520.5 recognize that a raceway encased in concrete is a pathway and that the protection, such as nail and screw penetration, is provided by the concrete.

Panel Meeting Action: Reject

Panel Statement: Panel action on Proposal 2-153 makes this recommendation unnecessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

Comment on Affirmative:

COLUCCIO, F.: The panel should have accepted this proposal in part to allow RNC and ENT wiring methods by adding an exception No. 3 to what is written in 210.12 (B) Exception No.1 and Exception No.2 of the 2008 NEC to read as follows:

Exception No.3: For general purpose branch circuits including individual fire alarm circuits, RNC or ENT encased in not less than 50mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, where stubbing up out of the concrete the wiring method to the first metal box shall be RMC, IMC, or EMT.

This will allow non-metallic wiring methods to be installed in concrete deck work on low and high rise buildings.

2-155 Log #3896 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: Kasey Card, E Light Electric Services

Recommendation: Revise text as follows:

All 120-Volt, single phase, 15 and 20 ampere branch circuits supplying outlets installed in dwelling unit ~~family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways~~ bedrooms or similar rooms or areas shall be protected by a listed arc fault circuit interrupter combination type, installed to provide protection of the branch circuit.

Substantiation: I believe we should return to the original requirement for AFCI protection until more AFCI device are available and the cost is reduced for these devices. No data has yet to be presented to indicate that the AFCI protection has reduced residential fires. The expanded AFCI requirements have added significant cost to the dwelling unit electrical cost and yet no documented safety benefit can be shown to justify this cost. The US is heading into difficult economic times. Safety requirements that increase the cost of installation should be weighted carefully against the safety benefits versus the additional cost. We should at least wait to add these costs and requirements until we have documented data to show they truly decrease residential fires.

Panel Meeting Action: Reject

Panel Statement: AFCI devices are widely available in the market, and the panel notes that the costs have already come down since the introduction of AFCIs into the 1999 NEC. The panel has reviewed significant data over numerous code cycles and continues to support the safety benefits provided by AFCIs. The panel has carefully considered the justification for AFCIs at each phase of the code cycle where the requirements have been introduced and changed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-156 Log #3992 NEC-P02 **Final Action: Accept in Principle in Part**
(210.12)

TCC Action: It was the action of the Technical Correlating Committee to refer this proposal to Code-Making Panel 3 for correlating action in Article 760.

This action will be considered by the panel as a public comment.

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 210.12.

210.12 Arc-Fault Circuit-Interrupter Protection.

(A) Definition: Arc-Fault Circuit Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.

(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

FPN No. 1: For information on types of arc-fault circuit interrupters, see UL 1699-1999, Standard for Arc-Fault Circuit Interrupters.

FPN No. 2: See 11.6.3(5) of NFPA 72®-2007, National Fire Alarm Code®, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

FPN No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

Exception No. 1: Where RMC, IMC, EMT or steel armored cable, Type AC, meeting the requirements of 250.118 using metal outlet and junction boxes is installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Exception No. 2: Where a <u>dedicated</u> branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in <u>metal raceway</u> ~~RMC, IMC, EMT, or steel armored cable, Type AC,~~ meeting the requirements of 250.118~~,~~ with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted<u>, subject to the following conditions</u>.

(1) <u>All non-power-limited circuits permitted by Part II of Article 760 shall be installed in metal raceway.</u>

<u>(2) All power-limited circuits shall be installed with the requirements of Part III of Article 760.</u>

Substantiation: The overall purpose of this proposal is to clarify the installation of fire alarm system wiring where the requirements for AFCI protection prevail.

The term "dedicated branch circuit" is from NFPA 72-2007, which reads as follows: "**4.4.1.4.1 Dedicated Branch Circuit.** A dedicated branch circuit of one of the following shall supply primary power."

It seems appropriate to use the term "metal raceway" rather than identify only certain types of installation materials.

Where a dwelling is greater that 25,000 square feet, NFPA 90A is the reference standard for air conditioning systems. This means that Type AC cable would not be permitted in an air duct by NEC, 300.22(B). Additionally, the rooms identified in 310.18 could fall under the requirements of NFPA 90A & 300.22.

The (1) and (2) additions to Exception No. 2 differentiate between the two types for fire alarm system field wiring. Non-power-limited circuits are permitted to be installed using non-power-limited fire alarm cable. This type of circuit will have maximum values of 150 volts and 10 amps. Clearly this type of circuit should be in metal raceway in keeping with the intent of AFCI protection. Conversely, power-limited circuits are not considered to be a source of fire ignition, so installation of power-limited cable is not a fire safety issue. The power source requirements for a power-limited fire alarm circuit is the equivalent to the Article 725 Class 2 or Class 3 requirements (e.g., door bell circuits, temperature control circuits, and security system circuits run throughout a home).

Panel Meeting Action: Accept in Principle in Part

In the current Exception No. 2 to 210.12(B) revise to read as follows:

"Exception No. 2: If an individual branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, or steel armored cable, Type AC meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted."

The remainder of the proposal is rejected.

Panel Statement: The panel has revised the wording to specify that an individual branch circuit must be installed to the fire alarm control unit. The use of the term "individual" is consistent with the definition in Article 100 and with the terminology used in Article 760. The panel changed "where" to "if" to be consistent with the panel action on Proposal 2-182.

The panel has rejected the remainder of the proposal based on the following: The use of the generic term "metal raceway" would include raceways such as flexible metal conduit, which the panel did not agree as being acceptable when this issue was debated during the 2008 NEC cycle. The expectation is that the metal raceway provide sufficient physical protection as well as a ground return path. The two "conditions" are rejected because they are outside the scope of Article 210. Circuits that are supplied from a fire alarm control unit whether power limited or not fall under the purview of Article 760. CMP-2 recommends to the TCC that this proposal be sent to CMP-3 for action in Article 760 with respect to the proposed conditions on the power limited and non-power limited circuits.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

Comment on Affirmative:

COLUCCIO, F.: The panel should have accepted this proposal in part to allow RNC and ENT wiring methods by adding an exception No. 3 to what is written in 210.12 (B) Exception No.1 and Exception No.2 of the 2008 NEC to read as follows:

Exception No.3: For general purpose branch circuits including fire alarm circuits, RNC or ENT encased in not less than 50mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first metal box, where stubbing up out of the concrete the wiring method to the first metal box shall be RMC, IMC, or EMT.

This will allow non-metallic wiring methods to be installed in concrete deck work in low or high rise buildings.

2-157 Log #4316 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: Richard W. Becker, Engineered Electrical Systems, Inc.

Recommendation: Delete this paragraph.

Substantiation: "Arcing" in 120 Volt circuits, for premises wiring or portable cords, has not been substantiated or demonstrated by proponents of the paragraph. There is no indicator on the devices that distinguish between standard circuit breaker overcurrent detection and "arcing".

Panel Meeting Action: Reject

Panel Statement: The panel has reviewed technical studies that support the use of these devices for their intended purpose and disagrees with the submitter's statement that their effectiveness has not been demonstrated.

The submitter's statement regarding an indicator is a product feature that is not necessary for the application of the product.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1

Explanation of Negative:

BECKER, R.: I do not agree that technical studies support the use of these devices. The benefit of arc detection has not been adequately substantiated or demonstrated. I am not able to produce a series condition that will cause the AFCI to trip. A parallel condition, that will trip the AFCI is an instantaneous event that causes the standard circuit breaker trip mechanisms to react substantially faster than the AFCI detection. I have not seen, nor am I aware of, a field condition that can be detected by the AFCI sensor. Fire investigation reports appear to be based on "joule heating" incidents, that can be demonstrated and repeated, and will not be detected by the AFCI. There is no correlation provided as to the number of the "possible electrically caused fires" that could or would be detected. Based on my personal experience, I believe the number is very small, and in no way justifies the cost of the device.

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-158 Log #4328 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: Steven Orlowski, National Association of Home Builders

Recommendation: Delete all of the following:

~~210.12 Arc-Fault Circuit-Interrupter Protection.~~

~~(A) Definition: Arc-Fault Circuit Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.~~

~~(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.~~

~~FPN No. 1: For information on types of arc-fault circuit interrupters, see UL 1699-1999, Standard for Arc-Fault Circuit Interrupters.~~

~~FPN No. 2: See 11.6.3(5) of NFPA 72®-2007, National Fire Alarm Code®, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.~~

~~FPN No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.~~

~~Exception No. 1: Where RMC, IMC, EMT or steel armored cable, Type AC, meeting the requirements of 250.118 using metal outlet and junction boxes is installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.~~

~~Exception No. 2: Where a branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, or steel armored cable, Type AC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.~~

Substantiation: During the recent code revision cycle to the 2008 *National Electrical Code,* there was a lack of fire data used to support the expansion of arc-fault circuit interrupters (AFCI's) to all receptacles in the dwelling, let alone the mandatory installation of AFCI's in bedrooms. Looking at the latest data from NFPA in the report "The U.S. Home Product Report (Appliances and Equipment Involved in Fires)", by John R. Hall, Jr. of the Fire Analysis and Research Division of NFPA dated November 2005, the report shows that the annual average of home fires is 372,900, with direct property damage of $443,000,000. Of this number 32,000 (or 9% = $39,870,000) of these fires are caused by "electrical distribution equipment." Of that 9%, only 14,500 (or 4% = $17,720,000) of those fires are attributed to "fixed wiring, switches, outlets, and receptacles." And, there is no data or study to support that any of these 14,500 fires would have been prevented had there been an AFCI device installed. Using the U.S. Census Bureau data on building permits for 2004 (Table (S-3) Final) shows 1,656,413 one- & two-family dwelling units and 413,664 multifamily units for that year.

Furthermore, calling this a "limited approach to the expansion of AFCI" still does not result in any cost-benefit to homeowners or society. It just needlessly increases the cost of housing. There is still no justification for any jurisdiction to burden its citizens with this unneeded expense. As it was during the 1999 revision cycle, there has been a failure to provide any fire study or cost benefit study to support installing these devices in bedrooms. NAHB continues to argue the requirement of AFCI on the basis that NO data or study has ever been assembled to support the expanded coverage to the whole house.

Panel Meeting Action: Reject

Panel Statement: The panel disagrees with the submitter's assertions in the substantiation. CMP-2 has reviewed significant amounts of data, heard presentations on all sides of the issue, reviewed cost analysis from various sources (including the CPSC), and concluded that AFCIs do provide a justified safety benefit to the electrical system and to the consumer.

The panel also notes that the submitter fails to take the total cost of electrical fires into account, including loss of life, the impact on the families involved, and the impact of fire fighters and fire-fighting resources.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1

Explanation of Negative:

BECKER, R.: The substantiation for this proposal clearly documents that this article should be deleted.

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-159 Log #4863 NEC-P02 **Final Action: Reject**
(210.12)

Submitter: John Steinke, Amish Electric

Recommendation: Delete entire section.

Substantiation: The entire AFCI issue has been a nightmare for the NEC, and has done much to undermine the code making process and led to decreased respect for the NEC. Political issues aside, there still remain a number of technical matters that need to be resolved.

The first issue has been the failure of the manufacturers to produce the product, as promised. Even the latest version is not available in a form that can be used with a multi-wire branch circuit. AFCI's installed under the 2005 NEC do not meet the requirements for the 2008 NEC.

As so well documented by Huber (Peter Huber; Galileo's Revenge: Junk Science in the Courtroom), the "law" ALWAYS gets in trouble when it attempts to legislate to the 'cutting edge' of technology, rather than to established norms. Even after a decade of code revisions, the AFCI is far from proven, or accepted, in the field.

Part of the problem has been the 'moving target' aspect of the debate. First the AFCI was to protect us from crushed plugs and frayed extension cords; then it was to protect the entire circuit (Goodbye $12 device, hello $35 breaker). It was claimed to protect against broken wires and loose connections ("series arcs"); when shown not to do so, an improved version was promised.

One major player in the debate has been the role of "Romex," or NMC. AFCI manufacturers have made many claims as to the hazards presented by an errant staple; at the same time, cable makers have campaigned (successfully) to expand the NEC's acceptance of their wiring method. Oddly enough, where AFCI devices have been allowed (in theory; they're still not available), they are to be supplied by a more substantial wiring method.

If NMC is so unsafe as to require this additional protection.... maybe we need to delete Article 334. We certainly ought not be expanding the approved uses of the method.

Nor is the self-interest of the manufacturers to be ignored. Every manufacturer has opposed the development of AFCI test equipment, apart from the test button on the breaker. In a related development, US Customs has already seized numerous "GFCI" breakers with false labels and a 'test' button that did nothing but turn them off. Absent recognized test equipment, the inspector has no way, in the field, of determining if a circuit really is protected.

There have many other concerns voiced; if nothing else, these concerns are evidence that the technology is not yet accepted.

The AFCI debate has been fraught with design issues. In previous codes, the specification that bedrooms be AFCI protected resulted in dedicated circuits for bedrooms. This change in wiring practices resulted in costs that went well beyond the cost of the breakers.

As currently written, every circuit in a house (except, for some reason, stairwells) now requires either AFCI or GFCI protection. Not only has this resulted in a tenfold increase in breaker expense, there are many other additional costs that result. These additional costs include:

a) Lack of panel space. It is common for even a new home to have panels filled with 'skinny' breakers. You can't just add panel spaces - there's only room for so many cables to enter the top - you end up needing to add panels and feeders;

b) The inability to use multi-wire branch circuits will result in additional panel fill issues and material costs;

c) The very heat generated by AFCI's will ensure that panel interiors remain well over 40C - the temperature at which breakers are calibrated; and,

d) Anecdotal reports are suggesting a major nuisance problem, caused either by appliances, or by devices mandated by energy codes (motion sensors, timers, additional fluorescent light ballasts, etc.) If nothing else, the inability to independently test parts of a circuit, and the 'whole circuit' approach, greatly complicate troubleshooting.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-157. The submitter's claims regarding the availability of AFCIs is not substantiated and is in conflict with the industry experience regarding availability across the country. In addition, the panel notes the following on the claims regarding "additional costs" in the submitter's substantiation:

(a) Lack of panel space - there are numerous panels on the market that can take up to 42 full-size circuits (and potential even higher numbers with the change to Article 408 in the 2008 NEC).

(b) Multiwire circuits - 2-pole AFCIs can be used on multi-wire circuits. The availability of such a device is driven by market demand. If the market has a sufficient demand for such a product, the manufacturers will respond.

(c) The submitter has provided no information to substantiate the claim that panelboard temperatures are exceeding the requirements provided in the standards.

(d) The claim of nuisance tripping is, as noted by the submitter, anecdotal in nature and not actionable by the panel.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-160 Log #2535 NEC-P02 **Final Action: Reject**
(210.12 Exception No. 3 (New))

Submitter: Marcus R. Sampson, Lysistrata Electric
Recommendation: Add new text as follows:

Exception No. 3: An existing circuit may be extended with no more than ten (10) feet of conductor without AFCI protection.

Substantiation: Frequently, installers are asked to extend an existing branch circuit for a limited use, such as extending a living room 15-amp receptacle circuit for a new gas fireplace receptacle or a 15-amp bedroom receptacle circuit to add a smoke alarm. This exception would allow a single, limited extension of existing, code complaint wiring without the added expense of changing the service panel to one that accommodates AFCIs or rewiring an older home.

This seems a reasonable allowance for those occupancies where a minor installation project could easily become a costly, major electrical undertaking.

Panel Meeting Action: Reject
Panel Statement: The decision on applying the new construction AFCI requirements to a circuit modification is that of the authority having jurisdiction.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-161 Log #590 NEC-P02 **Final Action: Accept in Principle**
(210.12(A))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Revise text as follows:

Move existing definition of Arc-Fault Circuit Interrupter from 210.12 to article 100 definitions.

Substantiation: The term is used in four Articles and should be located in Article 100 in accordance with the NEC Style Manual.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-162.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-162 Log #701 NEC-P02 **Final Action: Accept in Principle**
(210.12(A))

Submitter: Thomas R. Proffit, I.B.E.W. Electrician/JATC Director
Recommendation: Revise text to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection.

~~(A) Definition: Arc-Fault Circuit Interrupter (AFCI). A device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc-fault is detected.~~

~~(B)~~ (A) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: The proper and most useful place for definitions is in Article 100, Part I Definitions.

This definition was found in 210.12(A), note that the NEC Style Manual requires a defined term used in more than one article be defined in Article 100. See 760.121(B), 440.65, or 550.25.

Panel Meeting Action: Accept in Principle

Relocate 210.12(A) definition to Article 100.

Delete the words "(B) Dwelling Units" from the existing (B) so that the remaining text becomes a main rule of 210.12.

Change the title of the section to "Arc-Fault Circuit-Interrupter Protection for Dwelling Units."

Panel Statement: The panel agrees with moving the definition to Article 100 and has made further changes to the section to eliminate the subdivision lettering and create a single main rule with exceptions. The title was also revised to make it clear that the section applies to dwelling units.

The panel recommends to the TCC that CMP-2 maintain responsibility for the definition.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-163 Log #2880 NEC-P02 **Final Action: Accept in Principle**
(210.12(A))

Submitter: William Gross, Electric Service of Clinton
Recommendation: Delete section 210.12(A) and relocate this definition to Article 100.
Substantiation: This definition appears in more than two articles of the NEC. Specifically in sections 210.12(A), 210.12(B), 440.65, 550.25(A), 760.41(B) and 760.121(B). It should be relocated to Article 100.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-162.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-164 Log #526 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Sarah Ibarra, Metro Wastewater Reclamation District
Recommendation: Revise text to read as follows:

All ~~120~~ 125 volt, single phase, 15- and 20-ampere branch circuit supplying outlets installed in dwelling units.

Substantiation: All 125 volt, single phase, 15- and 20-ampere branch circuit supplying outlets installed in dwelling units.
Panel Meeting Action: Reject
Panel Statement: Changing from 120V to 125V is technically incorrect. The branch circuit carries a nominal voltage of 120V as stated in 220.5. 125V is generally in reference to voltage ratings of specific devices such as a receptacle.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-165 Log #529 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: George H. Little, Little Enterprises
Recommendation: Revise text as follows:

Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed or extended in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Substantiation: The current wording implies that it is only that the new branch circuits are required to have arc-fault protection. Inserting the words "or extended" will provide for protection of not only the new branch circuits but also any new wiring installed as an extension of an otherwise non-AFCI protected circuit.
Panel Meeting Action: Reject
Panel Statement: The decision on applying the new construction AFCI requirements to a circuit modification is that of the authority having jurisdiction.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2 Abstain: 1
Explanation of Negative:

KING, D.: I agree with Mr. Webber's explanation of negative. Accepting this Proposal in Principal in Part would add clear prescriptive requirements for the Authority Having Jurisdiction to be able to consistently enforce. The Proposed text will not expand the existing requirement for AFCI Protection but rather it will ensure that AFCI Protection is required in locations that are already required for new installations.

WEBER, R.: This proposal should have been accepted in Principal and Part; given the affirmative vote on at the panel meeting on Proposal 2-153 and subsequent support in the written ballot phase for listed branch circuit AFCI device type units in the branch circuit for extensions. The use of this type device for replacement of existing receptacles and extensions to the branch circuits should be supported. The part that would not be accepted "combination-type", would not be valid with the listed new type device. If we do not provide clear code text and requirements, the circuit extensions are going to remain up to the AHJ as to if it is required or not. Given this new enhanced safety protection scheme for an AFCI protection option, it needs our support.

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-166 Log #676 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Ray C. Mullin, Ray C. Mullin Books

Recommendation: Revise text to read as follows:

210.12 Arc-fault Circuit-Interrupter Protection.

(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling units ~~family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas~~ shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

Exception No. 1: Exempt from (B) are 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling units that are required to have GFCI protection as stipulated in 210.8(A).

Note: It shall be permitted to provide both AFCI and GFCI protection for 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling units.

Exception No. 2: Insert current Exception No. 1.

Exception No. 3: Insert current Exception No. 2.

Substantiation: There is much confusion in the interpretation of 210.12(B). Down the road, AFCI and GFCI devices will become available in many types. The "Laundry list" of rooms really does not cover all types of rooms that come under many different names.

My proposal is quite simple to understand and enforce.

Panel Meeting Action: Reject

Panel Statement: The list of rooms is consistent and easy to understand since it was based on a similar list in NEC 210.52(A). The submitter's claim that AFCI protection is not required where GFCI protection is required is inaccurate. AFCI protection and GFCI protection are two independent protections that accomplish two different objectives. AFCI protection is for protection from fire ignition for the branch circuit. GFCI protection is for protection from electrocution. Currently, there are areas of the dwelling that would require both forms of protection - one example is a wet bar located within a den or family room. The receptacles within 6 ft of the wet bar must have GFCI protection and the circuits supplying all outlets in the room must have AFCI protection. The panel does not agree that the current provisions are confusing - branch circuits supplying outlets in the rooms specified in 210.12(B) must be provided with AFCI protection. Receptacles installed as specified in 210.8(B) must have GFCI protection. Both requirements coexist and must be complied with.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-167 Log #687 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Keith M. Whitesel, Whitesel Electric

Recommendation: Delete "Dining rooms" from the list of rooms that require AFCI protection.

Substantiation: Since Kitchens and Bathrooms are not on the list I can only assume that it is because they have GFCI protection.

210.52 allows dining rooms to be fed from the small appliance circuits. The current requirement in 210.12 for AFCI protection on the dining room receptacles would force BOTH GFCI and AFCI protection on the small appliance circuit if it also feeds the dining room. Have both AFCIs GFCIs been tested along with each other to function properly?

210.8 does not require kitchen wall receptacles to be GFCI protected so why are the dining room wall receptacles required to be so protected.

While I agree that AFCI protection has great potential for saving lives and property, the technology has not been around long enough and used long enough to promote it into all areas of a house. Just as GFCI protection needed to prove itself reliable so does AFCI protection.

See the supporting material I have provided for further possible wiring connections that will be affected.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The list of rooms currently in 210.12(B) was developed based on proposals and comments in the 2008 cycle that allowed for an incremental expansion of AFCI. Having or not having GFCI protection does not impact the AFCI requirements. The panel also notes that AFCI protected circuits can have GFCI receptacles installed without compatibility issues.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-168 Log #722 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Delete *Exception No. 2* and the numbering of *Exception No. 1* to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection.

(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.

FPN No. 1: For information on types of arc-fault circuit interrupters, see UL 1699-1999, *Standard for Arc-Fault Circuit Interrupters*.

FPN No. 2: See 11.6.3(5) of *NFPA 72*®-2007, *National Fire Alarm Code*®, for information related to secondary power supply requirements for smoke alarms installed in dwelling units.

FPN No. 3: See 760.41(B) and 760.121(B) for power-supply requirements for fire alarm systems.

Exception ~~No. 1~~: Where RMC, IMC, EMT or steel armored cable, Type AC, meeting the requirements of 250.118 using metal outlet and junction boxes is installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

~~Exception No. 2: Where a branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, or steel armored cable, Type AC, meeting the requirements of 250.118, with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted.~~

Substantiation: Correlation issue. In the NEC® fire alarm system universe, there two types fire alarm circuits: Non-Power-Limited Fire Alarm (NPLFA) Circuits in Part II of Article 760 and Power-Limited Fire Alarm (PLFA) Circuits in Part III of Article 760. 760.41(B) of Part II and 760.121(B) of Part III, both already referenced in 210.12(B) FPN No. 3, each state without qualification as to any wiring method: "This branch circuit shall not be supplied through … arc-fault circuit interrupters.". No AFCI protection on NPLFA and PLFA circuits. No interference with essential fire alarms due to the need to reset tripped AFCIs (and GFCIs). Period.

210.12(B) Exception No. 2, however, states that "… AFCI protection shall be permitted to be omitted", i.e., that AFCI protection is optionally ALLOWED to supply NPLFA and PLFA circuits (but you can leave AFCI protection out, too, if you want), under particular wiring method arrangements. This 210.12(B) Exception No. 2 conflicts with 760.41(B) and 760.121(B).

Therefore, delete 210.12(B) Exception No. 2 and redesignate 210.12(B) Exception No. 1 as 210.12(B) Exception.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree that this is a correlation issue. CMP-2 is responsible for branch circuits and added the exception as a means to comply with the provision of 760.41(B) and 760. 121(B). The requirement to install the branch circuit in a metal raceway provides a method to accomplish a level of protection and allows the provision in 760 to be met. The use of the words "shall be permitted to be omitted" along with the direct references to the Article 760 provisions provides clear and consistent direction to the user.

See also the panel action and statement on Proposal 2-156.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-169 Log #1885 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: All 120-volt single phase 15- and 20-ampere circuits supplying outlets installed ~~in~~ inside dwelling units and accessory structures ~~family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas~~ shall be protected by a listed arc-fault circuit interrupter, combination type, installed to provide protection of the branch circuit.

Substantiation: Edit. Proposal eliminates a laundry list of locations and eliminates outside outlets on circuits with no outlets inside buildings or accessory structures, which do not warrant an arc-fault circuit interrupter.

Panel Meeting Action: Reject

Panel Statement: The submitter has noted that the proposal is "editorial" when in fact it results in a significant change in requirements. The submitter should provide technical substantiation for the change.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-170 Log #2780 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Travis Kummer, Kummer Electric LLC
Recommendation: Revise text as follows:
(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuit supplying outlets installed in dwelling unit kitchens, laundry rooms, utility rooms, bathrooms, garages, outdoor areas (other than those required to be ground-fault circuit-interrupter protected by this code), family rooms, dining areas, living rooms...etc. (continue as currently written).
Substantiation: As written currently in 210.12(B) there is no Arc-fault circuit-interrupter protection at all in the areas underlined above. These areas should be treated no differently than thhe areas currently stated in 210.12(B) as fire hazards exist in the above underlined areas due to arcing as in all other areas.
Panel Meeting Action: Reject
Panel Statement: See panel statements on Proposals 2-174 and 2-166.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-171 Log #2817 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Larry Cross, Local Union #98 IBEW
Recommendation: Revise text as follows:
Kitchen outlets that are not covered by 210.8(A)(6).
Substantiation: It could be possible to have outlets in the kitchen of a dwelling unit not protected by an AFCI or GFCI circuit the way 210.12(B) and 210.8(A)(6) is addressed in the 2005 NEC
Panel Meeting Action: Reject
Panel Statement: The submitter is confusing AFCI protection and GFCI protection. The AFCI requirements are for specific rooms as specified in the present list within 210.12(B). Having or not having GFCI protection does not impact those AFCI provisions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-172 Log #2889 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Lisa M. Couture, Mr. Electric
Recommendation: Revise text to read as follows:
(B) Dwelling Units.
All 120-volt, single phase, 15- and 20-amp branch circuits supplying outlets installed in dwelling units family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sun rooms, recreation rooms, clothes closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.
Substantiation: Garages are required by Code to have ground-fault circuit interrupter protection for personnel (210.8(A)(2)).
Single family dwelling units, with washer and dryer units in garages, enclosed in walls with walls around the units, it appears as a closet, requiring arc-faulting by Code.
Panel Meeting Action: Reject
Panel Statement: The use of the term "closets" is intended to cover both clothes and other storage closets. The submitter's revision would limit the application to only clothes closets. The panel does not agree that the configuration described by the submitter is a closet.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-173 Log #3150 NEC-P02 **Final Action: Reject**
(210.12(B))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Terry Cromer, NC Association of Electrical Contractors
Recommendation: Revise text as follows:
All 120-volt, single phase, 15- and 20-ampere ~~branch circuits supplying~~ outlets installed in dwelling unit family rooms, dinning rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, ~~installed to provide protection of the branch circuit~~.
Substantiation: By changing to code language this way you would eliminate the exceptions. It would allow the use of Nonmetallic-Sheathed Cable (Type NM). Type NM Cable is the most used wiring method in dwelling units and is a proven safe method. The 2005 NEC allow Type AC Cable which can be very easily damaged when installed through bored holes in wood members. If the outside jacket is damaged on the AC Cable, then the integrity of the grounding system is endangered where NM Cable would not.
I know that there would be some wire that would not have AFCI Protection, but is that not the case in the other wiring methods in Exception 1 as well. It is proven that arc-faults in the hard wiring of dwelling units generally happen at termination points, such as where the wire is attached to a receptacle or switch. By putting the AFCI protection at the first receptacle, just like GFCI protection, it would protect the circuit down stream from that point.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-153.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 4 Abstain: 1
Explanation of Negative:
COLUCCIO, F.: CMP2 is not recognizing the main reason why the wiring methods must be steel protected as debated in the last code cycle, by allowing non-metallic cable to be installed on 20% to 60% of a run on for general purpose branch circuits and 100% on runs for individual branch circuits defeats the entire purpose of what is written in the 2008 NEC. The panel has no information on how the combination AFCI will function when providing upstream protection. Additional information is required to determine the performance of this device, I have concerns when ceiling outlets with attached various types of luminaires can be the first outlet.
LAROCCA, R.: See my explanation of negative vote on Proposal 2-153.
PAULEY, J.: See negative voting comment on Proposal 2-153.
WILKINSON, R.: The whole circuit should be protected.
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.
Comment on Affirmative:
KING, D.: See my Affirmative with Comment for Proposal 2-153.

2-174 Log #3451 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Larry Logan, Township of Princeton
Recommendation: Add text to read as follows:
Dwellings Units. All 120 volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling units ~~family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas~~ shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.
Substantiation: If, in fact, we are trying to protect the BRANCH CIRCUIT from arc-fault hazards, then the circuits that are protected by GFCI devices should not be excluded. I'm sure some members of Code Making Panel 2 must have seen the result of staples in walls or screws piercing wires that have caused fires from the arc effect, but may not have been a ground fault. I also believe that most GFCI protection is provided by a receptacle type device in homes, thus, leaving the BRANCH CIRCUIT unprotected until the first device. This proposal would also do away with the litany of room types required to be protected.
Panel Meeting Action: Reject
Panel Statement: In the 2008 NEC cycle the panel expanded AFCI to the list of locations and rooms as shown in 210.12(B). It is the intent of the panel to continue with AFCI in currently listed locations and rooms through the 2011 NEC. This expansion is independent of the requirements for GFCI.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-175 Log #3832 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: James H. Maxfield, Dover, NH
Recommendation: Revise text to read as follows:
(B) Dwelling Units. All 125-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sun rooms, recreation rooms, kitchen and bathroom lighting circuits, closets and hallways within finished living areas, or similar habitable rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit.
Substantiation: The purpose of this proposal is to clarify the intended areas for AFCI protection within the dwelling. Current code language appears to require all 125v, 15-20 ampere branch circuits supplying any closet or hallway circuits to be AFCI protected regardless of their location within the dwelling even if it is in an unfinished area within the dwelling unit. It appears that the current code language requires AFCI protection of closet and hallway branch circuits in the finished living areas and in unfinished areas such as walk-up 3rd floor areas, basements, wine cellars, and garages (garage under style)etc., and other unfinished areas within the dwelling structure.

Additionally, the current code requires AFCI protection of the lighting circuits within most of the finished living areas except the kitchen and bathrooms.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The revisions are unnecessary. The list in 210.12(B) was derived substantially from the list already contained in 210.52(A) and as such there is no need to specify "habitable" rooms. The addition of the kitchen and bathroom lighting circuits would add further confusion because the list is based on the the room and not specific outlets within the room. The inclusion of hallways and closets that are not finished does not created a conflict and simply provides additional locations for the required AFCI protection. For the revision of 120V to 125V see the panel statement on Proposal 2-164.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-176 Log #4581 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Revise to read as follows:

All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets in or for dwelling units shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit. For those circuits supplying receptacle outlets that are required to have ground-fault circuit-interrupter protection for personnel by 210.8(A), and where that protection is provided as part of the branch-circuit overcurrent device, the arc-fault circuit interrupter shall be permitted to be omitted.

Substantiation: This wording assures residual current detection of some sort on all dwelling unit branch circuits. The 2008 NEC requires AFCI protection for all wiring except areas where GFCI protection is generally required for receptacle outlets (outdoors, kitchens, bathrooms, basements). This leaves wiring faults in the branch circuits uncovered for those areas, seemingly without adequate substantiation. How does an arcing failure in the 20A branch-circuit wiring to a bathroom receptacle know that it is supposed to self extinguish because there is no AFCI ahead of it?

Panel Meeting Action: Reject

Panel Statement: The panel does not agree that AFCI and GFCI provisions are interchangeable. The current list is an expansion of AFCI to specified areas of the dwelling unit. Whether or not GFCI protection is provided has no bearing on the AFCI requirements.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-177 Log #4713 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Robert P. McGann, City of Cambridge

Recommendation: Revise text as follows:

Dwelling Unit <u>(Habitable Areas and closets and hallways)</u> ~~(Family Rooms, Dining Rooms, Living Rooms, Parlors, Libraries, Dens, Bedrooms, sun rooms, recreation rooms, closets, hallways or similar rooms or areas.~~

Substantiation: The terminology similar rooms or areas is confusing, at best. For example when your dining area is in a dwelling is the kitchen counter top. This would solve that confusion and also give expanded protection into areas that only have GFCI protection, which is not a safe guard for the hazards that AFCI would protect against.

Panel Meeting Action: Reject

Panel Statement: The current wording is based largely on the list from 210.52(A). There have not been significant issues with interpreting the words of 210.52(A) that have existed for a number of code cycles and as such there should be no similar interpretation problems with the 210.12(B) wording.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-178 Log #4778 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Lawrence S. Cross, BCIT

Recommendation: Add finished basements to 210.12(B).

Substantiation: The terms recreation rooms, similar rooms or areas may not meet the meaning of finished basements. Therefore outlets in the finished basement could be left unprotected from Arc-Fault Circuit-Interrupter Protection and Ground-Fault Circuit-Interrupter Protection because the outlet is now installed in a finished basement as opposed to an unfinished basement.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree that the current wording of "similar rooms" would not include the finished basement as described. The terms used are consistent with those in 210.52(A) that would also require that outlets be spaced appropriately in such a finished space.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-179 Log #4876 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: David Zinck, Wiring Inspector / Rep. Newburyport, MA

Recommendation: Add two additional sentences.

This requirement shall apply to new dwellings or new branch circuits in existing dwellings. It shall not apply to modifications to existing circuits in existing dwellings.

Substantiation: An electrician is call to a small room renovation. The homeowner has a carpenter remove a short section of wall. They find there is a wire running through it. The electrician simply has to install a plug on either side of the opening and run a new wire between the two. Most electricians could leave the truck running and do this job. But there is a problem.

The electrician finds that it is a multiwire branch circuit. He would have to rewire them in order to install an arc-fault circuit breaker. He also finds that the panel is a "Push-Matic" (or any other brand no longer made) panel that is flush mounted in a finish room. Now he has to replace the panel, or install a new panel, plus rewire the two circuits, just to be able to install arc-fault circuit breakers. What is really going to happen is the electrician is not going to pull a permit or get an inspection and he is going to just install the two plugs. Or the carpenter is going to do it himself because he never carried the $800 this job just turned into.

The added wording would eliminate this problem by allowing simple modifications to be done without requiring the AFCI circuit breakers.

Panel Meeting Action: Reject

Panel Statement: The decision on applying the new construction AFCI requirements to a circuit modification is that of the authority having jurisdiction.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-180 Log #4924 NEC-P02 **Final Action: Reject**
(210.12(B))

Submitter: Robert Kopelman, Rockville Centre, NY

Recommendation: Revise text to read as follows:

210.12 Arc-Fault Circuit-Interrupter Protection.

(B) Dwelling Units. All 120-volt, single phase, 15- and 20-ampere branch circuits supplying outlets installed in dwelling unit family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas shall be protected by a listed arc-fault circuit interrupter, combination-type, installed to provide protection of the branch circuit. <u>(These outlets shall have thermal sensing built in).</u>

Substantiation: There is a major problem called a glowing connection. As UL 1699 Scope states – AfCI's " 1.3 These devices are not intended to detect glowing connections" Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. Attached are documents showing that an AFCI starts to detect Arcs at 5 amps. Also attached are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time do to the differential of expansion and contraction of the metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connections.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel is unclear of what the submitter intends. An outlet is defined in Article 100 of the NEC as "a point on the wiring system where power is taken to supply utilization equipment". It is unclear how the "outlet" can have thermal sensing built in. If the submitter's intent is to require that a receptacle, luminaire, or similar device have some type of thermal sensing then proposals should be made to CMP 18 or to the product standard. Also see the panel statement on Proposal 2-142.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-181 Log #3748 NEC-P02 **Final Action: Reject**
(210.12(B) Exception No. 1)

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise Exception No. 1 of 210.12(B) as follows:
Exception No. 1: Where the ~~Where RMC, IMC, EMT or steel armored cable, Type AC, meeting the requirements of 250.118 using metal outlet and junction boxes is installed for the~~ portion of the branch circuit between the branch-circuit overcurrent device and the first outlet is installed with metal outlet and junction boxes and installed using the following wiring methods, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.
a. RMC
b. IMC
c. EMT
d. steel armored cable, Type AC, meeting the requirements of 250.118
e. steel sheathed cable, Type MC, meeting the requirements of 250.118
Substantiation: The purpose of this proposal is to accomplish two objectives. First, the proposal rearranges the existing text to move the wiring methods into a list that follows the other parts of the exception. This allows for easier reference to the wiring methods that the exception permits.
The proposal also adds a new wiring method by permitting steel sheathed MC cable. There are steel sheathed versions of MC cable that could be used as equivalent to the steel sheathed AC cable that is already permitted.
CMP 2 has done an excellent job at maintaining its consistency with respect to AFCI requirements. For each revision to the AFCI requirements, it is important that the panel maintain its commitment to the fundamental tenants that have been developed by the panel over numerous code cycles. These tenants can be outlined as follows:
1. The first and fundamental objective of AFCI protection is to protect the branch circuit wiring (which is exactly the reason the provisions are in Article 210).
2. The entire branch circuit must be protected by the AFCI. The panel has addressed numerous times over multiple code cycles that omitting portions of the branch circuit without other appropriate measures is unacceptable.
3. The AFCI is permitted to not protect a portion of the branch circuit provided that portion is provided with other elements of protection that are inherent in the wiring method. These other elements are: physical protection by a metallic raceway or metallic cable sheath, the raceway or cable sheath must qualify as a grounding path and cable sheaths must be of steel construction. All of these elements were generated from substantiation provided to the panel during the 2008 NEC cycle. All of these elements are critical because the objective is to create means for the normal branch circuit overcurrent device to be able to provide protection should an arcing fault event occur in the portion of the wiring not protected by the AFCI.
4. AFCI protection must cover both parallel and series arcing events – this is established by the provision requiring that a combination AFCI be used.
This proposal maintains those fundamental tenants that the code panel has set forth.
Panel Meeting Action: Reject
Panel Statement: The panel has revised the exception in Proposal 2-153. These revisions make the recommendation unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
WILKINSON, R.: This should be accept.
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.
Comment on Affirmative:
COLUCCIO, F.: This proposal should have been accepted as written with an additional item (f) to read as follows:
(f) For general purpose branch circuits including individual fire alarm circuits RNC or ENT encased in not less than 50mm (2in.) of concrete for the portion of the branch-circuit between the branch circuit overcurrent device and the first metal box, when stubbing up out of the concrete the wiring method shall comply with a, b, c, or e listed above.
This will allow non-metallic wiring methods to be installed in concrete deck work in low and high rise buildings.

2-182 Log #2940 NEC-P02 **Final Action: Accept in Principle in Part**
(210.12(B) Exception No. 1 and No. 2)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise 210.12(B) Exception Nos 1 and 2 as follows:
Exception No. 1: If ~~Where~~ RMC, IMC, EMT or ~~steel armored~~ Type MC or ~~cable,~~ Type AC cables meeting the requirements of 250.118 and ~~using~~ metal outlet and junction boxes are ~~is~~ installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a combination AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.
Exception No. 2: If ~~Where~~ a branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, or ~~steel armored~~ Type MC or ~~cable,~~ Type AC cables meeting the requirements of 250.118 and ~~using~~ metal outlet and junction boxes are ~~is~~ installed, AFCI protection shall be permitted to be omitted.
Substantiation: Armored cables are more than suitable to offer the physical protection needed for the branch circuit conductors between the panelboard and box where receptacle-type ACFI devices are permitted to be installed. The cables must pass rigorous testing mandated in UL-4, the UL standard that applies to Type AC cables and UL 1569, the UL standard that applies to Type MC cables.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Accept in Principle in Part
Revise text of Exception No. 2 as follows:
"Exception No. 2: If an individual branch circuit to a fire alarm system installed in accordance with 760.41(B) and 760.121(B) is installed in RMC, IMC, EMT, or steel sheathed cable, Type AC or MC meeting the requirements of 250.118 with metal outlet and junction boxes, AFCI protection shall be permitted to be omitted."
The remainder of the proposal is rejected.
Panel Statement: The panel notes that the action on this proposal is in addition to the action taken on 2-156. The panel accepts changing "where" to "if" in Exception No. 2. The panel accepts the addition of MC cable to Exception No. 2 but retains the reference to steel outer covering. The remainder of the proposal is rejected. As the panel reviewed information and testimony during the 2005 cycle, it was noted that relative to the arcing events the steel armor plays a key role.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.
Comment on Affirmative:
COLUCCIO, F.: This proposal accepted in principle in part to include individual branch circuits for fire alarms, and adding a new exception No. 3 to read as follows:
Exception No.3: For general purpose branch circuits including individual fire alarm circuits RNC or ENT encased in not less than 50mm (2in.) of concrete for the portion of the branch-circuit between the branch circuit overcurrent device and the first metal box, when stubbing up out of the concrete the wiring method to the first metal box shall be RMC, IMC, EMT, or steel sheathed MC cable meeting the requirements of 250.118.
This will allow non-metallic wiring methods to be installed in concrete deck work in low and high rise buildings.

2-183 Log #4582 NEC-P02 **Final Action: Reject**
(210.12(B) Exception No. 1 and No. 2)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Replace the words "RMC, IMC, EMT" them with "steel raceways and auxiliary gutters" in both exceptions.
Substantiation: This recognizes that frequently steel wireways and auxiliary gutters are placed adjacent to panelboards for other reasons. It should not be necessary to make acrobatic conduit or tubing runs to use these exceptions.
Panel Meeting Action: Reject
Panel Statement: The panel has revised Exception No. 1 in Proposal 2-153. These revisions make the recommendation to Exception No. 1 unnecessary.
For Exception No. 2, the panel does not agree with replacing the specific raceways with a generic reference to "steel raceways". Doing so would include raceways such as flexible metal conduit, which is not intended. The minimal application of wireways and auxiliary gutters for branch circuits in a dwelling unit does not justify the inclusion in the list.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-184 Log #3516 NEC-P02 **Final Action: Reject**
(210.12(B) Exception No. 3)

Submitter: Randy Hunter, City of Las Vegas
Recommendation: Exception No. 3: In existing dwellings it shall be permissible to install a combination AFCI device at the first outlet to provide protection for the remaining portion of the branch circuit.
Substantiation: Owners of any home built before the last two code cycles have not been able to benefit from the safety provided by the AFCI technology. With this proposal we don't get the protection of the home run, however protection of the rest of the circuit is certainly better than none at all. The code should not discriminate against those who don't have a new residence. I have asked in several public forums how many of the attendees have AFCI and it is usually less than 10 percent, if this device is as good as we believe, we should make it possible for more people to benefit from it in existing dwellings without extensive re-wiring or modifications which could include homerun replacement or panel change outs. This would allow for retro-fitting provisions similar to the GFCI methods used in Art 406.3 (D)(3).
Panel Meeting Action: Reject

Panel Statement: The panel has revised the exception in proposal 2-153. These revisions make the recommendation unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2 Abstain: 1
Explanation of Negative:
KING, D.: This Proposal should have been accepted in Principal. See my explanation of negative on Proposal 2-165.
WEBER, R.: I understand that given the support for the action taken on Proposal 2-153, for Listed Branch Circuit AFCI devices being utilized as an option, that this proposal was rejected. Given the close vote during the panel review of that proposal; I feel that this proposal should have been accepted in principle to support the need for this means of protection in existing dwellings and extensions made to existing circuits. We need to support the expansion of the use of AFCI technology as it enhances the cause of electrical safety to the public.
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.
Comment on Affirmative:
COLUCCIO, F.: This proposal should be accepted in part and the wording should be changed to read as follows:
Exception No. 3: In existing dwellings containing existing wiring it shall be permissible to install a combination AFCI device at the first outlet to provide protection for the remaining portion of the branch circuit.
Even though this decision should be made by the AHJ, guidance can be given to the home owner making the decision whether to change the fuse panel to circuit breakers or install AFCI devices at the first outlets.

2-185 Log #3803 NEC-P02 **Final Action: Reject**
(210.12(C))

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add Section 210.12(C) to read as follows: <u>(C) Guest Rooms and Guest Suites. Guest rooms and guest suites that are provided with permanent provisions for cooking shall comply with 210.12(B) and 406.11.</u>
Substantiation: Since we are already extending the dwelling unit requirements for branch circuits in these areas in 210.18. it is obvious that we are treating these areas as dwellings. By extending other dwelling unit requirements to these areas we are enhancing the safety of these areas. These rooms and suites are often short-term apartments, and as such should provide the same degree of safety as any other dwelling unit.
Panel Meeting Action: Reject
Panel Statement: This provision is already covered in 210.18, which requires that these areas have branch circuits installed to meet the dwelling unit rules. This addition would be redundant.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-186 Log #4373 NEC-P02 **Final Action: Reject**
(210.12(C) (New))

Submitter: Alan Manche, Square D Company/Schneider Electric
Recommendation: Add a new 210.12(C) to read as follows:
(C) AFCI Protection in Existing Installations. Where an existing dwelling unit panelboard containing 15 or 20 ampere 120V branch circuit overcurrent devices is upgraded or replaced, AFCIs shall be installed to meet the requirements of 210.12(B). Only those branch circuits that are part of the upgraded or replaced panelboard are required to comply with this section.
Substantiation: This proposal offers language to the code panel in order to establish a retrofit requirement for AFCIs in existing installations.
The provision to retrofit GFCIs in Article 406 is activated when a receptacle is replaced. Since AFCI protection is for the branch circuits, it is logical that a retrofit requirement be activated when the existing dwelling unit panelboard is being replaced.
This proposal would require that AFCI protection be installed in an existing installation where the dwelling unit panelboard is being replaced. There are various implementations that may replace the panelboard such as upgrading the service, replacing damaged or non functioning panelboards, or other repair situations.
One of the most fundamental provisions of this requirement is that the proposal would put AFCI protection on the same circuits that are required to have AFCI protection in new installations. So as the panelboard is replaced, AFCIs would be required on circuits that supply bedrooms, living spaces, etc. (same areas specified in 210.12(B)).
The proposal also makes it clear that only those branch circuits that are part of the replaced panelboard are required to now have AFCI protection. So if an installation had two existing panelboards and only one of those was being replaced, then only those branch circuit that are part of the panelboard being replaced must be provided with AFCI protection.
The most important aspect of a retrofit provision is that it not have elements that would create an installation that has a "lower level" of protection than that for new installations. This proposal accomplishes the objective of maintaining equivalent protection by requiring that it meet the same provisions as new construction through a reference to 210.12(B).
Much of the discussion about a retrofit provision has been around how to handle wiring systems that are already plagued with problems. Installing AFCIs in existing installations will certainly find installations that have grounded or crossed neutrals in the branch circuits. However, if our objective is to take actions that will make these existing systems safer, then those types of wiring issues need to be tracked down and repaired.
In addition, CMP 2 must ensure the fundamental protection requirements that have been developed over numerous code cycles related to AFCIs remain in place:
● AFCI protection must be provided for the entire branch circuit
● Trade offs in the location of the AFCI protection must be with wiring methods that provide the necessary physical and electrical characteristics
● AFCIs must protect from the circuit from both parallel and series arcing events.
Panel Meeting Action: Reject
Panel Statement: The panel would like more experience to be obtained regarding the installation of combination type AFCIs in new dwellings before requiring the installation of combination type AFCIs in the wide variety of existing dwellings that will have numerous different wiring configurations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-187 Log #4384 NEC-P02 **Final Action: Reject**
(210.12(C))

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add Section 210.12(C) to read as follows:
<u>**(C) Guest Rooms and Guest Suites.** Guest rooms and guest suites that are provided with permanent provisions for cooking shall comply with 210.12(B) and 406.11.</u>
Substantiation: The problem is a lack of consistent safety rules in areas considered as dwelling units.
Since we are already extending the dwelling unit requirements for branch circuits in these areas in 210.18, it is obvious that we are treating these areas as dwellings. By extending other dwelling unit requirements to these areas we are enhancing the safety of these areas. These rooms and suites are often short-term apartments, and as such should provide the same degree of safety as any other dwelling unit.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-185.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
ORLOWSKI, S.: Please see NAHB's Comment on Proposal 2-152.

2-188 Log #3147 NEC-P02 **Final Action: Reject**
(210.13 (New))

Submitter: Steven R. Montgomery, 2D2C Inc.
Recommendation: Add new text to read as follows:
<u>Electrical-Fault Circuit-Interrupter Protection for Dwelling Units</u>
<u>All 125-volt, single-phase, 15- and 20-ampere receptacles installed shall have Electrical Fault Circuit Interrupter protection.</u>
Substantiation: Resistive heating and arcing faults ignite most of the major residential electrical fires. Resistive heating faults ignite 59% of the fires, in spite of branch circuit over-current protection (see "<u>Electrical Ignition Causes of Fires in Ontario 2002-2007</u>," Electrical Safety Authority (ESA) report, 2008). The latest code enhancements, including Arc Fault Circuit Interrupters (per UL Std. 1699), are not designed to protect against resistive heating from current flowing through poor branch circuit connections (high resistance points), overloaded appliances and open neutral conditions. New homes may have aged and potentially faulty appliances, extension cords and lighting fixtures brought in by homeowners. The 2006 NFPA report titled "Selected Residential Electrical Fires" indicates these faults have resulted in numerous fire fatalities.
Electrical Fault Circuit Interrupter (EFCI) technology is designed to provide primary protection against resistive heating ignition mechanisms including high resistance points in branch circuit wiring (cause of 23% of residential electrical fires, per the attached ESA 2008 report), appliance overloads (cause of 17% of the electrical fires), and open neutral conditions (cause of 2% of the electrical fires). EFCI also provides supplementary protection against overloaded circuits (cause of 7% of the electrical fires) and insulation damage that leads to arc tracking (cause of 7% of the electrical fires). A large portion of residential electrical ignitions are caused by resistive heating that cannot be protected by branch circuit overcurrent devices but can be protected by EFCI.
EFCI protection must be located at the junction between the load and branch circuit wiring to detect these faults and cannot be located at the panelboard. EFCI technology is a superior approach compared all relevant alternatives. (see "<u>Alternatives to Electrical Fault Circuit Interrupter (EFCI) Technology</u>", Wayne Hartill, 2D2C Inc., 2008.)

The complete protection of EFCI technology has been previously referred to as the combination of Overload Fault Circuit Interrupter (OFCI) and Power Fault Circuit Interrupter (PFCI) technologies. For simplicity, OFCI and PFCI technologies have been renamed Electrical Fault Circuit Interrupter (EFCI). Some previous documentation refers to the old nomenclature.

Two Fact Finding Reports from independent NRTL's substantiate the performance of EFCI technology. (see "Descriptive Report and Test Results", Todd Hamden, CSA International, Feb 2006 & "Descriptive Report and Test Results", Intertek Testing Services NA Ltd., Jan 2006). A third NRTL Fact Finding Report has been request from Underwriters Laboratories (UL).

Products containing EFCI technology have NRTL certification against UL 498 and UL 498A standards and have been available for sale in the marketplace since 2006. Multiple producers of EFCI technology exist in the marketplace. With a mandate more producers will likely enter the marketplace.

A mandate of EFCI technology is required because the net safety benefit to society is far greater than that of voluntary sales alone.

Please review submitted letters of support from the following fire forensics experts including:

- Vytenis Babrauskas, Ph.D., President of Fire Science and Technology Inc. and author of the "Ignition Handbook".
- John S. Robison, President of Robison Forensic Consulting, previously Alabama State Fire Marshal, and previous President of International Fire Marshals Association.
- Chris W Korinek, P.E., President of Synergy Technologies and author of Chapter 10 of "Kirks Fire Investigation" book.
- Doug Crawford, Deputy Fire Marshal of the Ontario Office of the Fire Marshal.

Note that multiple sister proposals have been submitted as a new 100, 210.50(C), 406.3(D)(4) and 550.13(A)(4).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There are no product requirements for electrical-fault circuit-interrupter protection. The Fact-Finding Investigations submitted by the two testing laboratories (CSA and Intertek) appear to be only test programs designed by the product manufacturer. They conclude that Safe Plug performs as specified by the manufacturer. A thorough study of wiring device failure mechanisms, and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC. In addition, the features proposed for receptacle power denial and overload protection of the cords are issues that would be under the jurisdiction of CMP-18 and CMP-10 respectively.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-189 Log #4568 NEC-P02 **Final Action: Reject**
(210.13 (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels 17 and 18 for action on protection of the appliance and action related to the construction of the receptacle, respectively.

This action will be considered by Code-Making Panels 17 and 18 as public comments.

Submitter: Phil Simmons, Simmons Electrical Services / Rep. OFI, Inc. (Safe Plug)

Recommendation: Add new text to read as follows:

210.13 Electric Clothes Dryer Receptacle. All 15-, 20, and 30-ampere, 125- or 250-volt receptacles installed in a dwelling for electric clothes dryer(s) shall have electrical fault circuit interrupter protection.

Substantiation: Based on data from the 2007 U.S. Fire Administration report titled "Clothes Dryer Fires in Residential Buildings", 12,700 clothes dryer fires occur in residential buildings, annually, resulting in 15 deaths and 300 injuries. 80% of clothes dryer fires occur in residential buildings. Average loss per dryer fire in residential buildings is $9,176. Electrical failure or malfunction accounts for 15.3% of residential dryer fires. Mechanical failure or malfunction accounts for 32.6%.

Electrical Fault Circuit Interrupter (EFCI) is designed to prevent electrical failure fires caused by resistive heating ignition mechanisms that cannot be protected by branch circuit overcurrent protection including poor connections / high resistance points, appliance overloads, and open neutral conditions. EFCI could also detect mechanical failure fires such as seized motor bearings. Due to their nature, these faults cannot be detected by branch circuit overcurrent devices but can be detected by EFCI. EFCI protection must be located at the junction between the load and branch circuit wiring to detect these faults and cannot be located at the panelboard.

EFCI technology is a superior approach compared all relevant alternatives. (see Alternatives to Electrical Fault Circuit Interrupter (EFCI) Technology: Dryer, Wayne Hartill, 2D2C Inc., 2008).

The complete protection of EFCI technology has been previously referred to as the combination of Overload Fault Circuit Interrupter (OFCI) and Power Fault Circuit Interrupter (PFCI) technologies. For simplicity, OFCI and PFCI technologies have been renamed Electrical Fault Circuit Interrupter (EFCI). Some previous documentation refers to the old nomenclature.

Two Fact Finding Reports from independent NRTL's substantiate the performance of EFCI technology. (see Descriptive Report and Test Results, Todd Hamden, CSA International, Feb 2006 & Descriptive Report and Test Results, Intertek Testing Services NA Ltd., Jan 2006). A third NRTL Fact Finding Report has been requested from Underwriters Laboratories (UL). These Fact Finding Reports tested the implementation of EFCI technology in NEMA 5-15R duplex receptacles. The results of these reports also support EFCI as implemented into a NEMA 14-50R dryer receptacle since they differ only in form factor.

Products containing EFCI technology have been NRTL tested against UL standards and available for sale in the marketplace since 2006. Multiple producers of EFCI technology exist in the marketplace. With a mandate more producers will likely enter the marketplace.

EFCI receptacles sold in the marketplace have NRTL certification against UL 498 and UL 498A standards.

A mandate of EFCI technology in a NEMA 14-50R dryer receptacle is required because the net safety benefit to society is far greater than that of voluntary sales alone.

Please review submitted documents of support from the following fire forensics experts including:

· Vytenis Babrauskas, Ph.D., President of Fire Science and Technology Inc. and author of the "Ignition Handbook".

· John S. Robison, President of Robison Forensic Consulting, previously Alabama State Fire Marshal, and previous President of International Fire Marshals Association.

· Chris W Korinek, P.E., President of Synergy Technologies and author of Chapter 10 of "Kirks Fire Investigation" book.

· Doug Crawford, Deputy Fire Marshal of the Ontario Office of the Fire Marshal.

Note that a sister proposal for Electrical Fault Circuit Interrupter (EFCI) has been submitted for a new definition in article 100.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There are no product requirements for electrical-fault circuit-interrupter protection. The Fact-Finding Investigations submitted by the two testing laboratories (CSA and Intertek) appear to be only test programs designed by the product manufacturer. They conclude that Safe Plug performs as specified by the manufacturer. A thorough study of wiring device failure mechanisms, and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC. The submitter's substantiation does not address the branch circuit for the dryer, but addresses the cord and dryer itself. As such, the provision is outside the scope of Article 210. The panel recommends to the TCC that this proposal be sent to CMP-17 and CMP-18 for protection of the appliance itself and possible action related to the construction of the receptacle itself respectively.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-190 Log #4918 NEC-P02 **Final Action: Reject**
(210.13 (New))

Submitter: Steven Montgomery, 2D2C, Inc.

Recommendation: 210.13 Clothes Dryer Receptacle. All 15-, 20, and 30-ampere, 125- or 250-volt receptacles installed in a dwelling for clothes dryer(s) shall have Electrical Fault Circuit Interrupter protection.

Substantiation: Based on data from the 2007 U.S. Fire Administration report titled "Clothes Dryer Fires in Residential Buildings", 12,700 clothes dryer fires occur in residential buildings, annually, resulting in 15 deaths and 300 injuries. 80% of clothes dryer fires occur in residential buildings. Average loss per dryer fire in residential buildings is $9,176. Electrical failure or malfunction accounts for 15.3% of residential dryer fires. Mechanical failure or malfunction accounts for 32.6%.

Electrical Fault Circuit Interrupter (EFCI) is designed to prevent electrical failure fires caused by resistive heating ignition mechanisms that cannot be protected by branch circuit overcurrent protection including poor connections and other high resistance points, appliance overloads, and open neutral conditions. EFCI could also detect mechanical failure fires such as seized motor bearings. Due to their nature, these faults cannot be detected by branch circuit overcurrent devices but can be detected by EFCI. EFCI protection must be located at the junction between the load and branch circuit wiring to detect these faults and cannot be located at the panelboard.

Two Fact Finding Reports from independent NRTLs substantiate the performance of EFCI technology. (see "Descriptive Report and Test Results", CSA International, Feb. 2006 & "Descriptive Report and Test Results", ETL Intertek Testing Services NA Ltd., Jan. 2006). A third NRTL Fact Finding Report has been requested from Underwriters Laboratories (UL). These Fact Finding Reports tested the implementation of EFCI technology in NEMA 5-15R duplex receptacles. The results of these reports support EFCI as implemented into a NEMA 5-15R or 5-20R gas dryer receptacle or 14-30R electric dryer receptacle since the EFCI implementations only differs in form factor.

Products containing EFCI technology have been NRTL tested and certified against UL standards (498 and 498A) and available for sale in the marketplace since 2006. Multiple producers of EFCI technology exist in the marketplace. With a mandate, more producers will likely enter the marketplace.

An NEC mandate of EFCI technology in a dryer receptacle is needed because the net safety benefit to society would be far greater than that of voluntary installations alone.

EFCI technology is a superior approach compared to relevant alternatives. (See "Alternatives to Electrical Fault Circuit Interrupter (EFCI) Technology for Dryer Circuits", Wayne Hartill, 2D2C, Inc., 2008).

Please review the supporting documents I have submitted from the following fire forensics experts including:

- Vytenis Babrauskas, Ph.D., President of Fire Science and Technology, Inc. and the author of the "Ignition Handbook."

- John S. Robison, President of Robison Forensic Consulting, previously Alabama State Fire Marshal, and previous President of the International Fire Marshals Association.

- Chris W. Korinek, P.E., President of Synergy Technologies and author of Chapter 10 of "Kirks Fire Investigation" book.

Note that a compantion proposal for Electrical Fault Circuit Interrupter (EFCI) has been submitted for a new definition in Article 100.

The complete protection of EFCI technology has been previously referred to as the combination of Overload Fault Circuit Interrupter (OFCI) and Power Fault Circuit Interrupter (PFCI) technologies. For simplicity, OFCI and PFCI technologies have been renamed Electrical Fault Circuit Interrupter (EFCI). Some previous documentation refers to the old nomenclature. For a more detailed explanation, see "Electrical Fault Circuit Interrupter (EFCI) Technology" published by 2D2C, Inc.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 2-189.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-191 Log #4711 NEC-P02 **Final Action: Reject**
(210.18)

Submitter: Robert P. McGann, City of Cambridge

Recommendation: Revise text as follows:

210.18 Guest rooms, guest suites and <u>sleeping areas in dormitories.</u>

Substantiation: This addition to this title is not only to correlate with 210.60, but also with consideration of plug strip use attached to each other and laying in amongst clothing on floor. This view holds true most times an inspector enters these inhabited areas. Our inspectors see this weekly, this is why we need a code rule to stand on regarding outlet spacing, AFCI + GFCI protection otherwise we will need to go on recommending these.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented substantiation to require that all sleeping areas in dormitories comply with all of the branch circuit provisions for dwelling units. In addition, the proposal is unclear because it only proposes changes to the title of the section.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

KING, D.: I disagree with the panel action. This is an area where AFCI protection needs to be added. For any one that has ever been in or has lived in a residence hall or other college/university living unit you certainly can appreciate the need. The same hazards exists in these locations as in dwelling unit bedrooms.

2-192 Log #3486 NEC-P02 **Final Action: Reject**
(210.19 (New))

Submitter: Jack Wells, Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium

Recommendation: Add text to read as follows:

<u>210.19 (new) - When additional branch circuits are added to an existing installation and where no AFCI circuit breakers are available due to age or type of the distribution panel, a Listed Combination Type AFCI Receptacle shall be permitted provided it is installed as the first outlet on the branch circuit and the branch circuit wiring is continuous from the service panel to the AFCI receptacle.</u>

Substantiation: This proposal is made on behalf of The Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium. The Consortium members are: Cooper Wiring Devices, Hubbell Incorporated (Delaware), Leviton Manufacturing Company, Inc., Pass and Seymour/ Legrand.

This new proposal seeks a compromise in that it has no effect on the existing rules for AFCI protection in new construction. The proposal specifically rules out installations where combination circuit breaker AFCI's are readily available for new construction and only permits the combination AFCI receptacle as a safety measure of last resort for the retrofit market. This proposal adds a significant level of safety when the practicality of a new service panel, or sub-panel is not warranted. As an example, a home with fuses can easily add cost effective AFCI protection for an additional branch circuit without imposing a huge expense on the homeowner.

In anticipation of a comment questioning the availability of AFCI receptacles, the panel is reminded of section 90.4 which states: "The Code may require new products, constructions, or materials that may not yet be available at the time the Code is adopted." Also, the panel is reminded of the action it took when accepting a previous proposal for Combination AFCIs when none were available at the time the proposal was accepted.

By accepting this proposal, the panel will recognize the many requests from field installers for a receptacle AFCI and pave the way for continued technological innovation by specifically allowing AFCI receptacles without the armored "home-run" that has never been justified other than anecdotally.

Panel Meeting Action: Reject

Panel Statement: The panel has revised 210.12 in Proposal 2-153. These revisions make the recommendation unnecessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

PAULEY, J.: See NEMA statement on Proposal 2-153. Given NEMA's position on Proposal 2-153, this proposal may need to be revisited at the Comment stage.

2-193 Log #2957 NEC-P02 **Final Action: Reject**
(210.19(A) (New))

Submitter: Paul A. Keleher, Paul Keleher Electrical Services

Recommendation: Revise text to read as follows:

210.19 Conductors- Minimum Ampacity and size

(A) Branch Circuits Not More Than 600 Volts.

(5) <u>**Permissible Voltage-Drop.** The circuit conductors of a 15 or 20-ampere/120-volt branch circuit shall be sized such that voltage-drop measured at the rated ampacity of the circuit shall be 5% or less at any outlet.</u>

<u>*Exception No. 1: Use of non-standardized circuit breakers in compliance with 240.4 shall be permitted on circuits supplying dedicated loads with high inrush or motor starting current where a circuit breaker meeting the requirements of this section can be shown to nuisance trip.*</u>

<u>*Exception No. 2: Where 240.3 or 240.4(G) applies.*</u>

<u>**FPN:** Standard 120/240V circuit breakers rated from 15-50A that are listed to meet the overcurrent protection requirements of 240.4 contain a nonadjustable, instantaneous trip mechanism whose current setting will open the circuit within 1 cycle of being subjected to an overcurrent equal to or greater than 20 times their rated current. A full-load voltage drop measurement of 5% on a 120V branch circuit allows the system to deliver at least 20 times the rated current of the circuit to a short-circuit or bolted fault, ensuring that the circuit breaker's instantaneous mechanism will respond in compliance with other requirements of this Code.</u>

Substantiation: CMP-2 rejected a proposal in the last cycle to make 210.19(A), FPN 4 mandatory with the statement, "it is not clear from the substantiation that making the fine print note mandatory will reduce electrical fires". The present proposal is substantiated by a sample of >1000 in-situ short-circuit tests conducted at 15-20A/120V receptacle outlets selected at random in dwelling units across the US. This data substantiates the claim of the previous submitter and this proposal that limiting voltage drop at outlets is necessary to provide effective protection against branch circuit fault current. Analysis of the test data shows that:

1. At more than ½ of the outlets in the sample, the breaker failed to trip instantaneously.
2. In nearly 20% of those tests where the instantaneous trip failed, the value of I2T conductor heating recorded by the test exceeded the maximum safe limit according to accepted industry standards for conductor heating in insulated cables, potentially compromising the insulation when power to the circuit is restored.
3. In ALL tests where the breaker did respond instantaneously, conductor heating was limited to levels far below the safe threshold, safely preventing conductor overheating during fault conditions.

Furthermore, this failure in circuit breaker performance violates the requirements of section 250.4(A)(5) and other sections of the NEC. In 2005 CMP- 5 added several new sections and notes to the NEC, all reinforcing the intent of the CMP regarding the purpose of the equipment-grounding conductor in a circuit. 250.4(A)(5) is an extraordinary requirement in that explanatory language usually reserved to a non-mandatory Fine Print Note is here made MANDATORY TEXT. The intent of these requirements and the extraordinary emphasis it has placed on them is to make clear to installers of electrical circuits that an equipment-grounding conductor must be a "...permanent, low impedance circuit facilitating the operation of the overcurrent device...". The Panel has indicated its intent in 250.4(A)(5) is for an OCPD to operate "as quickly as possible," which for a thermal/magnetic circuit breaker means it must respond magnetically. The published time/current curves of the 5 dominant lines of 120/240V, 15-50A standard circuit breakers used to meet the requirements of 240.4 all show the magnetic response mechanism in a circuit breaker, when engaged, will clear the circuit in 1-cycle (.167 seconds). Therefore, the intent of NEC Section 250.4(A)(5) is to assure that a fault to the equipment-grounding conductor will trigger the magnetic response of a thermal/magnetic circuit breaker. The data indicates that the intent of 250.4(A)(5) is not met at more than half of 15 and 20A/120V outlets.

NEC Section 240.9 (Thermal Devices) prohibits the use of thermal devices as protection from short circuits or ground faults. Although intended to clarify the proper use of thermal overload relays in motor applications, 240.9 says in part, " thermal relays and other devices not designed to open short circuits or ground faults shall not be used for the protection of conductors against overcurrent due to short circuits or ground faults." So, when the magnetic (instantaneous) trip mechanism in a thermal/magnetic circuit breaker fails to engage in response to a short circuit or ground fault at an outlet, leaving the thermal device as the sole response mechanism, this thermal device is being used as de facto protection of conductors against a short circuit or ground fault, in violation of 240.9.

Referring to the chart accompanying this proposal, the system supplying any outlet on a 120V branch circuit that exhibits a voltage-drop of 5% or less when measured at the full rated load of the circuit as stipulated in the proposal, will deliver sufficient current to a short circuit or ground fault to trigger a magnetic (instantaneous) circuit breaker response, provided that response is set to trigger at 20X its current-rating or less, as products installed to meet the requirements of Section 240.4 presently do. A proposal presently under evaluation by UL/STP-489 will, if accepted, assure that the circuit breaker performance described in the proposed Fine Print Note is assured in the future for all OCPD devices installed to meet the overcurrent protection requirements of 240.4.

The result of this coordination is that all 15 and 20A/120V outlets are assured of an instantaneous breaker response to fault current, putting to rest the questions raised by the test data and assuring compliance with 250.4(A)(5) and 240.9 for 15-20A/120V outlets.

The data supporting this proposal shows how the failure of circuit breakers to respond instantaneously to fault-level overcurrent creates a safety issue based on accepted engineering standards that the NEC should address. Accordingly, the submitter urges the NEC to accept this proposal and put the safety questions raised by the test data to rest.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel reaffirms their position taken on similar proposals in previous Code cycles that voltage drop is a design consideration that must be dealt with by the installer/designer for each installation and can be specific to the involved equipment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-194 Log #1841 NEC-P02 **Final Action: Reject**

(210.19(A)(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: Branch circuit conductors shall have an <u>allowable</u> ampacity not less than the maximum <u>calculated</u> load to be served. Where a branch circuit supplies continuous load(s) or any combination of continuous and noncontinuous load(s), the minimum branch circuit conductor size, ~~before~~ <u>after</u> the application of any adjustment or correction factors, shall have an allowable ampacity not less than the continuous load(s) plus 125 percent of the continuous load(s).

Substantiation: Loads should be designated as "calculated". Conductor sizes before application of adjustment/correction factors may not be adequate after reduction factors of table 310.15(B)(2)(a).

Panel Meeting Action: Reject

Panel Statement: The use of the term "ampacity" is consistent with 310.15. The addition of calculated load is incorrect. The basic premise of the sentence is to establish a rule that the conductors must always be adequate for the maximum load. The calculated load may or may not be the maximum load.

For the explanation of rejecting the change of the word "before" to "after" see the panel statement on Proposal 2-195.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-195 Log #2941 NEC-P02 **Final Action: Accept in Part**

(210.19(A)(1))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text to read as follows:

(A) Branch Circuits Not More Than 600 Volts.

(1) General. Branch-circuit conductors shall have an <u>allowable ampacity, after the application of any adjustment or correction factors, not less than the noncontinuous load plus 125 percent of the continuous load and</u> ~~ampacity~~ not less than the maximum load to be served. ~~Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size, before the application of any adjustment or correction factors, shall have an allowable ampacity not less than the noncontinuous load plus 125 percent of the continuous load~~.

Exception No. 1: <u>If</u> ~~Where~~ the assembly, including the overcurrent devices protecting the branch circuit(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the branch circuit conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load.

Exception No. 2: Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the continuous and noncontinuous load.

Substantiation: An attempt is being made to simplify the requirements as well as to revise the phrase, "before the application of any adjustment or correction factors" to, "after the application of any adjustment or correction factors." This is the way conductors are being selected in the field and complies with the intent of 110.14(C) to assure the conductors are sized not smaller than that required in Table 310.16 based upon the temperature rating of the terminations. The present language can be interpreted to require that the conductors be sized for the noncontinuous load plus 125 percent of the continuous load plus any adjustment or correction factors.

Also, see 240.4(D) which used the phrase for Small Conductor overcurrent protection, "<u>after</u> any correction factors for ambient temperature and number of conductors have been applied." This seems to be the correct concept to ensure proper conductor ampacity.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Part

Change the word "Where" to "If" in the Exception No. 1.

The remainder of the proposal is rejected.

Panel Statement: The two sentences of the main rule are separate issues. The first sentence is intended to establish a basic rule that the conductors must be able to serve the load. The second sentence is to specifically handle the continuous and noncontinuous load issue.

The submitter's change of the word "before" to "after" is technically incorrect. Making that change would require that the 125% sizing rule apply sequentially to the ampacity adjustment factors when, in fact, those ampacity adjustments can overlap the 125% calculation provided the conductor can carry the load and be protected by the overcurrent device. Applying the 125% after adjusting for ambient conditions or conduit fill would result in a conductor larger than necessary to comply with all of the rules.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-196 Log #2951 NEC-P02 **Final Action: Reject**

(210.19(A)(1))

Submitter: Konrad J. A. Kundig, Kundig Metallurgical Consultant

Recommendation: Revise text to read as follows:

(1) General. Branch-circuit conductors shall have an ampacity not less than the maximum load to be served <u>and not less than the rating of the branch circuit.</u> Where a branch circuit supplies continuos loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size, before the application of any adjustment or correction factors, shall have an allowable ampacity not less than the noncontinuous load plus 125 percent of the continuous load.

Substantiation: The requirement that the rating of a branch circuit cannot be higher than the final ampacity of the circuit conductors is already in 210.19(A)(2) for circuits with multiple receptacle outlets serving cord-and-plug loads, because of the unpredictable nature of those loads. This requirement should apply universally. If a gap is left between the ampacity of circuit conductors and a higher circuit breaker rating, a hazardous condition could occur, either due to a mistake in the calculation of load by a designer, or due to a future addition to that load. In fact, the circuit breaker's ampere rating may be the only indication to a future designer/installer of the circuit's capacity.

In the 2008 NEC Handbook, the proposed change is assumed to be in effect in two references, as follows: (1) the discussion following 210.20(A) Exception, on page 93, states: "The rating of the overcurrent device cannot exceed the final ampacity of the circuit conductors after all the derating or correction factors have been applied, such as for temperature or number of conductors." (2) The discussion following 240.4(B) on page 172 states: "Section 210.19(A) requires that branch-circuit conductors have an ampacity not less than the rating of the branch circuit and not less than the maximum load to be served."

Adoption of this proposal will require correlation with other Code sections. For example, 210.19(A)(2) will no longer be necessary.

Panel Meeting Action: Reject

Panel Statement: The revision would be in conflict with 240.4(B) that permits rounding up to the next size overcurrent device when the conductor ampacity does not correspond to a standard size.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-197 Log #1716 NEC-P02 **Final Action: Reject**

(210.19(A)(1), FPN No. 5 (New))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.

Recommendation: Add new text as follows:

<u>FPN No. 5: See 110.14(C)(1)(a) and (b) for termination provisions of equipment.</u>

Substantiation: Ignoring the temperature rating of equipment is the most common mistake being made in conductor sizing today. Entirely too many wiremen take no notice of the temperature limitations of 110.14(C) when sizing conductors. They disregard the temperature rating of equipment, and use the 90°C column of Table 310.16 when 90°C rated conductors, such as THHN, are being used. I've even had engineers stand up in seminars and yell "Larry, how are we supposed to know that!?"

At the very least, there should be a Fine Print Note directing the reader to the rules of 110.14(C)(1)(a) and (b).

Panel Meeting Action: Reject

Panel Statement: The provisions of 110.14(C) apply generally to all installations. As such, adding cross references to rules that already apply is redundant and only adds confusion to areas of the code that do not have a similar cross reference.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-198 Log #4583 NEC-P02 **Final Action: Accept**

(210.19(A)(1) Exception No. 2)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Delete this exception.

Substantiation: This exception should be reserved for instances where the grounded conductor runs from busbar to busbar, as is the case for a feeder. Branch circuit applications typically involve runs from busbar to device, and the equipment on the other end of the wire may not be as forgiving as the connection on a busbar. IT should also be pointed out that the exception is not limited to neutrals, and there are applications where the grounded conductor will be a phase conductor. The literal text could then result in two different sizes of wire arriving at the same device and carrying the same current, and therefore causing unequal heating across the device terminals. The version of this provision that applies in Article 215 is perfectly acceptable, but the wording here was never fully substantiated. In addition, there appears to be little real-world need for this allowance, and it should be either withdrawn or severely limited if it stays in the NEC at all.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-199 Log #3247 NEC-P02 **Final Action: Reject**

(210.19(A)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete.

Substantiation: The heading is "multioutlet" while the text refers to more than one receptacle; multiple receptacles can be installed in one outlet box which may be the only outlet on the circuit. Section 210.21 and the tables thereto appear to be sufficient.

Panel Meeting Action: Reject

Panel Statement: The tables in 210.21 are not sufficient for this issue since the rule in 210.19(A)(2) deals with the conductor itself The rule is important because it establishes that for circuits with multiple receptacles, the rating of the overcurrent device cannot exceed the ampacity of the conductor.

For the heading, see panel action and statement on Proposal 2-200.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-200 Log #4584 NEC-P02 **Final Action: Accept in Principle in Part**

(210.19(A)(2))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 10 for action in 240.4(B)(1) for consistency relating to the text in 210.19(A)(2).

This action will be considered by the panel as a public comment.

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Insert the word "outlet" after the words "more than one receptacle".

Substantiation: As written, this paragraph conflicts with both its title and also with 240.4(B)(1), both of which apply to multioutlet applications. A duplex receptacle can be wired to the next higher standard overcurrent device rating according to 240.4(B)(1), but not two single receptacles in different outlets. However, as written, the text of this section disallows the use of the next higher standard device for a duplex receptacle, in direct conflict with 240.4(B)(1). This proposal brings the paragraph text in line with its title and removes the conflict with Article 240.

Panel Meeting Action: Accept in Principle in Part

Revise the title of 210.19(A)(2) to read:

"**(2) Branch Circuits with More than One Receptacle.**"

The remainder of the proposal is rejected.

Panel Statement: The panel has revised the title of the section to make it consistent with the text. The panel does not agree with revising the rule to apply only when there is more than one outlet versus more than one receptacle. The objective is to ensure that the rating of the overcurrent device does not exceed the conductor ampacity when you supply multiple cord and plug connected loads. With respect to a conflict with 240.4(B)(1), the panel recommends to the Technical Correlating Committee that this proposal be forwarded to CMP 10 for possible action in Article 240 to make 240.4(B)(1) consistent with the rule in 210.19(A)(2).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-201 Log #3570 NEC-P02 **Final Action: Reject**

(210.19(A)(3))

Submitter: George M. Stolz, II, Pierce, CO

Recommendation: Add the following to the end of 210.19(A)(3):

<u>The demand load as calculated in accordance with Article 220 shall be permitted as the maximum load to be served.</u>

Substantiation: Table 220.55, Note 4, allows the branch circuit load to be derived from the table. This would clarify the use of the table at the branch circuit level. As this section reads, it could be intrepreted two ways; one by the nameplate of the appliance, and the other by Table 220.55 as allowed by that section.

Panel Meeting Action: Reject

Panel Statement: 220.55 already provides the specific guidance requested by the submitter.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-202 Log #1842 NEC-P02 **Final Action: Reject**

(210.19(A)(3) Exception No. 1 and (A)(4))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise latter part of (A)(3) Exception No. 1: ...and shall be ~~sufficient for~~ not less than the load to be served.

Revise latter part of (A)(4): "...and shall be ~~sufficient for~~ not less than the load to be served and shall not be smaller than 14 AWG copper or <u>12 AWG aluminum or copper-clad aluminum</u>.

Substantiation: "Sufficient" is subjective and a term to be avoided per the Style Manual. Tap conductors of aluminum or copper-clad aluminum should be minimum 12 AWG.

Panel Meeting Action: Reject

Panel Statement: The use of the term "sufficient" is appropriate in this context. It is unnecessary to specify the conductor type in reference to #14 AWG since Table 310.16 already provide the limits on aluminum conductors.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-203 Log #4890 NEC-P02 **Final Action: Reject**

(210.19(A)(4) Exception No. 1)

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services

Recommendation: Revise text as follows:

Tap conductors shall have an ampacity sufficient for the load served. In addition, they shall h~~ave an ampacity of not less than 15~~ <u>be a minimum of 14 AWG</u> for circuits rated less than 40 amperes and ~~not less than 20~~ <u>12 AWG</u> for circuits rated at 40 or 50 amperes and only where these tap conductors supply any of the following loads.

Substantiation: Table 310.16 does not include conductors with an ampacity of 15 amperes under the 60 degree C or the 75 degree C columns. Whips that are part of listed equipment are covered under the product standard. Field installed flexible cords are covered under Table 400.5(A) which also requires 14 AWG for 15 amperes and 12 AWG for 20 amperes, with the exception for cord types HPD, HSN, HSJ, HSJO, & HSJOO which are for portable heaters. The proposed change would also correlated this section with 240.5(A)

Panel Meeting Action: Reject

Panel Statement: The reference to the ampacity is correct in this section. Should the conductors have to be ampacity adjusted, the rule is intended to still require that the adjusted ampacity not be less than 15 or 20A respectively.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-204 Log #3298 NEC-P02 **Final Action: Accept**

(210.20(B)(3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change the word "larger" to "rated higher".

Substantiation: Edit. "Rated" is more appropriate and the word used in the latter part.

Panel Meeting Action: Accept

Panel Statement: The panel notes that the revision is to 210.21(B)(3) and not 210.20(B)(3).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-205 Log #668 NEC-P02 **Final Action: Reject**

(210.21(B)(1))

Submitter: William Riggenbach, Riggs Electric

Recommendation: Revise text to read as follows:

(1) Single Receptacle <u>or One Duplex Receptacle</u> on an Individual Branch Circuit. A single receptacle <u>or one duplex receptacle</u> on an individual branch circuit shall have an ampere rating not less than that of the branch circuit.

Substantiation: The use of one (1) 15 amp rated duplex receptacle on 20 amp circuits is commonplace in the industry. The interpretation of the Code is that under 210.21(B)(3), a duplex receptacle falls under the “two or more receptacles” part of paragraph (3). However, under Table 210.21(B)(2), a 15 amp receptacle may only carry 12 amperes, whereas a 20 amp receptacle may carry 16 amperes, the same as the 20 amp circuit may carry. Placing a single 15 amp duplex receptacle on a 20 amp circuit limits the ampacity of that circuit to 12 amperes.
Panel Meeting Action: Reject
Panel Statement: The submitter’s interpretation is incorrect. A 15A duplex receptacle consists of two receptacles by definition and each could supply up to 12A (further limited by the branch circuit overcurrent device). As such a duplex receptacle can fully utilize a 20A branch circuit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-206 Log #704 NEC-P02 **Final Action: Reject**
(Table 210.21(B)(2))

Submitter: Steven French, I.B.E.W. Electrician/Apprentice Instructor
Recommendation: Revise Table 210.21(B)(2) as follows:

Table 210.21(B)(2) Maximum Cord-and-Plug-Connected Load to Receptacle

Circuit Rating (Amperes)	Receptacle Rating (Amperes)	Maximum Load (Amperes)
15 ~~or 20~~	15	12
20	20	16
30	30	24

Substantiation: By allowing the installation of 15 amp device(s) (receptacle) on a 20 amp branch circuit increases the chance of a fire that may result in destruction of property and loss of life.
The table states that a 15 amp receptacle is to experience a maximum of 12 amp load. In today’s world this can not be ensured without an overcurrent device limiting the current flow.
The 1940 NEC stated that a 15 amp receptacle could be installed on a 20 amp circuit if only 15 amp loads utilized the receptacle.
In today’s world the users are often using adapters installed on the receptacle for convenience of plugging in more than two utilized equipment. This is done by strips and adapters, all of which have one common connection point to the wiring systems, which is the 15 amp receptacle installed on a 20 amp circuit.
By omitting allowing the installer to install a 15 amp receptacle on a 20 amp circuit, would be supported by NEC Article 110.10. Listed products applied in accordance with their listing shall be considered to meet the requirements of this section.
Manufacturers normally do not list 15 amp receptacles to be used in a 20 amp circuit.
The general rule should install the device according to its listings.
Note: there would be a very negligible financial impact, but a significant increase in safety.
Panel Meeting Action: Reject
Panel Statement: A 15A receptacle is listed for use on a 20 ampere circuit. The 15A receptacle is further limited to the 12A level through the attachment cap that is placed on the product. The submitter has not substantiated that adapters have resulted in fires or lack of protection of the branch circuit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-207 Log #1963 NEC-P02 **Final Action: Reject**
(210.21(B)(2) and Table 210.21(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: This rule is virtually unenforceable. The NEC is a safety code which permits a receptacle on an individual circuit to supply a load for which it is rated. What safety hazard is incurred if a 15 ampere rated receptacle supplies a 15 ampere load? The typical user doesn’t know that a listed appliance with a 15 ampere cord plug for a 13 ampere rated appliance is prohibited by the Code from being plugged into a 15 ampere receptacle. Where more than one receptacle with a special configuration is installed on a branch circuit only for the supply of a single appliance such as a carpet cleaner or floor polisher, the circuit is technically an individual circuit and the tables do not apply. The panel has stated deletion would remove a safety margin; why is a safety margin not required for a single receptacle on an individual circuit? Listed receptacles are rated to carry current up to their rating. If these provisions are intended to allow for additional load, they don’t correlate with 90.1(B).
Panel Meeting Action: Reject
Panel Statement: The rule is necessary to correlate with the product standards for receptacles. 15A duplex receptacles are evaluated to supply 15A through the individual receptacle contact points.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-208 Log #3246 NEC-P02 **Final Action: Reject**
(210.21(B)(2) and Table 210.21(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: This rule is virtually unenforceable. The NEC is a safety code which permits a receptacle on an individual circuit to supply any load for which it is rated. What safety hazard is incurred if a 15 ampere rated receptacle supplies a 15 ampere load? The typical user doesn’t know that a listed appliance with a 15 amp cord plug for a 13 ampere rated appliance is prohibited by the Code from being plugged into a a 15 ampere receptacle. Where more than one receptacle with special configuration is installed on a dedicated circuit only for the supply of a single appliance such as a floor polisher or carpet cleaner the circuit is technically an individual circuit and the tables do not apply. The panel has stated this would remove a safety margin. Why is a safety margin not required for a single receptacle on an individual circuit? Listed receptacles are rated to carry current up to their rating. If these provisions are intended to allow for additional loads they don’t correlate with 90.1(B).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-207.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-209 Log #669 NEC-P02 **Final Action: Reject**
(210.21(B)(3))

Submitter: William Riggenbach, Riggs Electric
Recommendation: Add new text to read as follows:
210.21(B)(3)(a) Where two or more 15 ampere rated receptacles are installed on a 20 ampere rated circuit, the device must not be used for continuity of the circuit. Splices must be made for ungrounded, grounded (neutral) and ground conductors, and a pigtail be brought out for connection to the device.
Substantiation: Common practice (at least in the state of Georgia) is to “stab” the #12 NM-B cable into the back of 15 ampere receptacles (i.e., a kitchen or dining room circuit). This is true even if the receptacles are only rated for #14 wire. I have seen at least two circumstances where a fire has either already happened or was about to happen. Splices and pigtails will not only remove continuity from the circuit, but will also allow the circuit loading to be 16 amperes instead of the 12 that is in place using the receptacle for continuity.
Panel Meeting Action: Reject
Panel Statement: The push-in terminals of a receptacle are limited to #14 AWG, which would limit the overcurrent protection of the circuit to not more than 15 amperes.
When not using the push-in terminals, the receptacle is suitable for use on a 20 ampere circuit and the terminals are suitable for 20 amperes. The submitter has not substantiated that all 15A receptacles must be pigtailed rather than connection to the terminals directly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-210 Log #4590 NEC-P02 **Final Action: Reject**
(210.23 Exception (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 8 for comment.
Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert an exception following the parent text and prior to (A), as follows:
Exception: Luminaires protected with supplementary overcurrent devices in accordance with 368.17(C) Exceptions No. 2 or No. 3 shall be permitted to be supplied from busways of higher ratings than those specified in 210.23.
Substantiation: The rules in the two exceptions cited in this proposal clearly envision supplementary overcurrent protective devices, not branch-circuit overcurrent devices. The new definition of this term in Article 100 makes this very clear. That means that the busway to which they are connected must have the status of a branch circuit. That status then invokes the circuit ampere limits described in 210.23, which are very unlikely to match the typical busway ratings on which the exceptions in 368.17(C) will be applied. This proposal provides the necessary correlation to avoid what is effectively a conflict between Articles 210 and 368.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that 368.17(C) clearly envisions supplemental overcurrent protection. In fact, the current Exception No. 2 specifically references the branch circuit overcurrent device. The panel recommends that the Technical Correlating Committee send this proposal to CMP-8 for comment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-211 Log #4795 NEC-P02 **Final Action: Reject**
(210.23(A)(2) Exception)

Submitter: Adam J. Drozdowski, Artisan Electrical Contractors
Recommendation: Add the following new text:
Exception: When there is two or more receptacles used to supply a load for utilization equipment fastened in place, it shall be permissible to use the full allowable ampacity of the branch circuit if the receptacles are not readily accessible.
Substantiation: The receptacles behind dishwashers, pigs, refrigerators, etc. with cord and plug connection that are not readily accessible will not be subjected to other loads of other equipment.
Panel Meeting Action: Reject
Panel Statement: The current rule only invokes the 50% limitation if the branch circuit supplies, in addition to the fixed in place equipment, lighting units, cord and plug connected equipment not fixed in place, or both. As such, if the circuit supplies only equipment fastened in place, the full branch circuit can be used.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-212 Log #3292 NEC-P02 **Final Action: Reject**
(210.23(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: A 40- or 50-ampere circuit shall be permitted to supply cooking appliances ~~that are fastened in place~~ in any occupancy.
Substantiation: Present wording implies such circuits cannot supply a free-standing electric range that is not fastened in place.
Panel Meeting Action: Reject
Panel Statement: Removal of the words would imply that the circuit could supply smaller cord and plug connected cooking appliances, which is not intended. The panel is not aware that the present words are resulting in issues with freestanding ranges in the field.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-213 Log #296 NEC-P02 **Final Action: Accept**
(210.24)

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.
Recommendation: Revise text to read as follows:
Branch-Circuit Requirements - Summary.
The requirements for circuits that have two or more outlets or receptacles, other than the receptacle circuits of 210.11(C)(1), (C)(2) and (C)(3), are summarized in Table 210.24. This Table provides only a summary of minimum requirements, see 210.19, 210.20, and 210.21 for specific requirements applying to branch circuits.
Substantiation: Code Uniformity - for a more accurate calculation of dwelling unit(s) total connected general lighting loads and the consideration given to the demands of specific required loads of Article 220.
Since the inception of the individual 20 amp branch circuit requirement for dwelling unit bathroom receptacle outlet(s) in 1996 NEC 210.52(D), it has been unclear why the Code-Making Panel refuses to consider this circuit as an "other than lighting load". The CMP simply states in their rejection comment that dwelling unit bathroom outlet(s) are lighting loads and are calculated under the square footage rule for general-use outlets. There is a conflict in the NEC concerning this.
210.11 (new in the 1999 NEC) was a major recognition of the importance of special 20 amp loads for dwelling units; in particular small appliances, laundry and bathrooms. Prior to this new Section in 210, small appliances and laundry load requirements were in 220.4. However, when the CMP relocated these loads to Article 210 their significant load contribution to the Service/Feeder demand factors was recognized. At the same time, the bathroom load requirements were moved to 210.11(C)(3). The 1999 CMP made it clear in 220.3(B)(10)(a) - (1999 code section at the time) - that the 20 amp bathroom circuit now required in 210.11(C)(3) must be included in the general-use outlet requirements for dwelling unit square footage calculations.
There have been numerous attempts during each code cycle to have this required 20 amp bathroom dwelling unit receptacle outlet load be recognized as a 1.5 kva addition to the Service/Feeder demand calculations as with its counterparts of the same code article. 220.42 of the 2008 NEC states that demand factors for general lighting shall not be applied in determining the number of branch circuits. This is clearly a conflict since 210.11(C)(3) is considered a lighting load and requires a minimum of "one" 20-amp branch circuit that can have no other loads. In fact, the code language in 210.11(C)(3) is almost exactly like that of 210.11(C)(1) & (C)(2) which requires 1.5 kva for each 2-wire circuit installed. It cannot be both ways, first calling the dwelling unit bathroom receptacle outlet(s) a lighting load and then requiring an individual circuit to supply it without taking into consideration the connected load.
This one word change submitted for review would also require changes to Articles 210 and 220 to allow a coherent flow to the change.
Panel Meeting Action: Accept
Panel Statement: The panel agrees with adding (C)(3) to the text because the required branch circuit for the bathroom must be 20 amperes and the table could imply that a 15A circuit is acceptable.
However, the panel does not agree with the submitters substantiation that this change results in having to calculate 1500VA for the bathroom branch circuit. The panel maintains its position that the additional 1500VA in the feeder or service calculation is not necessary. The table provides a summary of branch circuit requirements and not load calculations.
The panel does not agree that the application of the demand factors of 220.42 create a conflict with 210.11(C)(3).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-214 Log #2300 NEC-P02 **Final Action: Accept**
(Table 210.24, Footnote 2)

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Table 210.24, Footnote 2 – Revised to
"410.30(C)" to "410.62(C)"
Substantiation: Typo due to renumbering of Article 410 from the 2005 to the 2008 edition.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-215 Log #3297 NEC-P02 **Final Action: Accept in Part**
(210.25(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Branch circuits ~~required~~ installed for the purpose of lighting central alarm, signal, communications, or other ~~needs~~ purposes for public or common areas of a two-family dwelling, a multifamily dwelling, or a multi-occupancy building shall ~~not~~ be supplied from branch-circuit distribution equipment that supplies only such circuits. ~~an individual dwelling unit or tenant space.~~
Substantiation: Edit. A service is equipment that may supply individual units or tenant spaces. Present wording can be deemed as not permitting such circuits to be supplied by a service that serves all dwelling units or tenant spaces.
Panel Meeting Action: Accept in Part
Revise the text of 210.25(B) to read as follows:
"Branch circuits installed for the purpose of lighting, central alarm, signal, communications, or other purposes for public or common areas of a two-family dwelling, a multifamily dwelling, or a multi-occupancy building shall not be supplied from equipment that supplies only an individual dwelling unit or tenant space."
Panel Statement: The panel accepts the revision of the words "installed" and "purposes". The panel did not accept the recommendation to add branch circuit distribution equipment and to delete the reference to individual dwelling unit or tenant space because the text needs to specify that the common equipment must be connected ahead of any equipment that supplies "only an individual unit or tenant space".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-216 Log #2530 NEC-P02 **Final Action: Reject**
(210.50(B))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Add text as follows:
[210.50] **(B) Cord Connections.** A receptacle outlet shall be installed wherever flexible cords with attachment plugs are used. Where flexible cords are permitted to be permanently connected, receptacles shall be permitted to be omitted for such cords. Receptacle outlets shall not be installed where flexible cord is not permitted in accordance with 400.8.
Substantiation: The current text of the NEC, in 400.8(5), does not allow flexible cord to be used above a suspended or dropped ceiling. The NEC does NOT currently have any restriction on the installation of receptacle outlets in such locations. Wherever a receptacle outlet is installed, a flexible cord is sure to follow!
For added clarity for code users and also for enforceability, it makes sense to include the proposed new sentence as shown here in 210.50(B).
Panel Meeting Action: Reject
Panel Statement: The receptacle outlet is not prohibited and could be installed to provide temporary power for purposes such as those in 210.63 or for purposes such as a plug-in power supply.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-217 Log #880 NEC-P02 **Final Action: Reject**
(210.50(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Receptacles shall not be installed in a face-up position in any countertop in the living areas.
Substantiation: The provisions of 550.13(F)(2) should apply.
Panel Meeting Action: Reject
Panel Statement: This provision is already covered in 406.4(E). The panel notes the reference is 210.52(C) not 210.50(C).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-218 Log #3918 NEC-P02 **Final Action: Reject**
(210.50(C)(5) Exception to (5))

Submitter: Michael R. Fisher, Bluhm Electric Inc.
Recommendation: Revise text as follows:
Exception to (5): To comply with the conditions specified in (1) or (2), receptacle outlet shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop and within 150 mm (6 in.) of the countertop overhang. ~~Receptacles mounted below a countertop in accordance with this exception shall not be located where the countertop extends more than 150 mm (6 in.) beyond its support base.~~
Substantiation: We have countertops with overhangs that exceed 150 mm (6 in.) which create a safe place to place a receptacle. Since the requirement is to have the receptacle within 300 mm (12 in.) of the top of the countertop and as long as it is within 150 mm (6 in.) of the overhang. It would not matter how much the overhang would extend. It would be safer installation to have the receptacle under the overhang instead of on the front or side where the cords that are attached would be more in the traffic area of the kitchen.
Panel Meeting Action: Reject
Panel Statement: The panel notes that the proposal is actually to 210.52 and not 210.50. The 150 mm (6 in.) restriction in the current requirement is meant to preclude the installation of the receptacle outlet below the countertop where the counter protrudes far enough from the supporting base for a chair or stool to fit beneath it. This could cause damage to an attachment plug or power supply cord used with the outlet or injury to a person who knocked an appliance off the counter by bumping into the plug or power cord. Relocating the outlet to the underside of the counter at a distance of 150 mm (6 in.) or less would not address this concern.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-219 Log #541 NEC-P02 **Final Action: Reject**
(210.52)

Submitter: William L. Arnold, Arnold Electrical Inspection, P.C.
Recommendation: Add new text to read as follows:
At least one GFCI protected outlet shall be installed in safe rooms, storm cellars, and similar rooms.
Substantiation: These type rooms are becoming more and more popular. Homeowners and some electricians argue that since this is not a habitable room, it does not require any wiring. I can find nothing in the codes to overrule this argument. Therefore, I feel that a new code is needed.
Panel Meeting Action: Reject
Panel Statement: The listing of rooms in 210.52(A) utilizes the term “similar rooms” to describe the areas where receptacle placements are required. The submitter has not shown that the rooms described would differ substantially from the rooms listed in 210.52(A) or from an unfinished basement to warrant a specific list. The requirements for GFCI protection are outlined in 210.8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-220 Log #2411 NEC-P02 **Final Action: Reject**
(210.52(l))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Add (I) Attics: In dwelling units where attic spaces are not used for habitable living space and contain an appliance that requires service at least one 125 volt single phase 15- or 20- ampere rated receptacle outlet shall be required. This outlet shall be within 25 ft of the appliance.
Substantiation: There is no provision for a receptacle outlet in attics that contain appliances that require service. A service technician needs to run an extension cord from the floor which has access to the attic through the attic access panel which is in violation of 408.8(3).
Panel Meeting Action: Reject
Panel Statement: The panel notes that the provisions in 210.63 already require a receptacle on the
same level and within 25 feet.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-221 Log #2903 NEC-P02 **Final Action: Reject**
(210.52, FPN)

Submitter: David A. Williams, Lansing, MI
Recommendation: Delete the Fine Print Note to 210.52.
Substantiation: The fine print note should be deleted since the listing requirements do not permit receptacles to be installed above baseboard heaters. See the 2008 UL White Book, Page 186 Category (KLDR). “To reduce the likelihood of cords contacting the heater, the heater should not be located beneath electrical receptacles.”
Panel Meeting Action: Reject
Panel Statement: The FPN is still accurate. The note is important to draw attention to the instructions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-222 Log #1884 NEC-P02 **Final Action: Reject**
(210.52(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Except as provided in 210.52(C) in every living room, kitchen, family room,...(remainder unchanged).
Substantiation: Edit. Correlation with 210.52(C).
Panel Meeting Action: Reject
Panel Statement: The rules in 210.52(A) still apply to the wall space around the kitchen. A reference to 210.52(C) is unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-223 Log #2962 NEC-P02 **Final Action: Accept in Principle**
(210.52(A))

Submitter: Joseph Whitt, JW Electric
Recommendation: New text:
210.52(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, recreation room, foyer, or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(3).
Substantiation: Today’s homes are being built with larger foyers some being as large as other rooms in the dwelling. As the code now stands, this area will be considered a hall which would require only one receptacle if it is more than ten feet in one direction no matter the other direction. With the addition of foyers to 210.52(A) it will reduce the possibilities of a homeowner running extension cords under rugs and through doorways of the foyer to power table lamps and other appliances.
Panel Meeting Action: Accept in Principle
The panel does not Accept the insertion of the word “foyer” as recommended in the proposal. Instead, the panel has created a new section (I) to read as follows:
“(I) Foyers. Foyers that have an area that is greater than 60 ft2 shall have a receptacle(s) located in each wall space as defined in 210.52 (A)(2)(1).”
Panel Statement: The panel has added a new subdivision “(I) Foyers” for clarity. The panel has also added a minimum area requirement to this section to exempt smaller foyers that typically do not have the space to facilitate home furnishings and electrical equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ORLOWSKI, S.: In agreement with the Ballot Comment from Mr. Pauley, and somewhat in agreement with the Ballot Comment from Mr. Coluccio. There are too many possible configurations of a foyer. But, the biggest problem is what constitutes a “foyer”. In almost all configurations of residential units, there is no foyer at the entrance door, only a hallway. Hallways are already covered under 210.52 (H) that only requires “3.0 m (10 ft) or more in length shall have at least one receptacle outlet.” If a new provision relating to foyers is included in the NEC, a definition of a “foyer” needs to be added to the NEC, and the minimum size, window location, door locations needs to be considered relative to the placement of receptacle outlets.
PAULEY, J.: The panel did not have substantiation to treat foyers over 60 sq ft as rooms that require receptacles in all wall spaces that would qualify under 210.52(A). This creates a requirement for receptacles in spaces where they have no practical use. Consider an entry door with side glass panels and two small walls about 2.5’ in width on each side that then extend into another space. This provision would require receptacles in both of these wall spaces with no practical purpose.
Comment on Affirmative:
COLUCCIO, F.: The panel is correct in requiring foyers over 60sq. ft. to have receptacles, many foyers are not designed to have receptacles and I have seen this in the field when performing inspections. The wording should be changed to relax what was written so this proposal won’t be rejected. There are many different shaped foyers you have to take into consideration where you

can easily have many wall spaces 2 feet wide or greater on each side of a doorway resulting in many receptacles having to be installed in this area.
rewrite (l) to read:
(l) Foyers. Foyers that have an area that is greater than 60 sq. ft. shall have a receptacle (s) installed in each wall 900 mm (3 ft) or greater in width excluding doorways from this measurement.
KING, D.: I agree with the Panel Action to now require receptacles be installed in Foyers over 60 sq ft. This added requirement will eliminate the use of extension cords run across doorways and openings to supply lights and other electrical appliances located along wall spaces in these areas.

2-224 Log #3566 NEC-P02 **Final Action: Reject**
(210.52(A))

Submitter: John E. Coleman, Electrical Forensics, Inc.
Recommendation: Add new text as follows:
<u>Receptacles shall not be installed below or within two feet horizontally of windows that may be covered by curtains.</u>
<u>Exception: Receptacles dedicated to HVAC components.</u>
Substantiation: High resistance points generated by improper connections or damaged power cords can produce ignition sources for nearby combustible window treatments.
Curtains often touch connected cords and provide an abundant source of fuel for potential fires. Curtains are especially hazardous to electrical connections when the window is open permitting the wind to oscillate curtains.
Panel Meeting Action: Reject
Panel Statement: This rule is unenforceable since there is no basis for determining whether or not
curtains would exist. It is often specified that the receptacle be directly below the window to allow for holiday decorations to be used in the window.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-225 Log #3806 NEC-P02 **Final Action: Reject**
(210.52(A))

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add language to the middle of 210.52(A) as follows: "**(A) General Provisions.** In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, <u>three-season room,</u> bedroom, recreation room..." (remaining text remains unchanged)
Substantiation: Unheated three-season rooms are often treated as nothing more than a deck with a roof, and proper receptacle spacing is not observed. These rooms are often constructed exactly as any indoor room in a dwelling except for heat. For three-quarters of the year, they are used as interior living space, including furniture, cord-and-plug connected lighting, and appliances such as televisions. Without proper receptacle spacing, some or all of these items are connected with extension cords or undersized lamp cord extensions or other unsafe means. By adding these rooms into the requirements of 210.52(A), electrical safety will be enhanced.
Panel Meeting Action: Reject
Panel Statement: The use of the term "similar rooms" in the current language provides the necessary latitude to include the room described by the submitter. The term "three season room" is undefined.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-226 Log #4385 NEC-P02 **Final Action: Reject**
(210.52(A))

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add language to the middle of 210.52(A) as follows
(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den, sunroom, <u>three-season room,</u> bedroom, recreation room… (remaining text remains unchanged)
Substantiation: Unheated three-season rooms are often treated as nothing more than a deck with a roof, and proper receptacle spacing is not observed. These rooms are often constructed exactly as any indoor room in a dwelling except for heat. For three-quarters of the year, they are used as interior living space, including furniture, cord-and-plug connected lighting, and appliances such as televisions. Without proper receptacle spacing, some or all of these items are connected with extension cords or undersized lamp cord extensions or other unsafe means. By adding these rooms into the requirements of 210.52(A), electrical safety will be enhanced.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-225.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-227 Log #4493 NEC-P02 **Final Action: Accept in Principle**
(210.52(A))

Submitter: Clynard M. Welch, Randolph Community College
Recommendation: Revise text as follows:
210.52 Dwelling Unit Receptable Outlets.
(A) General Provisions. In every kitchen, family room, dining room, living room, parlor, library, den sunroom, bedroom, recreation room, <u>foyer,</u> or similar room or area of dwelling units, receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(3).
Substantiation: Add foyer because homes are being built with substantially large foyers that are being decorated with electrical appliances such as table lamps and other items that use electricity. With the only requirement for receptacle being found in 210.52(H) the use of extension cords to supply power to these items are being used.
The inclusion of foyers to the text in 210.52(A) would require receptacles to be installed as outlined in that section and eliminate the use of cords that could possibly cause fire.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-223.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ORLOWSKI, S.: See NAHB's Comment on Proposal 2-223.

2-228 Log #4791 NEC-P02 **Final Action: Accept in Principle**
(210.52(A))

TCC Action: It was the action of the Technical Correlating Committee that this action be rewritten to comply with the NEC Style Manual.
The panel action did not include a title for the new subdivision (4).
This proposal will be considered by the panel as a public comment.
Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Revise text as follows:
Receptacle outlets shall be installed in accordance with the general provisions specified in 210.52(A)(1) through (A)(3) <u>and shall be in addition to 210.52(C)</u>.
Substantiation: Required countertop receptacles cannot be used to comply with wall space requirements, an example is a 3 ft wall space between the end of a counter and a door, that wall space needs a receptacle and cannot use a countertop receptacle to comply.
Panel Meeting Action: Accept in Principle
Add a new item (4) to 210.52(A) to read as follows:
(4) Receptacles installed for countertop surfaces as specified in 210.52(C) shall not be considered as the receptacles required by 210.52(A).
Panel Statement: The panel has accepted the concept and added a new item (4) to specifically note that countertop receptacles are not permitted to be counted as meeting the surfaces as provisions of 210.52(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ORLOWSKI, S.: Need to revise 210.52(A)(2)(1) as follows.
Wall Space. As used in this section, a wall space shall include the following:
(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways, fireplaces, "fixed cabinets," and similar openings.
Without this text the "unbroken floor line" would include the floor line in front of the kitchen cabinets.

2-229 Log #1349 NEC-P02 **Final Action: Reject**
(210.52(A) and Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (A)(1)(3):
The space afforded by fixed room dividers such as ~~free standing~~ bar-type counters or ~~railings~~ other fixed appurtenances.
Add after (A):
Exception: Wall spaces occupied by cabinets, built-in furniture, or other appurtenances.
Substantiation: "Free-standing" as in electric range, can be deemed as not fastened in place. Proposed Exception is for clarification.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the term "freestanding" as used in this context implies not fastened in place. The objective is to ensure that a freestanding bar-type counter that is used as a room divider is included in the wall space measurements. A bar-type counter, without any wall space behind it, that is attached to the kitchen wall counter is not a room divider. The proposed exception is unnecessary since the described items are not "wall space".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-230 Log #269 NEC-P02 **Final Action: Accept**
(210.52(A)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "in" to "of" so the section reads: "...along the floor line of any wall space...".
Substantiation: Grammatical correction. The floor line is not in the wall space.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-231 Log #2331 NEC-P02 **Final Action: Reject**
(210.52(A)(1))

Submitter: David Nemchik, Medina County Building Department [Ohio]
Recommendation: Revise text as follows:
(1) Spacing. Receptacles shall be installed such that no point measured horizontally along the floor line in any wall space is more than ~~1.8 m (6 ft)~~ 1.5 m (5 ft) from a receptacle outlet.
Substantiation: The original purpose of this spacing requirement was to reduce the usage of extension cords in dwellings. Free standing table luminaires and other portable cord and plug electrical equipment is commonly supplied with a 6 ft cord. When these are placed on an end table 6 ft from a receptacle, the cord is sometimes pulled tauntly elevated in midair against the wall. This results in lighter equipment being tipped over by the pull of the cord weight. This also results in the homeowner introducing an extension cord to eliminate the midair cord. When maximum allowable spacing and cord length are the same, the cord is required to follow the same path as the tape measure, "as the crow flys".
Additionally, the expansion of tamper resistant receptacles does not increase the safety to children when these energized extension cords without TR are available to the children.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated that the current 6 ft spacing requirement is inadequate. For the situation described in the substantiation the table could easily be moved to allow the 6 ft cord to be adequate.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-232 Log #2726 NEC-P02 **Final Action: Reject**
(210.52(A)(1))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Revise text to read as follows:
(1) **Spacing.** Receptacles shall be installed in each wall space so that no point measured horizontally along the floor line in ~~any~~ that wall space is more than 1.8 m (6 ft) from a receptacle outlet.
Substantiation: The change would clarify that receptacles outside the boundaries of the wall space do not fulfill the requirement for having receptacles that serve the wall space. For example, as presently written, the Code might be interpreted as allowing (1) A kitchen countertop receptacle that is close to the edge of the countertop to also serve a wall space adjacent to the cabinet/countertop surface, and (2) A receptacle mounted in the floor in the middle of a doorway to serve the two wall spaces to the left and to the right of the doorway. Also, consider a wall that has two feet of wall space on the left, then a three foot wide doorway, then additional wall space to the right of the doorway. The two foot wall space needs a receptacle, but the present NEC words can be interpreted as allowing that space to be served by a receptacle immediately to the right of the doorway. The receptacle serving a wall space should be actually IN that wall space.
Panel Meeting Action: Reject
Panel Statement: No clarity is provided by the submitter's recommendation. For additional information regarding countertop receptacles see panel action and statement on Proposal 2-228.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-233 Log #2781 NEC-P02 **Final Action: Reject**
(210.52(A)(1))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Revise text as follows:
(1) **Spacing.** Receptacles shall be installed so that no point on the floor line of ~~measured horizontally along the floor line in~~ any wall space is more than 1.8 m (6 ft), measured horizontally along the floor line, from a receptacle outlet.
Substantiation: This change corrects a grammar error that is a source of confusion. The phrase, "measured horizontally along the floor line," is apparently intended to be associated with the 1.8 meter (6 ft) measurement. But that phrase is presently located next to, and is therefore associated with (according to the rules of grammar), the word "point." You cannot measure a point. But more importantly, in its present location, that phrase allows us to select a point in the wall space, connect a six foot long string to that point, and look for a receptacle within a six foot circle centered at that point. It does not matter if that receptacle is above a kitchen countertop or is across a doorway's opening. The notion of "measured along a floor line" is completed, as soon as you select a point. The notion of being within six feet does not require a measurement to be taken along a floor line, nor does it forbid you to go across an area that is not part of the wall space.
Panel Meeting Action: Reject
Panel Statement: The submitter's wording doesn't add any clarity to the existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-234 Log #2782 NEC-P02 **Final Action: Reject**
(210.52(A)(2)(1))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Revise text as follows:
(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by permanently installed kitchen cabinets or by doorways, fireplaces, and similar openings.
Substantiation: As written, if a kitchen has a wall that is partially, but not completely, fitted with cabinets, and if you start measuring the open wall space in order to lay out the wall space receptacles, you will measure along the floor line, come to the cabinet base, measure around the corner to the front of the cabinet, continue measuring along the front of the base cabinet until you come to its other edge, measure around the corner to the back of the cabinet, and continue the measurement along the remaining floor line. This puts the "wall space" receptacle requirements of 210.52(A)(1) at odds with the "wall counter spaces" receptacle requirements of 210.52(C)(1). The lines at which the sides and the front of a kitchen cabinet meet the floor should not be considered "wall spaces," in the context of 210.52(A)(1). The present wording allows them to be considered wall spaces. The proposed wording still treats a permanent wall-to-wall bookcase as "wall space."
Panel Meeting Action: Reject
Panel Statement: The kitchen cabinets are not wall space under the rule as stated in the current code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-235 Log #1509 NEC-P02 **Final Action: Reject**
(210.52(A)(2)(3))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Revise text to read as follows:
(3) The space ~~afforded~~ occupied by fixed room dividers such as freestanding bar-type counters ~~or railings.~~
(4) Railings that establish a boundary between two areas or two elevations on the same floor level, or that provide a safety barrier between floor levels, but excluding staircase handrails.
Substantiation: This corrects an error in the use of the English language. There are no published definitions of the word "afford" and its derivative form "afforded" that fit into the context in which "afforded by" appears in 210.52(A)(2)(3). The nearest definition might be, "to furnish or supply," but even that does not fit the intended context. Thus, the current wording has no meaning, and it cannot, therefore, be enforced.
A simple substitution of the word "occupied" for "afforded" would correct the language error, but would create a new ambiguity. That is because the "space occupied by a railing" could be argued to include only the top and bottom rails and the posts that connect them, not the open air between the posts.
Bar-type counters are often used as the boundaries between two separate rooms on the same floor level. Railings are not. Railings frequently separate rooms with at least a one-step difference in height. Even more frequently, they establish a safety barrier between a second floor landing and the open living spaces below. These two cases are not addressed in the present wording, as the railing would not comprise a "room divider." For example, look at the architectural plans of the second floor landing, and you will not see two rooms with a railing between them. Rather, you see one room, with a railing at one edge, and thus the railing is not a "room divider." The intent of this code article may be to require floor-mounted receptacles along this railing, but the present wording does not require them. The additional words shown are needed to clarify that a railing is a "wall space."
Panel Meeting Action: Reject
Panel Statement: The current wording conveys the intent to include railings that serve as fixed room dividers regardless of their location. The submitter's text does not add clarity to the current text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-236 Log #240 NEC-P02 **Final Action: Reject**
(210.52(A)(2)(c))

Submitter: David Ware, Yorktown, VA
Recommendation: Revise as follows:
(c) The space affected by fixed room dividers ~~such as free standing bar type counters or railings~~.
Substantiation: 210.52(C)(3) speaks to the island counter spaces. Inspectors are calling islands "wall space" and requiring outlets on seating areas which is a hazard. Please see the photos I have provided.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The deletion of the language would eliminate the requirement for receptacles in areas where they are needed. In the majority of applications, an island does not function as a fixed room divider, which is what is addressed by the current language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-237 Log #1147 NEC-P02 **Final Action: Reject**
(210.52(A)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise text to read as follows:
(3) Floor Receptacles.
(a) Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.
(b) In meeting rooms located in office buildings and hotels/motels, a receptacle outlet in a listed floor box shall be installed in the center of each room. For a dividable meeting room a single receptacle outlet in a listed floor box shall be installed in the center of each partitioned area.
Substantiation: The purpose of this new section is to increase the number of access points to the electrical supply to reduce reliance on the use of extension cords and the number of extended and potentially overloaded in meeting rooms. Without centrally located receptacles, extension cords are used with power strips (which are often daisy chained) attached at wall outlets. Extension cords are a tripping hazard and damaged extension cords are a shock and fire hazard. The increased use of laptop computers and projection equipment has led to greater demand for electrical receptacles in convenient locations. The NEC needs to recognize this trend by requiring receptacles to be installed in listed floor boxes in the center of meeting areas, thereby reducing the need for extension cords.
Panel Meeting Action: Reject
Panel Statement: The proposal deals with meeting rooms in office buildings and hotel/motels, but the proposal is made to the section of the code that applies to dwelling units.
See panel action and statement on Proposal 2-276.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ORLOWSKI, S.: First, NO documentation was provided to show the current provisions are a cause of a real fire or other life/fire-safety problem that would be solved if the floor boxes were mandated. Second, it is unfortunate that the scope of the NEC does not relate to the NEC being the "minimum" requirements for "practical safeguarding" for electrical installations. The proposed requirement is nothing more than mandating a "convenience outlet that in fact may never be used.

2-238 Log #3699 NEC-P02 **Final Action: Reject**
(210.52(A)(3) (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Section 210.52(A)(3) should be revised to read as follows:
(3) Floor Receptacles.
(a) Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets unless located within 450 mm (18 in.) of the wall.
(b) A receptacle outlet in a listed floor box shall be installed at least 1.8m (6ft) from the wall in rooms that are 60 m² (625 ft²) in area or larger other than hallways, bedrooms, basements, kitchens, bathrooms, garages and swimming pool rooms. A receptacle outlet in a listed floor box shall be installed for each 60 m² (625 ft²) in area in a room.
Substantiation: The purpose of this new section is to increase the number of access points to the electrical supply to reduce the number of potentially overloaded circuits in residential family rooms, living rooms and great rooms. Panel 2 discussed how cord lengths for lamps and other electrical equipment have been shortened from 6 feet to 5 feet. The lack of a sufficient number of available receptacle outlets near the center of larger rooms leads the homeowner to use extension cords in place of a permanent wiring. In addition, extension cords may be covered by rugs or carpets. According to the Electrical Safety Foundation International (EFSi), this should never be done as heat buildup and friction could cause a fire. Also, cords left exposed across a room can create a tripping hazard (see attached brochure). With the proliferation of cord connected home use electrical products such as room air conditioners, dehumidifiers, humidifiers, air purifiers, cordless phones, home entertainment systems, computer equipment, electronic games, multiple TV's, appliances, etc., it is evident that the number of receptacles required 50 years ago is no longer adequate for today's home. The addition of floor receptacles as recommended in this proposal will help to ensure that there are an adequate number of receptacles available for connection of the large number of cord connected appliances now being used in the typical dwelling.
Damaged extension cords are a cause for shock and fire. Furniture and lights are placed in the middle of these rooms away from any wall receptacles. Requiring the provision for receptacles to be installed in listed floor boxes will eliminate the need for extension cords. The proposed language is written so that there is flexibility in where to locate the floor receptacle(s). According to National Association of Homebuilders statistics, the average size home more than doubled in size since the 1950's. The proposed 625 square foot (25 foot by 25 foot) room is directed toward much larger homes then the average house built today.
There has been a significant increase in the number of cord connected household electrical products used in dwellings, there has been no corresponding change in the NEC that addresses the need for the additional receptacle outlets that are necessary to accommodate the use of these products by the homeowner. Since 1956, the receptacle spacing requirements in 210.52(A)(1), and the resultant number of receptacles installed, has remained unchanged.
Previous editions of the NEC Handbook (e.g., 1981) stated, "Receptacles are to be located so that no point in any wall space is more than 6 ft from a receptacle. This rule intends that an appliance or lamp with a flexible cord attached may be placed anywhere in the room and be within 6 ft of a receptacle, thus eliminating the need for extension cords." Since most cord connected equipment will have 5 ft cords, based on the UL standards requirements for these products, it is still true that the receptacle spacing requirements now in the NEC will allow the cord on any single product to reach a receptacle from any point along the wall without the use of extension cords. However, this requirement did not anticipate the use of cord connected electrical equipment used in large rooms where the furniture is placed in the middle. The addition of floor receptacles will allow lamps and other electrical appliances to be used in the center of large rooms without the use of extension cords.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Requiring the placement of receptacles in the floors of dwelling unit areas of 625 ft^2 or more, located at least 6 ft from the wall, in areas that may have no furniture or other provisions for interior design specifications, is not practical and has not been substantiated. If a floor receptacle were required in such areas, it could still end up underneath furniture which, if still used by the homeowner, would be a hazard in itself.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 8 Negative: 4
Explanation of Negative:
KING, D.: Placement of furniture should not be a consideration for panel 2 when determining the minimum safety requirements for the spacing of receptacles in dwelling units. The intent of the submitter is to require a receptacle and not to mandate the location of the device. The location of the device is a design consideration and can be determined at the time that the receptacle is installed. Minimum spacing requirements for receptacles reduces the use of extension cords and can prevent electrical fires in dwelling units.
LAROCCA, R.: In large rooms such as "great rooms" that have become increasingly popular, the only requirement is for receptacles to be installed along the wall space. If receptacles are not included in the open floor space, extension cords will be used to provide power to lamps and other appliances used in the open central area of the room. Cords used in such a manner will be run under carpets and rugs and may be damaged creating a potential fire or shock hazard, or create a tripping hazard if left exposed. Requiring one or more floor receptacles in large rooms would help prevent these potentially hazardous conditions.
PAULEY, J.: This proposal should have been accepted by Panel 2. The NEC is not a design manual. The locations of floor boxes are the responsibility of designers and architects.
WEBER, R.: This proposal should have been accepted in principal and placed as an identified code requirement to address large room areas in dwellings and the need for other than wall receptacles around the outside walls. There was a similar proposal for the 2008 NEC Cycle, that was not supported at that time, however dwelling units are being built with large room areas and then forced to run cords under carpets or other floor coverings to provide electrical power to interior room areas and layouts. I agree that the designated location for the floor receptacle would need some flexibility and defined area limits that may require more than one receptacle to be installed. We need to address this issue with clear and meaningful code text.
Comment on Affirmative:
ORLOWSKI, S.: First, NO documentation was provided to show the current provisions are a cause of a real fire or other life/fire-safety problem that would be solved if the floor boxes were mandated. Second, it is unfortunate that the scope of the NEC does not relate to the NEC being the "minimum" requirements for "practical safeguarding" for electrical installations. The

proposed requirement is nothing more than mandating a "convenience outlet that in fact may never be used.

2-239 Log #4194 NEC-P02 **Final Action: Reject**
(210.52(B)(1) Exception No. 2)

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:
Exception No. 2: ~~The receptacle outlet~~ A single receptacle for refrigeration equipment shall be permitted to be supplied from an individual branch circuit rated 15 amperes or greater.
Substantiation: The definition of individual branch circuit indicates that it only supplies one utilization equipment which would seem to require a single receptacle opposed to a duplex receptacle to be used. A question was asked at the 2008 Southern Section IAEI meeting and multiple answers were provided indicating that duplex receptacles are acceptable. Although adding the term "single receptacle" to this exception might seem redundant, many do not read the ROP panel statements. If CMP 2 intends to permit duplex receptacles then the word "individual" should be deleted from this exception.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that a single receptacle is required. A receptacle other than a single receptacle could be used and other means such as configuration or arrangement of the equipment could limit the application to a single utilization equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-240 Log #2822 NEC-P02 **Final Action: Reject**
(210.52(B)(2) (New))

Submitter: Herbert Porter, Akron, Oh
Recommendation: Add Exception to read as follows:
(2) No Other Outlets. The two or more small-appliance branch circuits specified in 210.52(B)(1) shall have no other outlets.
Exception No. 1: A receptacle installed solely for the electrical supply to and support of an electric clock in any of the rooms specified in 210.52(B)(1).
Exception No. 2: Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units.
Exception No. 3 A single range exhaust hood mounted above a range may be connected to one of the small appliance branch circuits that serve the countertop receptacles.
Substantiation: Allowing a single range hood to be direct connected to one of the small appliance branch circuits will allow the electrician more flexibility when wiring a kitchen. One or two of the two required small appliance are available whereas the electrician can easily leave a wire out for a range hood. Most range hoods consume a maximum of two amps. Prior to the 1996 NEC. outdoor receptacle outlets were permitted to be connected the small appliance branch circuit and there was never a problem. I submitted a similar proposal for the 1996 code cycle and the proposal was accepted in principal. but was rejected in the comment stage.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that all range hoods add only minimal load to the small appliance branch circuit. Some of these hoods draw significant load and in some cases also include a microwave. The panel intends to limit the connections of equipment to the small appliance branch circuit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-241 Log #1714 NEC-P02 **Final Action: Reject**
(210.52(C))

Submitter: Ronald E. Hackett, Village of Buffalo Grove / Rep. NE Suburban IAEI
Recommendation: Add new text as follows:
(C) In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of the dwelling units, receptacle outlets for countertop spaces shall be installed in a kitchen to serve countertop surfaces in accordance with 210.52(C)(1) through (C)(5).
Where a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop, the range, counter-mounted cooking unit, or sink shall be considered to divide the counter space into two separate countertop spaces as defined in 210.52(C)(4). ~~Each separate countertop space shall comply with the applicable requirements in 210.52(C).~~
At least one receptacle shall be installed for the countertop space behind the range, counter-mounted cooking unit or sink; where the long dimension is 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater.
Substantiation: 210.52(C) is unclear to the electrical professional. From the electrician, instructor and the AHJ one is uncertain as to where or when a receptacle is required. Homeowners and designers may be included as well. The general rule is that at least one receptacle shall be installed at each island countertop space with a long dimension of 600 mm (24 in.) or greater and short dimension of 300 mm (12 in.) or greater.
The result is that many AHJs are only requiring one receptacle whether or not the island has separate spaces due to the installation of a range, cooking unit or sink. This is not the intent. AHJs are frustrated on this topic.
Currently, 210.52(C) makes a wonderful attempt to consolidate and apply one requirement for two distinct and unrelated spaces. However, this attempt falls short. Figure 210.52(C)(1), shows two illustrations. One shows a space exempt from wall line where "x" is less than 300 mm (12 in.). This requirement is clear and precise. It gives the user of the NEC a clear guideline concerning the wall space behind the appliance or sink with regards to receptacle spacing. The exception indicates that receptacle outlets shall not be required on a wall directly behind a range, counter-mounted cooking unit or sink where the wall space is less than 12 in. The key to understanding this is the wall. You have to have a wall.
This same 12 in. or less does not work for all island or peninsula counter spaces. For instance, an island with no wall space. The difference is that there may not be a wall directly behind the appliance or sink. This difference between wall space and no wall space for islands or peninsulas needs to be addressed. Clarification is warranted. In most cases, the island will not have wall space. Where this is the case, this 12 in. or less is not practical especially for the new innovative island designs.
When applying 210.52(C), the main criteria for determining separate spaces for islands and peninsulas should be based on whether a range, counter-mounted cooking unit, or sink is installed and not on the width measurement behind the range if 12 in. or less. In practical terms, this is when we should have separate spaces in determining the number of receptacles. This confusion is why many AHJs base their inspection on the general rule. "One receptacle outlet on the island, period". This is not the intent of 210.52 (C).
With new innovative islands. See article from Chicago Tribune on kitchen islands. The island most likely will include a sink or a cooking unit or both. As an AHJ, we should have clear code language as to the specific requirement. If the island has a sink or cooking unit, we should be able to conclude that the island has separate spaces. The next step then is to determine the number of separate spaces. We base the number of receptacles on the number of separate spaces. The Code reference to 210.52(4) brings us to (C)(1), (C)(2) and (C)(3). Any space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater, at least one receptacle is required. This is clear and right to the point. This works for the island with wall space and without wall space.
The proposal makes it clear that when we have a range, counter-mounted cooking unit, or sink on the island or peninsular, we have separate spaces. To determine if that space requires a receptacle, we visit 210.52(4). Also, where the space behind the range, counter-mounted cooking unit or sink has long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm(12 in.) or greater, at least one receptacle is required.
Additionally, deleting reference to 210.52(C) should be accepted. It would be better served by including 210.52(C) under 210.52(C)(4). For example, (4) Separate Spaces, should read as follows: Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C), (C)(1), (C)(2) and (C)(3). Removing redundancy of code sections will help alleviate confusion and be more user friendly. All requirements for separate spaces should be located under (4) separate spaces. This makes perfect sense. Why have someone go back and forth between 210.52(C) and 210.52(C)(4)?
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the current wording is confusing. If the space behind the sink or range is less than 12 in. then the countertop is considered to be two spaces that each must meet the dimensions to require a receptacle. If the space is 12 in. or greater, the space is considered to be a single countertop and only one receptacle is required.
The submitter has also confused the application of the drawings. These drawings apply to 210.52(C)(1), which only applies to wall counter space as indicated in the reference to the figures from 210.52(C)(1) Exception.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-242 Log #3108 NEC-P02 **Final Action: Accept in Principle in Part**
(210.52(C))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised Text and the upper drawing in Figure 210.52(C)(1):
(C) Countertops. In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop spaces shall be installed in accordance with 210.52(C)(1) through (C)(5).
~~Where a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the width of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.), the range, counter-mounted cooking unit, or sink is considered to divide the countertop space into two separate countertop spaces as defined in 210.52(C)(4). Each separate countertop space shall comply with the applicable requirements in 210.52(C).~~

(1) Wall Countertop Spaces. A receptacle outlet shall be installed at each wall countertop space that is 300 mm (12 in.) or wider. Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space.

Exception: Receptacle outlets shall not be required on a wall directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

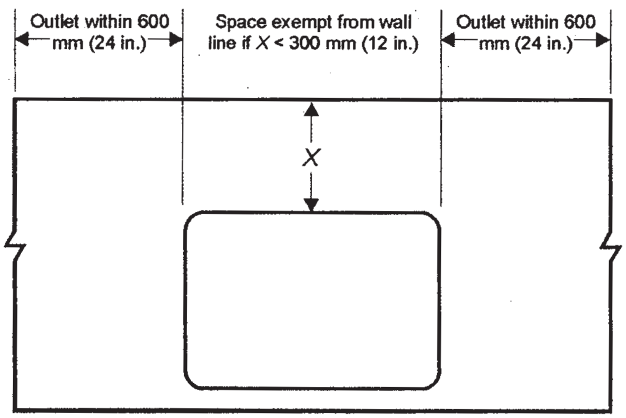
(2) Island Countertop Spaces. At least one receptacle shall be installed at each island countertop space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater.

(3) Peninsular Countertop Spaces. At least one receptacle outlet shall be installed at each peninsular countertop space with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater. A peninsular countertop is measured from the connecting edge.

(4) Separate Spaces. If a range, rangetop, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the depth of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.) as shown in Figure 210.52(C)(1), the range, rangetop, counter-mounted cooking unit, or sink is considered to divide the countertop space into two separate countertop spaces. Each separate countertop space shall comply with the applicable requirements in 210.52(C)(1), (C)(2) and (C)(3). ~~Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(1), (C)(2), and (C)(3).~~

210.52(C)(5) is not revised by this Proposal.

Replace the upper drawing in Figure 210.52(C)(1) with the following proposed revision:



Range or counter-mounted cooking unit in counter space

Revise the text in Figure 210.52(C)(1) to read, "Figure 210.52(C)(1) Determination of Area Behind a Range, ~~or~~ Counter-Mounted Cooking Unit, or Sink."

Substantiation: The second paragraph in 210.52(C) is proposed to be moved to 210.52(C)(4) and replace that subsection as it clearly relates to "Separate Spaces" as covered in that section and duplication is not necessary.

The upper drawing in Figure 210.52(C) needs to be revised as shown as most commonly, counter-mounted cooking units, rangetops and sinks do not extend from the face of kitchen counters. And, that is not the issue being addressed. This section addresses whether the appliance or sinks create a separation of the counter top for the purpose of determining the appropriate placement of receptacle outlets.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle in Part

Delete the second paragraph of 210.52(C).

Revise 210.52(C)(4) to read as follows:

"**(4) Separate Spaces.** Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(1). If a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop and the width of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.), the range, counter-mounted cooking unit, or sink is considered to divide the countertop space into two separate countertop spaces as defined in 210.52(C)(4). Each separate countertop space shall comply with the applicable requirements in 210.52(C)."

The remainder of the proposal is rejected.

Panel Statement: The panel agrees with relocating the second paragraph of 210.52(C) to become the second paragraph of 210.52(C)(4). The panel does not agree with deleting the current sentence in 210.52(C)(4) because the text is applicable to wall counter spaces.

The panel does not agree with revising the drawing. The drawing as referenced from 210.52(C)(1) is applicable to wall counter space and is intended to convey how to deal with a corner mounted sink, etc. or a sink that extends from the wall counter. Normal wall counters are not wide enough to accommodate a sink and have space behind the sink that would be greater than 12 in. A placement of sink or cooking unit in a normal 23 in. deep wall counter will in the vast majority of cases create separate spaces.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-243 Log #4498 NEC-P02 **Final Action: Accept in Principle**
(210.52(C))

Submitter: Monica J. Johnson, Randolph Community College

Recommendation: Revise text to read as follows:

210.52 Dwelling Unit Receptacle Outlets.

(C) Countertops. In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop spaces shall be installed in accordance with 210.52(C)(1) through (C)(5). Receptacles installed to serve countertops shall not serve to fulfill the requirements of wall space covered in 210.52(B)(1) as covered by 210.52(A).

Substantiation: Some installers and code officials think that receptacles installed to serve the countertops of kitchen receptacles will fulfill the wall space requirement outlined in 210.52(A) due to the fact that the receptacle is less than 5 1/2 ft from finish floor as outlined in 210.52(4).

I have provided a diagram.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 2-228.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-244 Log #1510 NEC-P02 **Final Action: Reject**
(210.52(C)(1))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.

Recommendation: Revise text to read as follows:

(1) Wall Countertop Spaces. A receptacle outlet shall be installed at each wall countertop space that is 300 mm (12 in.) or wider, exclusive of the countertop's side edges.

Substantiation: This change would clarify the requirement for a receptacle on a countertop space 12 in. or wider. As written, it could be interpreted that a receptacle is required for certain countertop spaces no wider than 11 in., or even as narrow as 1 in., as described below. I will use 6 in. for this example.

The side edge of a countertop is typically 25 in. long. At issue is whether that is intended to be included in the "12 in. or wider" requirement. Please note that 210.52(A)(2)(1) specifically includes space that is measured around corners. By contrast, 210.52(C)(1) does not say, one way or the other, whether to measure around corners. As written, if there were a sink within 6 in. of a countertop's side edge, and if you had to measure countertop wall space starting where the side wall meets the front edge of the countertop and continue to measure around the corner, you would get a total of 31 in. (i.e., 25 in. of space along the side edge plus 6 in. along the back edge). Thus, you would conclude that two receptacles are required. This would be a dangerous place to put receptacles. Even though GFCI protection would be required at that location, it would still be wrong to have an appliance sitting on 6 in. (or less) of countertop space, with a cord that could easily dangle into the sink.

It should also be noted that if the kitchen's back wall and the countertop's side edge end at the same place, and if there is no side wall, then (1) you do not have a peninsula, (2) there is no "countertop wall space" along that edge, (3) it is not possible to place a receptacle such that it is within 24 in. of the front corner, and (4) the present wording of this article can be interpreted as requiring a receptacle along this countertop side edge anyway.

I have provided marked-up figures that would emphasize the intent that the side edges of countertops are not to be included in the measurement of countertop wall spaces.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-246.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-245 Log #3577 NEC-P02 **Final Action: Reject**
(210.52(C)(1))

Submitter: George M. Stolz, II, Pierce, CO

Recommendation: Add the following sentence at the end of (C)(1):

Sidewalls that run perpendicular to the counter shall be permitted to be omitted from this measurement.

Substantiation: A receptacle installed along the back wall of a counter space is usually close to 24 in. from the front edge of a counter. This would serve as a clarification as to where the measurement for receptacle layout begins, the back corner of the wall counter space. As this section is currently written, there are at least two different ways of interpreting it, I am advancing the most prevalent interpretation in the field.

I have provided a discussion from an internet forum about this proposal, to clarify what exactly is sought by this proposal.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-246.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-246 Log #4585 NEC-P02 **Final Action: Reject**
(210.52(C)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following sentence: "Where a countertop space is bounded by more than one wall, the length of a wall line perpendicular to the front edge and equal to the depth of the counter shall not be included in this measurement."
Substantiation: Consider two identical 25-in. deep counters 4 ft long, one in a corner and the other between a kitchen sink and a refrigerator. On the literal text of this paragraph, the wall line for the counter in the corner is just over 6 ft long, because the wording "along the wall line" directly parallels "along the floor line" in 210.52(A)(1) and that rule always applies around contiguous wall sections. The other counter is simply a 4-ft counter. Why should one of two identical counters in terms of length and area get double the receptacle coverage? This disparity has been a source of inconsistent code application for decades, and it is time to clarify what should be enforced. In this example, the counter in the corner has zero length beyond the counter depth that is perpendicular to the front edge. The proposal text also covers short returns, however. As soon as the perpendicular wall space exceeds the counter depth it starts being counted, so a 12-in. return gets a receptacle outlet.
Panel Meeting Action: Reject
Panel Statement: The panel intends that this space be included in the wall line measurement. Exempting the space could result in receptacles being spaced 6 ft apart where the counter continues along wall.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-247 Log #1721 NEC-P02 **Final Action: Reject**
(210.52(C)(1) Exception and Figure 210.52(C)(1))

Submitter: Ronald E. Hackett, Village of Buffalo Grove / Rep. NE Surburban IAEI
Recommendation: Add new text as follows:
210.52(C)(1), Exception. Figure 210.52(C)(1) Determination of Area Behind a Range, or Counter-Mounted Cooking Unit or Sink where the counter connects to wall space.
Substantiation: Add new text as follows:
210.52(C)(1) Exception applies where there is a wall directly behind a range, counter-mounted cooking unit, or sink. The heading of the title should be the first indication that the figures clarify what is to be done with the wall space directly behind an appliance or sink. To be consistent with the exception, the heading needs to make it clear that the figure is based on wall space and that a free standing island or peninsula is not applicable.
Panel Meeting Action: Reject
Panel Statement: Figures are only applicable where they are referenced within the code text itself. In the case of Figure 210.52(C)(1), it is only referenced from 210.52(C)(1) Exception.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-248 Log #585 NEC-P02 **Final Action: Reject**
(Figure 210.52(C)(1))

Submitter: Mitch Feininger, North Dakota State Electrical Board
Recommendation: Revise Figure 210.52(C)(1) as follows:

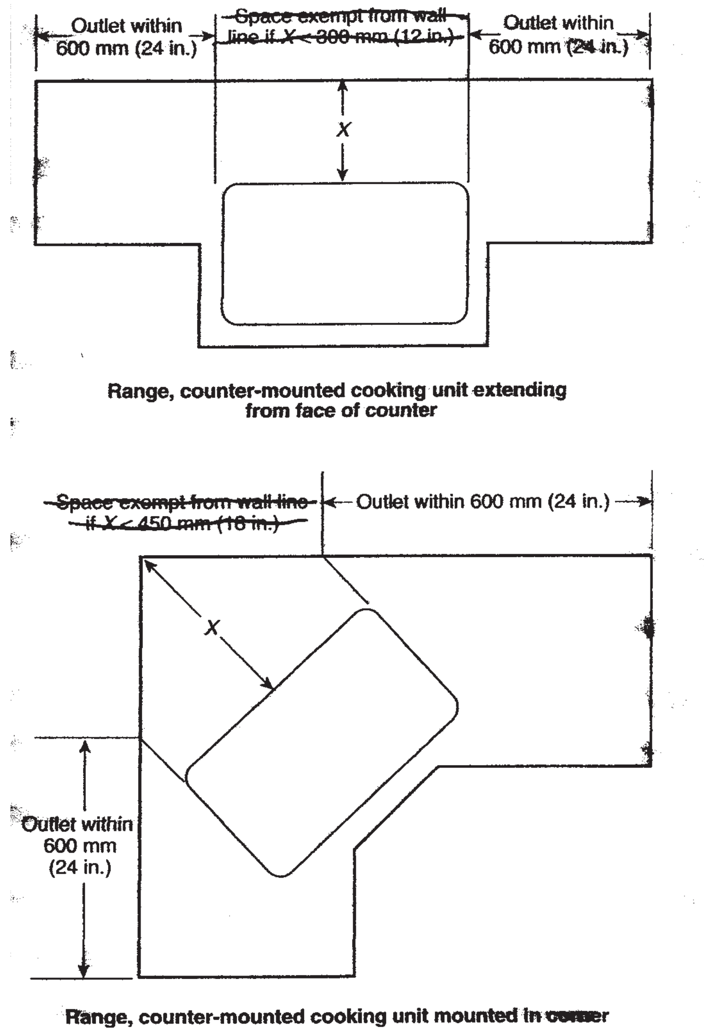


Figure 210.52(C)(1) Determination of Area Behind a Range, or Counter-Mounted Cooking Unit or Sink

Substantiation: Both of the illustrations in Figure 210.52(C)(1) are commonly complemented by windows at least as wide as the cooking unit or sink leaving no provisions for the installation of an ac receptacle. The bottom illustration typically consists of 2 windows on either side of the corner with solid framing between them. Note that 406.4(E) prohibits mounting receptacles face-up. The code is impractical in most applications.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the window makes the counter space unusable. As such, the space must be included in the wall line measurements if the dimensions exceed the values as shown in the figures. The submitter should note that the text does not require that the receptacle be in the space behind the sink or cooking unit, only that it be included in the wall line measurement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-249 Log #4873 NEC-P02 **Final Action: Reject**
(210.52(C)(2))

Submitter: David Zinck, Wiring Inspector / Rep. Newburyport, MA
Recommendation: Delete this subsection.
Substantiation: The requirement for an outlet on the island came in in the 1990 NEC. The argument for it was that if someone wanted to use an appliance on the island, they would have to run an extension cord from another counter plug to the island. This would create the hazard that someone walking by could accidentally pull the appliance off of the counter. If the appliance were a coffee pot or a FryBoy (a small at-home fryolator) there could be a burn hazard.

In the history of electricity it never happened. How do I know? Simple. Let me ask you all a simple question. Where do you keep the extension cords at your house? If you work in the field, you have a couple on the truck. If you are handy around the house you might have a 50' one at the work bench. If you have an electric hedge trimmer or lawn mower, you probably have a 100 footer in the shed. Other than that, they pare packed away with the Xmas ornaments in the attic. Would anyone go get one of these 100' cords, leave 90' of it in a pile between counter and island, just to use an appliance at the island? Of course not. you will just move the blender to the counter with the outlet.

This requirement also leads to inconsistent inspections. One house has an island with an overhang on 3 sides 6" or greater and all moveable surfaces (drawers, and doors, etc.) on the only side that does not have a 6" overhang. You tell this electrician that he does not have to have one. The neighbor has a space for one but is adamantly opposed to it. You have to tell him that he has to have one whether he likes it or not. I bet your name comes up at the pool party. Lets say the only spot for one is about 1 1/4" above the draws and below the counter. Do you force them to install plugmold whether they like it or not? Good luck finding that in Tamper-Proof.

It also introduces a hazard. If the outlet is about 12" down on the side of the island, that Fryboy or coffee pot cord is ripe for being pulled by a small child. Just having the outlet here invites the appliances to this location. I have 3 year old triplets. You cannot watch them every second. And I can attest to the fact that they do get into everything.

Deleting the requirement for this outlet does not outlaw it. Anyone who wants one can have one. It leaves the decision to the homeowner.
Panel Meeting Action: Reject
Panel Statement: The panel has debated the issue of where to mount receptacles on islands over numerous code cycles. The current wording of the NEC provides a reasonable set of rules to address practical mounting based on the construction of the countertop and cabinets. Deleting the section entirely would leave substantial areas of modern kitchens without any receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-250 Log #3571 NEC-P02 **Final Action: Reject**
(210.52(C)(3)Exceptions 1 and 2)

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Add text as follows:

Exception No. 1: If a peninsula contains a rangetop or sink which would divide it into two counter spaces according to the provisions of 210.52(C)(4), a receptacle shall not be required for the portion of the peninsula that is between the rangetop or sink and the wall counter space connecting edge.
Exception No. 2: If a rangetop or sink exists at the end of a peninsula, a receptacle shall not be required.
Substantiation: For the first exception: Presently a peninsula that is 8 ft long is only required to have one receptacle. There is no reason to require a receptacle in the middle of the overall peninsula just because someone added a sink or a range in the middle.

For the second exception: It builds on the principle of the first. In practice, in the field, I see many receptacles installed at the end of a peninsula containing a sink at its very end, and none in the center of the overall peninsula (the opposite of what would currently be required by the NEC.)

I'm not defending the practice, I'm saying that installers often ignore sinks in peninsulas anyway. They cause migraines.

A modern kitchen with a full complement of wall counterspace receptacles should provide enough places to plug in appliances. Sounding a call across the land that a peninsula lacking a receptacle under these circumstances will likely improve safety, lest someone actually use that non-required receptacle on the 2 ft countertop next to the sink.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is confusing. If a peninsula has a sink or range installed and the space behind the sink or range is less than 12 in., the space becomes two countertop spaces and a receptacle is required for each space provided it meets the minimum dimension requirements. If the sink were installed at the end of the peninsula, placing a receptacle at the end where the sink is located is not code compliant because the peninsula space that meets the minimum requirements does not have a receptacle installed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-251 Log #4586 NEC-P02 **Final Action: Accept in Principle**
(210.52(C)(3) Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following exception:

Exception: A receptacle in a wall countertop space shall be permitted to serve as the receptacle for a peninsular countertop space where the spaces are contiguous and the receptacle is located within 1.8 m (6 ft) of the end.
Substantiation: The NEC does not clearly address the common instance where a peninsular countertop may or may not be served by a receptacle in a wall for a contiguous counter. Technically that wall receptacle is not "at" the peninsular counter unless the "connecting edge" is taken to be extended from the near front lip of the peninsula at right angles to the adjacent wall counter, a creative interpretation that works but that is very inconsistently applied. Many peninsulas are really attached kitchen tables, and present significant construction difficulties in providing a receptacle if the wall is not an eligible placement. However, once a peninsular counter exceeds 6 ft in distance from the wall, it would still require a receptacle somewhere at its more distant margin to comply with 210.52(A)(2)(3), and this proposal reinforces that requirement.
Panel Meeting Action: Accept in Principle

Revise the submitter's recommendation to read:

Exception: A receptacle in a wall countertop space shall be permitted to serve as the receptacle for a peninsular countertop space where the spaces are contiguous and the receptacle is located within 1.8 m (6 ft) of the outside end of the peninsula.
Panel Statement: The panel has accepted the submitter's recommendation but added additional words to make it clear that the 6-ft measurement is from the end of the peninsula itself.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

KING, D.: This proposal will eliminate the existing requirement for at least one receptacle to supply a penninsular countertop space in many common installations without adequate substantiation from the Submitter. The code clearly defines where a penninsular countertop space begins and it should be considered a separate countertop space.

WEBER, R.: I feel the panel needs to reconsider its position on this proposal and ultimately reject, this exception which would remove the requirement or have a required receptacle on the peninsular counter top space if it is shorter than 6 ft. long. As proposed the wall receptacle within 6 ft. of the end of the peninsular and at the wall line that it attaches to, would meet the code. As most counter top appliances being utilized now come with an 18 in. to 2 ft. cord connected to it, we would then need to use an extension cord or plug strip inserted in the wall receptacle to provide power for use on the peninsular space. Some may say to just not place any appliances for use on the peninsular area; my position is to retain the current code requirement and provide a fixed receptacle to meet the dwelling unit owners needs.

2-252 Log #1713 NEC-P02 **Final Action: Accept in Principle**
(210.52(C)(4))

Submitter: Ronald E. Hackett, Village of Buffalo Grove / Rep. NE Suburban IAEI
Recommendation: Revise text as follows:

(4) Separate Spaces. Countertop spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52_(C),_ (C)(1), (C)(2), and (C)(3).
Substantiation: Including (C) under (4) Separate Spaces is better served here, avoids confusion and redundancy and becomes more user friendly. Where to find the requirements for separate spaces should be located together. This is part (4). Part (C), includes requirements for separate spaces and as such should be included under (4). In (4), separate spaces, it makes sense referencing part (C) in addition to (C)(1), (C)(2) and (C)(3) due to the fact that part (C) contains separate space requirements.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-242.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-253 Log #2056 NEC-P02 **Final Action: Reject**
(210.52(C)(5))

Submitter: Timothy P. McNeive, Thomas & Betts Corporation
Recommendation: Amend 210.52(C)(5) as follows:

(5) Receptacle Outlet Locations. Receptacle outlets shall be located in, on, or above, but not more than 500 mm (20 in.) above the countertop. Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(1), Exception, or appliances occupying dedicated space shall not be considered as these required outlets.
Substantiation: The present text in 210.52(C)(5) is prescriptive in requiring the receptacle outlet to be "located above...the countertop". The strict interpretation of this requirement can prohibit acceptance, and even listing, or

certain design solutions. "Tombstone" style receptacles have been offered for many years and should be allowed to be counted. Note that 406.4(E) does not permit receptacles to be installed in the face up position.

Panel Meeting Action: Reject

Panel Statement: The present text permits "tombstone" style receptacles to be used. The receptacle would still be "above" the countertop.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

PAULEY, J.: This proposal should have been accepted by Panel 2. The panel statement does not address the proposal to allow "in the countertop" constructions. The existing code requirement is design restrictive. The proposed language does not eliminate the requirement that the receptacle face remains vertical.

2-254 Log #2762 NEC-P02 **Final Action: Reject**
(210.52(C)(5))

Submitter: Donald R. Offerdahl, North Dakota State Electrical Board

Recommendation: Revise text to read as follows:

(5) Receptacle Outlet Location. Receptacle outlets shall be located above, hut not more than 500 mm (20 in.) above, the countertop. Receptacle outlets rendered not readily accessible by appliances fastened in place, ~~appliance garages~~, sinks, or rangetops as covered in 210.52(C)(1), Exception, or appliances occupying dedicated space shall not be considered as these required outlets.

Substantiation: Receptacle outlets located in appliance garages are readily accessible by definitions. I do not know of anyone who cannot get to the receptacle located in a appliance garage.

Appliance garages can be located in the comer of counters and by not recognizing that wall space, will result in not meeting the requirements of 21 0.52(c)(l) because the receptacles would be installed more that 48 inches apart. The best way to look at the layout of the counter is to treat the space as if the appliance garage is not there when laying out the spacing of the receptacles. In many cases home owners will open the door to the appliance garage, pull the appliance forward and utilize the appliance in that area. By laying out the receptacles as if the appliance garage is not there, this application would have a better location for the receptacles to use that appliance.

Panel Meeting Action: Reject

Panel Statement: Allowing the receptacle in the appliance garage to be counted could leave a large portion of counter space without access to a receptacle. Often appliance garages are used to store numerous small appliances which would severely limit the access to the receptacle.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-255 Log #3801 NEC-P02 **Final Action: Reject**
(210.52(C)(5))

Submitter: Robert Steven Hale, City of Hillsboro

Recommendation: Delete condition No. 2 to exemption No. 5 of Receptacle Outlet Location.

Substantiation: Electrical outlets below counter tops in kitchen island's and peninsula's require cords to dangle over the counter top when in use. Based on the US Consumer Safety bulletin that suggests this condition should not exist due to the temptation for children to pull on these cords and potentially cause the electrical appliance connected to the cord to be pulled off the counter top causing burns or other injuries, this condition No. 2 to exemption No. 5 of 210.52(C)(5) that allows receptacles 12 in. below counter top should be omitted.

Panel Meeting Action: Reject

Panel Statement: The panel has debated this topic over numerous code cycles and has taken the position that the current language provides a reasonable balance in the approach. The panel shares concerns relative to the access of a side-mounted receptacle to children, which is why the language minimizes the installation of receptacles on the side of countertops as much as possible with the present products and construction methods. Parents will have to be prudent in their use of side-mounted receptacles where small children are present as they are with many other hazards in the home. The primary requirement is that the receptacles be mounted above the countertop.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

ORLOWSKI, S.: The aspect of having "accessible" outlets for the disabled and those of short stature needs to be retained.

2-256 Log #4772 NEC-P02 **Final Action: Reject**
(210.52(C)(5))

Submitter: John E. Staires, Tulsa, OK

Recommendation: Revise text as follows:

~~*Exception to (5): To comply with the conditions specified in (1) or (2), receptacle outlets shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop. Receptacles mounted below a countertop in accordance with this exception shall not be located where the countertop extends more than 150 mm (6 in.) beyond its support base.*~~

~~*(1) Construction for the physically impaired*~~

~~*(2) On island and peninsula countertops where the countertop is flat across its entire surface (no backsplashes, dividers, etc.) and there are no means to mount a receptacle within 500 mm (20 in.) above the countertop, such as an overhead cabinet.*~~

Exception to (5): To accommodate construction for the physically impaired receptacles shall be permitted to be mounted not more than 300 mm (12 in.) below the countertop. Receptacles mounted below a countertop in accordance with thisexception shall not be located where the countertop extends more than 150 mm (6 in.) beyond its support base.

Substantiation: Each year, numerous children and adults are burned due to appliance cords overhanging kitchen countertops. Electrically heated appliances may be pulled down onto children when they are able to readily access the length of appliance cord overhanging the countertop edge. According to the National Burn Center Reporting Systems, from June 2004 to December 2005, 261 burn incidents involving children under the age of 15 were reported by a poll off 33 burn centers nationwide. There are products commercially available to enable mounting of receptacles above countertop surfaces, eliminating the need to mount receptacles below the countertop. In accordance with 406.4 (E), the commercially available equipment for locating receptacles above the countertop do not mount the receptacles in a face-up position. Mounting of receptacles below the countertop should be permitted to accommodate the physically impaired, and eliminating the exception allowing receptacles below the countertop on kitchen islands and peninsulas is an important step in improving the safety of children. The City of Tulsa, working with local representatives of the Shriners Hospitals, has added language to our adopting ordinance for the 2008 *National Electrical Code* prohibiting the mounting of receptacles below kitchen countertops, and the language contained in this proposal is the consensus opinion of the City of Tulsa Electrical Examining and Appeals Board.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-249.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-257 Log #3572 NEC-P02 **Final Action: Reject**
(210.52(C)(5) Exception)

Submitter: George M. Stolz, II, Pierce, CO

Recommendation: Add a third condition to the exception of (C)(5):

(3) On wall counter spaces where windows are within 5 in. of the counter surface.

Substantiation: There is currently no provision for installation of a receptacle on counters that are backed entirely by glass. This is becoming a much more popular feature in expensive homes, and presents installers with an impossible predicament when trying to adhere to the code. A wall composed of glass is not an acceptable reason to mount receptacles below counter height in today's NEC. This will provide relief for installers, whose receptacle requirements are frequently a back-burner item when a dwelling is designed.

Essentially, when these predicaments arise the electrician gets stuck in a tug of war between the AHJ and the customer unnecessarily. This will allow an option where currently the code does not provide one - unless the panel would like to go on record saying that countertops flanked by windows are not backed by "wall space", which would make all our lives easier yet.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree that this aesthetic preference is a reasonable basis to eliminate receptacle mounting above the countertop. Architects and designers will need to ensure that their design can accommodate the receptacles as required by the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-258 Log #2057 NEC-P02 **Final Action: Accept in Principle**
(210.52(D))

Submitter: Timothy P. McNeive, Thomas & Betts Corporation

Recommendation: Add a second paragraph in 210.52(D) as follows:

(D) Bathrooms. In dwelling units, at least one receptacle shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the basin or basin countertop or installed on the side or face of the basin cabinet not more than 300 mm (12 in.) below the countertop.

Listed receptacle outlet assemblies designed to be located in or on the countertop shall be permitted.

Substantiation: Similar to kitchen countertops in 210.52(C)(5), listed receptacles designed for installation in or on bathroom countertops should be permitted.

Panel Meeting Action: Accept in Principle

Revise 210.52(D) to read as follows:

(D) Bathrooms. In dwelling units, at least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be located on a wall or partition that is adjacent to the basin or basin countertop, located on the countertop, or installed on the side or face of the basin cabinet not more than 300 mm (12 in.) below the countertop.

Panel Statement: The panel has added words to the existing text to make it clear that the receptacle can be located on the countertop using a "tombstone" or other method.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-259 Log #3671 NEC-P02 **Final Action: Reject**

(210.52(D))

Submitter: Mark Smythe, Smythe Electric Inc.

Recommendation: Revise text as follows:

210.52(D) Bathrooms. In dwelling units, at least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each basin. The receptacle outlet shall be <u>in a readily accessible location,</u> on a wall or partition that is adjacent to the basin or basin countertop, or installed on the side or face of the basin cabinet not more than 300 mm (12 in.) below the counter top.

Substantiation: The addition of the "in a readily accessible location" would eliminate the argument that a receptacle installed adjacent to the basin, in a cabinet, is code compliant.

Panel Meeting Action: Reject

Panel Statement: The main paragraph of 210.52 already specifies that the receptacles required in 210.52 are in addition to any receptacle located in a cabinet.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-260 Log #3520 NEC-P02 **Final Action: Reject**

(210.52(E))

Submitter: David Zinck, Newburyport Wiring Inspector

Recommendation: Revise text to read as follows:

(1) One Family and Two Family Dwelling. For a one family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet accessible ~~while standing~~ at grade level and ~~located~~ not more than...".

Substantiation: This restores the requirement to the 2005 NEC. Standing on grade should not be required. It has been a common practice to install the required rear GFCI receptacle on the deck where people can use it for a radio, TV, laptop computer, etc. while enjoying their deck. To require that this outlet be off of the deck just so that one can be standing on the grade while plugging in does not make sense. It also leads to inconsistent inspections. Picture a condo project where early buyers can chose from a variety of deck options. One choses a railing option that is wide enough so that you can reach through the balusters and plug into the outlet located near the edge of the deck while standing on grade. It passes. The next unit has a railing that the balusters are too close together to reach through to plug in. The exact same receptacle installation fails. The next unit choses a glass railing with the exact same receptacle and this one fails. The next unit choses to locate his receptacle in the middle of a large deck. At first glance you would think that this one certainly fails. But this owner decides to put a trap door in his deck that he can lift and store his kayak or deck furniture under. It so happens that you can stand on grade inside this trap door and plug into the receptacle. Would anyone ever lift up the trap door just to stand on grade and plug into this receptacle? Of course not. But, this receptacle passes inspection. They all should.

Let's not forget the reason for the rule in the first place. It is so that the most convenient receptacle to use outside is a GFCI protected outlet. The rule adopted in the 2008 NEC solves no problems and creates new ones. Let's go back to the 2005 wording.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with the substantiation. Previous codes required that the receptacle be accessible "at grade level," and the panel has repeatedly stated over numerous code cycles that this required the receptacle be accessible while standing on grade. The panel added the wording in the 2008 NEC to reinforce this long standing position that the panel has conveyed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-261 Log #4587 NEC-P02 **Final Action: Reject**

(210.52(E))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee

Recommendation: Revise this material to read as follows:

<u>(E) Outdoor Outlets.</u> Outdoor receptacle outlets shall be installed in accordance with (E)(1) through (E)(3). [See 210.8(A)(3).]

<u>(1) One-Family and Two-Family Dwellings.</u> For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet readily accessible from grade and not more than 2.0 m (6 1/2 ft) above grade level shall be installed at the front and back of the dwelling.

<u>(2) Multifamily Dwellings.</u> For each dwelling unit of a multifamily dwelling where the dwelling unit is located at grade level and provided with individual exterior entrance/egress, at least one receptacle outlet readily accessible from grade and not more than 2.0 m (6 1/2 ft) above grade level shall be installed.

<u>(3) Balconies, Decks and Porches</u>. Balconies, decks and porches that are attached to the dwelling unit and are accessible from inside the dwelling shall have at least one receptacle outlet installed accessible from the balcony, deck or porch.

<u>Exception to (3)</u>: Balconies, decks, or porches with a usable area of less than 1.86 m2 (20 ft2) are not required to have a receptacle installed.

Substantiation: The literal text of the NEC disqualifies a receptacle on a low open deck or open porch from serving as one or more of the required outdoor receptacles for one- and two-family dwelling units unless it is close enough to the edge so it can be reached while standing on grade. No credible basis has been put forward to support this distinction. The safety justification for the receptacle placement is clearly met provided there is unfettered access to the receptacle, and that it is low enough so it will be routinely used for outdoor applications instead of resorting to running cords through windows or doorways. This proposal supports both objectives. It would still need to be readily accessible, which means not obstructed from someone approaching from grade, and not up more than a few steps. It might even be in a damp, as opposed to a wet location, resulting in a less hazardous condition. It would not be more likely to require an extension cord, and in fact, it might be less likely since it would be placed nearest the likely location for electrical appliance usage.

This is because a receptacle placed in the middle of a porch or deck will frequently be where "flexible cords with attachment plugs are used" and therefore in accordance with the general rule in 210.50(B). Requiring additional receptacles or effectively mandating inconvenient receptacle locations serves no safety objective and is excessive. We are also aware of instances where this rule has been used to disqualify a receptacle between two garage doors on the grounds that the asphalt surface below did not count as actual grade, etc. It is time to limit this rule to the simple requirements for safety. Remember, the current NEC requirements are satisfied on a low 30-ft deck if a single receptacle is placed at the edge but within the perimeter of that deck, thereby meeting both 210.52(E)(1) and (E)(3). A rule that creates a market incentive for such bizarre placements reflects poorly on the NEC process.

This proposal also removes a distinction between a one- and two-family dwelling (subject to the deck disqualification), and a multifamily dwelling (certainly not so restricted, in fact, their decks don't even require stairs to grade.) Regardless of accessibility, many outdoor receptacle covers allow for the application of a lock, which should address concerns about improper access in some neighborhoods, concerns that frequently apply equally in one- or two-family applications.

Panel Meeting Action: Reject

Panel Statement: The panel has had and continues to have the position that the most effective use of the required receptacle is while standing on grade. Additional receptacles that are installed for a porch or deck are permitted to be installed. There are significant variations in designs that are not clear as to whether or not a receptacle on a porch or deck is readily accessible, and the panel has the view that this is most effectively handled with having a clear requirement with respect to standing on grade.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-262 Log #3490 NEC-P02 **Final Action: Reject**

(210.52(E)(1))

Submitter: Thomas N. Tombarello, Sandown, NH

Recommendation: Revise 210.52(E)(1) as follows:

For a one-family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet accessible ~~while standing at~~ <u>from</u> grade level and located not more than 2.0 m (6 1/2 ft) above grade shall be installed at the front and back of the dwelling.

Substantiation: The present text is being interpreted by some that to locate an outdoor receptacle above a 4-inch thick perimeter concrete apron, a 2-inch brick walk, a 4-inch hot top driveway between two garage doors, 6-in. of mulch, etc. does not <u>now</u> meet the requirements of (E)(1) unless a person can stretch across such boundaries; insert the attachment cap; while keeping their feet in bounds (ft on grass). This is contrary to the Panel's Statement this was not CMP 2's intent when they wrote the rule. Check the IAEI Analysis of the 1984 NEC.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with the interpretation that the concrete, brick or mulch described in the substantiation is not considered to be grade level. Using the interpretation that the term only includes grass or dirt is inconsistent with the use of the term throughout the NEC.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-262a Log #CP201 NEC-P02 **Final Action: Reject**
(210.52(E)(1) and 210.52(E)(2))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" based on the lack of a proposal to Code-Making Panel 1 to define "Finished Ground Level."
Submitter: Code-Making Panel 2,
Recommendation: Revise text to read as follows:
(1) One-Family and Two-Family Dwellings. For a one-family dwelling and each unit of a two-family dwelling that is at the finished ground level, at least one receptacle outlet accessible while standing at the finished ground level and located not more than 2.0 m (6½ ft) above the finished ground level shall be installed at the front and back of the dwelling.
(2) Multifamily Dwellings. For each dwelling unit of a multifamily dwelling where the dwelling unit is located at the finished ground level and provided with individual exterior entrance/egress, at least one receptacle outlet accessible from the finished ground level and not more than 2.0 m (6½ ft) above the finished ground level shall be installed.
Substantiation: The panel has developed a proposal to replace "grade" with a new defined term "finished ground level". The panel recognizes that if the definition of "finished ground level" is not accepted by CMP-1 then this proposal should be reported as Reject by the TCC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-263 Log #3899 NEC-P02 **Final Action: Reject**
(210.52(E)(1) and 210.52(E)(2))

Submitter: Kody Inman, E Light Electric Services
Recommendation: Revise text as follows:
For a one family dwelling and each unit of a two-family dwelling that is at grade level, at least one receptacle outlet accessible while standing at grade level and located not more than ~~2.0 m (61/2 ft)~~ 1.2 m (4 ft) above grade shall be installed at the front and back of the dwelling. (Same height corrections to both sections)
Substantiation: Lowering the height for required receptacles will help those that may have difficultly accessing and using a receptacle mounted at 61/2 ft above the ground and will not decrease safety in anyway.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated lowering the value to 4 ft. The current value is used elsewhere in the code to describe the accessibility of switches and other devices that must be accessed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-264 Log #453 NEC-P02 **Final Action: Reject**
(210.52(E)(3) and Exception to (3))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Add new text and delete existing text as follows:
(3) Balconies, Decks, and Porches. Balconies, decks, and porches with a usable area of 1.86 m^2 (20 ft^2) or greater and that are accessible from inside the dwelling unit shall have at least one receptacle outlet installed within the perimeter of the balcony, deck, or porch. The receptacle shall not be located more than 2.0 m (6$^1/_2$ ft) above the balcony, deck, or porch surface.
~~Exception to (3): Balconies, decks, or porches with a usable area of less than 1.86 m2 (20 ft2) are not required to have a receptacle installed.~~
Substantiation: The intent of this change is to convert the exception into positive code language by placing it in the main rule. By including the text "with a usable area of 1.86 m^2 (20 ft^2) or greater and" does not change the existing requirement or the exception to the rule as presently worded. This change also makes for a more user friendly code requirement.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 2-266. The panel has removed the exception so that the rule applies to balconies and decks of all sizes.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ORLOWSKI, S.: As pointed out during the development of this new provision last cycle, if there is no minimum dimension for a balcony, the opening area and guardrail afforded for a door in an exterior wall, installed for aesthetics or ventilation, would now be considered a "balcony".
It is truly unfortunate that most of the members of Panel 2 are not that familiar with the many types of architectural projections that will now be labeled as a balcony. These include the safety guardrail at second floor double doors that are used for natural ventilation. This arrangement consists of a simple guardrail that may extend a few inches out from the face of the building. There is no usable, occupiable, or habitable space, it is just a guardrail. In addition, a simple architectural balcony that extends a foot or so out in front of these doors. There is hardly any area for more than one person to stand, let alone participate in any activity except looking. The Exception was included in the 2008 NEC as it provided the means to define the usable area of a deck or balcony. Without this exception, the manufactures have gotten another mandate into the NEC to require more of their products without providing substantiation that a problematic fire or life-safety situation exists.

2-265 Log #2155 NEC-P02 **Final Action: Reject**
(210.52(E)(3) and Exception to (3))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Add new text and delete existing text as follows:
(3) Balconies, Decks, and Porches. Balconies, decks, and porches with a usable area of 1.86 m^2 (20 ft^2) or greater and that are accessible from inside the dwelling unit shall have at least one receptacle outlet installed within the perimeter of the balcony, deck, or porch. The receptacle shall not be located more than 2.0 m (61/2 ft) above the balcony, deck, or porch surface.
~~Exception to (3): Balconies, decks, or porches with a usable area of less than 1.86 m2 (20 ft2) are not required to have a receptacle installed.~~
Substantiation: The intent of this change is to convert the exception into positive code language by placing it in the main rule. By including the text "with a usable area of 1.86 m2 (20 ft2) or greater and" does not change the existing requirement or the exception to the rule as presently worded. This change also makes for a more user friendly code requirement.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-264.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ORLOWSKI, S.: As pointed out during the development of this new provision last cycle, if there is no minimum dimension for a balcony, the opening area and guardrail afforded for a door in an exterior wall, installed for aesthetics or ventilation, would now be considered a "balcony".
It is truly unfortunate that most of the members of Panel 2 are not that familiar with the many types of architectural projections that will now be labeled as a balcony. These include the safety guardrail at second floor double doors that are used for natural ventilation. This arrangement consists of a simple guardrail that may extend a few inches out from the face of the building. There is no usable, occupiable, or habitable space, it is just a guardrail. In addition, a simple architectural balcony that extends a foot or so out in front of these doors. There is hardly any area for more than one person to stand, let alone participate in any activity except looking. The Exception was included in the 2008 NEC as it provided the means to define the usable area of a deck or balcony. Without this exception, the manufactures have gotten another mandate into the NEC to require more of their products without providing substantiation that a problematic fire or life-safety situation exists.

2-266 Log #1148 NEC-P02 **Final Action: Accept**
(210.52(E)(3) Exception)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Delete the Exception:
~~Exception to (3): Balconies, decks, or porches with a usable area of less than 1.86 m2 (20 ft2) are not required to have a receptacle installed.~~
Substantiation: If a porch, deck or balcony is accessible, the safety of having a receptacle installed should be provided. There should be no distinction between sizes of these areas. The code rule intent is to avoid cords from passing through doorways. There is no less chance that this would occur for small porches, decks or balconies. These smaller areas will have holiday lighting and small appliances used there. Please reference Mr. King's Explanation of Negative in 2008 ROC 2-230.
KING, D.: I disagree with the Panel that a minimum dimension of 20 sq. ft should be a condition for this requirement. If a porch, deck or balcony is accessible and intended for use by occupants of the dwelling than a receptacle should be required regardless of the minimum dimension. The purpose of this section is to eliminate the use of cords through doorways to supply electrical equipment at these locations. Cords passed through doorways are a potential cause for electrical shock and fire due to damage that can easily occur to the cord where it passes through the doorway. Acceptance of this Comment will allow this hazardous condition to continue to exist for porches, decks and balconies that are less than 20 sq. ft.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ORLOWSKI, S.: As pointed out during the development of this new provision last cycle, if there is no minimum dimension for a balcony, the opening area and guardrail afforded for a door in an exterior wall, installed for aesthetics or ventilation, would now be considered a "balcony".
It is truly unfortunate that most of the members of Panel 2 are not that familiar with the many types of architectural projections that will now be labeled as a balcony. These include the safety guardrail at second floor double doors that are used for natural ventilation. This arrangement consists of a simple guardrail that may extend a few inches out from the face of the building. There is no usable, occupiable, or habitable space, it is just a guardrail. In addition, a simple architectural balcony that extends a foot or so out in front of these doors. There is hardly any area for more than one person

to stand, let alone participate in any activity except looking. The Exception was included in the 2008 NEC as it provided the means to define the usable area of a deck or balcony. Without this exception, the manufactures have gotten another mandate into the NEC to require more of their products without providing substantiation that a problematic fire or life-safety situation exists.

Comment on Affirmative:

WEBER, R.: I commend the panel and its action to remove the code section which states, "the area of less than 20 sq.ft. are not required to have a receptacle installed" for that portion of balconies, decks or porch spaces. This was put in the code during the 2005 NEC ROC cycle and was disputed at that time. It makes sense that if an exterior space is afforded some railing and small area whatever that may be; it will be used and should have a GFCI protected receptacle installed to provide power. Holiday lighting on the exterior of a dwelling unit is becoming more common and almost is displayed the year round for the various holidays observed. The other alternative is to have a cord put through the doorway out to that space without GFCI protection in most cases and create a known electrical code violation. If it is there (outside GFCI receptacle) it will be used, and we are ensuring a safe means to meet the customer's needs.

2-267 Log #2982 NEC-P02 **Final Action: Reject**
(210.52(E)(3) Exception No. 3)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

Exception to (3): Balconies, decks, or porches with a usable area of less than 1.86 m^2 (20 ft^2) ~~are~~ shall not be required to have a receptacle installed.

Substantiation: This is a simple edit to provide consistency in code language and compliance with the style manual.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 2-266. The panel has removed the exception so that the rule applies to balconies and decks of all sizes.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

ORLOWSKI, S.: As pointed out during the development of this new provision last cycle, if there is no minimum dimension for a balcony, the opening area and guardrail afforded for a door in an exterior wall, installed for aesthetics or ventilation, would now be considered a "balcony".

It is truly unfortunate that most of the members of Panel 2 are not that familiar with the many types of architectural projections that will now be labeled as a balcony. These include the safety guardrail at second floor double doors that are used for natural ventilation. This arrangement consists of a simple guardrail that may extend a few inches out from the face of the building. There is no usable, occupiable, or habitable space, it is just a guardrail. In addition, a simple architectural balcony that extends a foot or so out in front of these doors. There is hardly any area for more than one person to stand, let alone participate in any activity except looking. The Exception was included in the 2008 NEC as it provided the means to define the usable area of a deck or balcony. Without this exception, the manufactures have gotten another mandate into the NEC to require more of their products without providing substantiation that a problematic fire or life-safety situation exists.

2-268 Log #2548 NEC-P02 **Final Action: Reject**
(210.52(G))

Submitter: Russell A. Boyd, Harrison, TN
Recommendation: Revise text to read as follows:

210.52(G) Basements and garages, for a one family dwelling, the following provision shall apply: Add (3) Garages: outlets shall be installed as covered in 210.8(A) and 210.52 (A)(1) and (2).

Substantiation: Problem: Safety Concerns, trip Hazards: This is to eliminate extension cords running all around the floor, causing trip hazards and overloading outlet and circuit breakers.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated requiring that outlets in a garage be spaced in the same manner as a habitable room. The use of receptacles in the garage are considerably different than that of a habitable room.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-269 Log #1612 NEC-P02 **Final Action: Reject**
(210.52(G)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In 210.52(G)(1), add an additional sentence to read: "Where the garage accommodates more than two vehicles, at least one receptacle shall be provided for each vehicle space."
Substantiation: Many new larger homes are being built with attached garages that will accommodate 3 or more vehicles. A single receptacle requires the use of very long portable cords which can be a safety hazard.
Panel Meeting Action: Reject
Panel Statement: The objective is to have a receptacle available in the garage for use by the occupant. There is no substantiation submitted to support basing the number of receptacles on the number of vehicles that the garage can hold. In addition, there may be no clear definition of what defines the "vehicle space" for the placement of the receptacle.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-270 Log #3492 NEC-P02 **Final Action: Accept**
(210.52(G)(1))

Submitter: Mike Theisen, Midwestern Electrical Seminars
Recommendation: Add a provision to cover other out buildings normally found on single family premises.

(G) Basements, ~~and~~ Garages, and Accessory Buildings. For a one-family dwelling, the following provisions shall apply: (1) At least one receptacle outlet, in addition to those for specific equipment, shall be installed in each basement, in each attached garage, and in each detached garage or accessory buildings with electric power.

Substantiation: Many one-family dwellings have a detached garage and an additional building which services a similar purpose to a garage, but is not covered in 210.52(G). The same safety concerns should be addressed in these out buildings as in detached garages.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-271 Log #3291 NEC-P02 **Final Action: Reject**
(210.52(G)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise. ~~Where a portion of the basement is finished into one or more habitable rooms~~ Each separate unfinished portion shall have ~~a~~ at least one receptacle outlet installed in accordance with this section.
Substantiation: Whether or not the basement has habitable rooms is irrelevant; an unfinished basement may have separate walled portions which should warrant at least one receptacle outlet.
Panel Meeting Action: Reject
Panel Statement: The original rule required that a receptacle be installed in an unfinished basement regardless of how it was configured. The problem arose when part of the basement became finished and the receptacles were no longer GFCI protected, but used in the unfinished portion. The rule as stated only invokes the installation of the receptacle in the unfinished spaces when part of the basement is finished. This avoids the issue of only having non-GFCI protected receptacles available in the basement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-272 Log #2356 NEC-P02 **Final Action: Reject**
(210.52(H))

Submitter: James Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

(H) Hallways. In dwelling units, the following provisions shall apply:

(1) Hallways of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet. As used in this subsection, the hall length shall be considered the length along the centerline of the hall without passing through a doorway.

(2) portions of hallways that are wider than 1.4 m (4 ½ ft) shall have a receptacle located in each wall space as defined in 210.52(A)(2)(1).

Substantiation: In hallways wider than the normal 38 in. to 40 in., occupants frequently want to locate a table, chest, bookcase, lighted knick knack cabinet, or other piece of furniture in these hallway spaces and place a lamp on top, if it is not internally lit. Under the existing Code, power for the lighting would have to be provided by an extension cord run under a rug or through an adjacent doorway, which could lead to an unsafe or hazardous condition.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that having a 4.5 ft wide hallway creates an area that requires receptacle spacing by 210.52.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-273 Log #3573 NEC-P02 **Final Action: Accept in Principle**
(210.52(H))

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Revise text to read as follows:
(H) Hallways and Foyers. In dwelling units, hallways and foyers of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet.
As used in this subsection, the hall or foyer length shall be considered the length along the centerline of the hall without passing through a doorway.
Substantiation: In the panel response to proposals such as 2-195 Log #397 in the 2008 cycle, it became apparent that the panel would like foyers dealt with like hallways. This change would clarify the panel's intent for foyers.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-223.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ORLOWSKI, S.: There are too many possible configurations of a foyer. But, the biggest problem is what constitutes a "foyer". In almost all configurations of residential units, there is no foyer at the entrance door, only a hallway. Hallways are already covered under 210.52 (H) that only requires "3.0 m (10 ft) or more in length shall have at least one receptacle outlet." As the area of a dwelling that might be referred to as a foyers is included in the NEC, a definition of a "foyer" needs to be added to the NEC, and the minimum size, window location, door locations needs to be considered relative to the placement of receptacle outlets.

2-274 Log #4758 NEC-P02 **Final Action: Accept**
(210.52(H))

Submitter: D. Jerry Flaherty, East Islip, NY
Recommendation: Add revised text to read as follows:
(H) Hallways. In dwelling units, hallways of 3.0 m (10 ft) or more in length shall have at least one receptacle outlet.
As used in this subsection, the ~~**hall**~~ **hallway** length shall be considered the length along the centerline of the ~~**hall**~~ **hallway** without passing through a doorway.
Substantiation: No definition for "hall" in NEC.
Webster dictionary has several definitions that are not in line with this section of NEC.
1) "Entrance space into which the main door to house" — new large homes have "halls" that are quite large, fully furnished with tables (table lamps) and seating. By definition and code these "halls" need only one receptacle. I have inspected many with extension cords which are a fire hazard.
210.52(H) Hallways.
2) Webster definition - "A communually owned building where public business is transacted or where people meet etc. "which is in line with other areas of the NEC (assembles halls, dance halls, etc.) but not with this section of the code.
"Hallway" is not defined in the NEC and Webster defines as a passage connecting two or more rooms which is closer to what the NEC is referring too, but not quite.
See Proposal for a definition of a Hallway.
Hallway. A walled corridor used exclusively to connect two or more rooms.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-275 Log #2464 NEC-P02 **Final Action: Accept in Principle**
(210.55 (New))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Add a New Section 210.55 Meeting or Conference Rooms to read as follows:
210.55 Meeting or Conference Rooms.
(A) Meeting or Conference Rooms. For the purpose of this section, a meeting or conference rooms are defined as a designated communal office space in office buildings, hotels/motels or other structures that are designed for the assembly and seating of people. Meeting or conference rooms do not include individual offices or lecture halls found in buildings, hotels/motels or other structures.
(B) Floor Box Outlet Location. In meeting or conference rooms located in office buildings, hotels/motels or other structures, a minimum of one receptacle outlet in a listed floor box shall be installed. When only one floor box is provided it shall be located in the center of each room. For a dividable meeting or conference rooms a receptacle outlet in a minimum of one listed floor box shall be installed of each partitioned area. When only one floor box is provided it shall be located in the center of each partitioned area.
Substantiation: NEMA has submitted a similar proposal to add a NEW section for Meeting Rooms. The purpose of this proposal is to expand on the NEMA proposal to add a definition of a meeting room and to include the term "Conference Room". Additionally, this proposal does not restrict placement of the required floor box when more than one is installed. "Other Structures" was also added since meeting and conference rooms can be found in other buildings such as hospitals and arenas.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 2-276.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ORLOWSKI, S.: First, NO documentation was provided to show the current provisions are a cause of a real fire or other life/fire-safety problem that would be solved if the floor boxes were mandated. Second, it is unfortunate that the scope of the NEC does not relate to the NEC being the "minimum" requirements for "practical safeguarding" for electrical installations. The proposed requirement is nothing more than mandating a "convenience outlet that in fact may never be used. With few exceptions, the placement of receptacle outlets in commercial/industrial occupancies has always been a design consideration of the architect on consultation with the owner or tenant. With now mandating this floor receptacle Panel P02 has now made the NEC a design manual. It cannot be anything else because mandating a floor receptacle in the "middle of the room" can serve no other purpose than requiring design criteria the members of this Panel want.
WILKINSON, R.: This is a design matter and should be rejected.

2-276 Log #3700 NEC-P02 **Final Action: Accept**
(210.55 (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add a New Section 210.55 Meeting Rooms to read as follows:
210.55 Meeting Rooms. In meeting rooms located in office buildings and hotels/motels, a receptacle outlet in a listed floor box shall be installed in the center of each room. For a dividable meeting room a single receptacle outlet in a listed floor box shall be installed in the center of each partitioned area.
Substantiation: The purpose of this new section is to increase the number of access points to the electrical supply to reduce reliance on the use of extension cords and the number of extended and potentially overloaded in meeting rooms. Without centrally located receptacles, extension cords are used with power strips (which are often daisy chained) attached at wall outlets. Extension cords are a tripping hazard and damaged extension cords are a shock and fire hazard. The increased use of laptop computers and projection equipment has led to greater demand for electrical receptacles in convenient locations. The NEC needs to recognize this trend by requiring receptacles to be installed in listed floor boxes in the center of meeting areas, thereby reducing the need for extension cords.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ORLOWSKI, S.: First, NO documentation was provided to show the current provisions are a cause of a real fire or other life/fire-safety problem that would be solved if the floor boxes were mandated. Second, it is unfortunate that the scope of the NEC does not relate to the NEC being the "minimum" requirements for "practical safeguarding" for electrical installations. The proposed requirement is nothing more than mandating a "convenience outlet that in fact may never be used. With few exceptions, the placement of receptacle outlets in commercial/industrial occupancies has always been a design consideration of the architect on consultation with the owner or tenant. With now mandating this floor receptacle Panel P02 has now made the NEC a design manual. It cannot be anything else because mandating a floor receptacle in the "middle of the room" can serve no other purpose than requiring design criteria the members of this Panel want.
WILKINSON, R.: This is a design matter and should be rejected.
Comment on Affirmative:
WEBER, R.: Once again, the panel has made the correct decision on accepting this proposal regarding the need for a listed floor receptacle in meeting rooms located in office buildings and hotel/motels to meet the needs of today's IT system requirements and use. The panel may need to look at the room size and be flexible on the most efficient location for the listed floor receptacle....but it should be made available and save the daisy chaining of power cord strips that are now used because of the lack of availability of a power connection point in the meeting room space.

(Note: Sequence 2-277 was not used)

2-278 Log #2276 NEC-P02 **Final Action: Accept in Principle**
(210.60(A))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise Section to 210.60(A) to read as follows:
(A) General. Guest rooms or guest suites in hotels, motels, sleeping rooms in dormitories, and similar occupancies shall have receptacle outlets installed in accordance with 210.52(A) and 210.52(D). <u>The receptacles required for this section shall be in addition to any receptacle that is part of a furniture, luminaire or appliance.</u> Guest rooms or guest suites provided with permanent provisions for cooking shall have receptacle outlets installed in accordance with all of the applicable rules in 210.52.
Substantiation: This section was revised to add a requirement that receptacles used in guest rooms or guest suites in hotels, motels, sleeping rooms in dormitories, and similar occupancies shall not be integral the luminaires or appliances within the rooms. The new requirement will prevent these rooms from using portable lamps, luminaires or appliances with receptacles built into them to fulfill the number of required receptacles. Many of these portable lamps or luminaires are not Listed by a NRTL and are poorly built.
As the number of laptops and recharges for phones and other devices increase, guest rooms or guest suites in hotels, motels, sleeping rooms in dormitories, and similar occupancies need reliable and safe receptacles. In addition, permanently plugged in appliances are used more readily in dormitories.
Attached is a photo of a desk lamp at a Hilton in Alexandria, VA. This photo was taken during the 2008 IAEI Southern Section meeting. The desk lamp did not have any markings for a NRTL nor a bottom to conceal the conductors and splices. This desk lamp was used to fulfill the number of receptacles required for the hotel room.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
In the submitter's recommendation replace the words "that is part of a furniture, luminaire or appliance" with the words "that is part of a luminaire, appliance, or movable furniture."
Panel Statement: The panel revised the text to make it clear that the receptacles cannot be part of furniture that can be moved.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-279 Log #138 NEC-P02 **Final Action: Reject**
(210.60(B))

Submitter: Craig Schmidt, Hayes, VA
Recommendation: I would like to propose a change to the NEC, section 210.60(B) to say something such as:
"An unswitched receptacle shall be placed within 6 ft from the head of each bed solely for the use of sleeping aids. A separate receptacle shall be provided where a lamp, clock, or other device will be used at the same location."
Substantiation: I am one of millions of people with sleep-apnea. I require a CPAP machine to assist me during my sleeping hours. When traveling, I use hotels and motels. To access a receptacle, I must unplug a lamp, clock, or other device and often flip a switch. I often must pull the mattress away from the wall to plug in my breathing machine.
Panel Meeting Action: Reject
Panel Statement: The current rule requires that at least two receptacle outlets in the room be readily accessible. Attempting to further specify the receptacle location is limited because of the furniture layouts used in hotel and motel rooms. The panel also notes that the current rule prohibits the receptacle from being installed where the attachment cap would contact the bedding or that the receptacle be guarded.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-280 Log #2383 NEC-P02 **Final Action: Reject**
(210.60(B))

Submitter: David G. Humphrey, Midlothian, VA
Recommendation: Revise text to read as follows:
(B) Receptacle Placement. In applying the provisions of 210.52(A) <u>to guest rooms or guest suites without permanent provision for cooking,</u> the total number of receptacle outlets shall not be less than the minimum number that would comply with the provisions of that section. These receptacle outlets shall be permitted to be located conveniently for permanent furniture layout. ~~At least two receptacle outlets shall be readily accessible.~~ <u>All guest rooms or guest suites with or without permanent provisions for cooking, shall have at least two receptacle outlets that are readily accessible.</u> Where receptacles are installed behind the bed <u>of any guest room</u>, the receptacle shall be located to prevent the bed from contacting any attachment plug that may be installed or the receptacle shall be provided with a suitable guard.
Substantiation: The revised text makes clear exactly what portions of 210.60(B) apply to these distinctly different types of hotel or motel guest rooms. 210.52(A) tells us that *"all of the applicable rules in 210.52"* apply to guest rooms or guest suites with permanent provisions for cooking. 210.52(A) does not permit relocation of receptacle outlets to comply with permanent furniture layout. Consequently, the relocation permissions located in 210.60(B) does not apply to guest rooms with permanent provisions for cooking. 210.60(B) begins with the statement *in applying the provisions of 210.52(A)* and does not differentiate between whether the guest room has permanent provisions for cooking or not.
Panel Meeting Action: Reject
Panel Statement: The intent of the current rule is to allow that receptacles in all guest rooms or suites be permitted to be placed convenient to furniture layout. The submitter's recommendation would remove this flexibility from those guest rooms and suites that have permanent provisions for cooking.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-281 Log #3575 NEC-P02 **Final Action: Reject**
(210.63)

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Revise text to read as follows:
210.63 Heating, Air-Conditioning, and Refrigeration Equipment Outlet. A 125-volt, single-phase, 15- or 20- ampere-rated receptacle outlet shall be installed at an accessible location for the servicing of heating, air conditioning, and refrigeration equipment. The receptacle shall be located ~~on the same level and~~ within 7.5 m (25 ft) of the heating, air conditioning, and refrigeration equipment. The receptacle outlet shall not be connected to the load side of the equipment disconnecting means. <u>The receptacle shall be accessible without passing through a doorway.</u>
Substantiation: I can think of no good reason that the service receptacle cannot be placed on a porch that can be accessed by climbing three steps to utilize it. Adding the last sentence will ensure that the required receptacle is not indoors while the equipment served is outdoor equipment. The "same level" requirement is even more restrictive than "readily accessible", which would be a welcome compromise, if the panel were so inclined.
Panel Meeting Action: Reject
Panel Statement: The submitter's revision would allow a receptacle on the main floor to be used to meet the requirements for equipment located in an attic space. The idea of placing the receptacle on the same level can be universally applied.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-282 Log #540 NEC-P02 **Final Action: Reject**
(210.70)

Submitter: William L. Arnold, Arnold Electrical Inspection, P.C.
Recommendation: Add new text to read as follows:
<u>Safe Rooms or Storm Cellars: When these rooms are an integral part of the house, there shall be at least one wall switch controlled lighting outlet and one battery powered emergency luminaire.</u>
Substantiation: These type rooms are becoming more and more popular. Homeowners and some electricians argue that since this is not a habitable room it does not require any wiring. I can find nothing in the codes to overrule this argument. Therefore, I feel that a new code is needed.
Panel Meeting Action: Reject
Panel Statement: These rooms are not any more unique than those listed in 210.52(A) or an unfinished basement. As such, the rules for those same areas should be applied. The submitter has not substantiated a requirement for a battery powered luminaire.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-283 Log #748 NEC-P02 **Final Action: Reject**
(210.70)

Submitter: Darrell W. Morrow, Inspector for City of Montgomery
Recommendation: Add new text to read as follows:
On commercial buildings at least one wall switch controlled lighting outlet shall be installed to provide illumination on the exterior side of outdoor entrances or exit if no other means of illuminating is provided.
Substantiation: A lot of commercial buildings do not have illumination at some rear entrances and no other forms of illumination.
Panel Meeting Action: Reject
Panel Statement: The requirements for commercial building lighting are established in the appropriate building code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-284 Log #3633 NEC-P02 **Final Action: Reject**
(210.70(1))

Submitter: Greg Chontow, Hopatcong, NJ
Recommendation: Revise text to read as follows:
A wall switch shall control at least one lighting outlet at <u>each entry</u> to every habitable room and bathroom.
Substantiation: It is my intent to insure the safety of the occupants. The present wording does not take into consideration multiple entrances to a room.
Panel Meeting Action: Reject
Panel Statement: As the panel stated over numerous code cycles, the need to have a switch at all entrances to a room is a design consideration for the particular situation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-285 Log #1726 NEC-P02 **Final Action: Reject**
(210.70(A)(1))

Submitter: Paul J. Kennedy, Jr., Kennedy Seminars
Recommendation: Add an additional sentence to read as follows:
A wall switch is required at each entry and exit of a habitable room or similar rooms or areas.
Substantiation: I have seen many rooms that have multiple entry/exits that when there are furnishings in place would make it impossible to traverse the room or area safely without first turning on a wall switch near the entry/exit to light the way.
Panel Meeting Action: Reject
Panel Statement: As the panel stated over numerous code cycles, the need to have a switch at all entrances to a room is a design consideration for the particular situation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-286 Log #2777 NEC-P02 **Final Action: Reject**
(210.70(A)(1))

Submitter: Chris Fackler, FSG Electric
Recommendation: Revise text as follows:
At least one wall switch - controlled lighting outlet shall be installed in every habitable room and bathroom <u>and that switch shall be located in the same room as the outlet it controls.</u>
Substantiation: In dwelling units (and other applications as deemed necessary) the switch should be located in the same room as the device/luminaire it controls for the reasons of convenience and identification.
Panel Meeting Action: Reject
Panel Statement: The submitter's recommendation is too restrictive. There are instances where it is appropriate for the switch to be located at the door just before you go into the room.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-287 Log #3220 NEC-P02 **Final Action: Reject**
(210.70(A)(1))

Submitter: Paul J. Kennedy, Jr., Kennedy Seminars
Recommendation: Add an additional sentence to read as follows:
A wall switch is required at each entry and exit of a habitable room or similar rooms or areas.
Substantiation: I have seen many rooms that have multiple entry/exits that when there are furnishings in place would make it impossible to traverse the room or area safely with out first turning on a wall switch near the entry/exit to light the way.
Panel Meeting Action: Reject
Panel Statement: As the panel stated over numerous code cycles, the need to have a switch at all entrances to a room is a design consideration for the particular situation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-288 Log #3509 NEC-P02 **Final Action: Reject**
(210.70(A)(1))

Submitter: Joel Green, Evergreen, CO
Recommendation: Revise text to read as follows:
(A)(1) Habitable Rooms. At least one wall switch-controlled lighting outlet shall be installed in every habitable room and bathroom. <u>At least one point of control shall be at the usual point of entry to the room.</u>
Substantiation: Currently, there is no requirement for the control to be located near entry or exit locations. Entering into a dark room and being required to cross the room to turn on the lights may cause tripping.
Panel Meeting Action: Reject
Panel Statement: The term "usual point of entry" is vague and difficult to determine. There are instances where a switch may be located outside of that room.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-289 Log #3491 NEC-P02 **Final Action: Reject**
(210.70(A)(2)(a) and (b))

Submitter: Mike Theisen, Midwestern Electrical Seminars
Recommendation: Revise the text in 210.70(A) to read as follows:
210.70(A)(2) Additional Locations. Additional lighting outlets shall be installed in accordance with (A)(2)(a), (A)(2)(b), and (A)(2)(c).
(a) At least one wall switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, ~~and~~ detached garages, <u>and accessory buildings</u> with electric power.
(b) For dwelling units, attached garages, ~~and~~ detached garages, <u>and accessory buildings</u> with electric power, at least one wall switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of outdoor entrances or exits with grade level access. A vehicle door in a garage or <u>accessory building</u> shall not be considered as an outdoor entrance or exit.
Substantiation: Accessory buildings, auxiliary buildings, sheds, pole buildings, out buildings, and utility buildings all have uses similar to detached garages and should have similar lighting outlet requirements. Since the code already uses the term accessory building in 210.8(A)(2), I have chosen that term to refer to the aforementioned list of buildings.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated requiring lighting outlets in all accessory buildings.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
KING, D.: This Proposal should be given further consideration by Panel 2. The same hazards exists in accessory buildings that are supplied with electrical power that do in detached garages. Therefore, the need to require a switched lighting outlet for similar occupancies already covered in section 210.70 (A)(2)(a) and (b) is warranted.
WEBER, R.: The Panel should have accepted this proposal; the term "and accessory buildings" is consistent with the already incorporated garage concept, be it attached or detached and the need for a lighting outlet in those structures. It only applies when it is "with electrical power" and if a receptacle is needed, clearly a wall switched lighting outlet should be installed as well. What is being utilized now is cord sets and handy lights plugged into the receptacle and strung to various locations in the building. The question raised is then what is the safer practice and prolonged use of the temporary cords.

2-289a Log #CP202 NEC-P02 **Final Action: Reject**
(210.70(A)(2)(b))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" based on the lack of a proposal to Code-Making Panel 1 to define "Finished Ground Level."
Submitter: Code-Making Panel 2,
Recommendation: Revise text to read as follows:
(b) For dwelling units, attached garages, and detached garages with electric power, at least one wall switch–controlled lighting outlet shall be installed to provide illumination on the exterior side of outdoor entrances or exits with access to the finished ground level. A vehicle door in a garage shall not be considered as an outdoor entrance or exit.
Substantiation: The panel has developed a proposal to replace "grade" with a new defined term "finished ground level". The panel recognizes that if the definition of "finished ground level" is not accepted by CMP-1 then this proposal should be reported as Reject by the TCC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-290 Log #2143 NEC-P02 **Final Action: Reject**
(210.70(A)(2)(c))

Submitter: Gerald "Jerry" Rose, City of Biloxi, Mississippi
Recommendation: Delete text as follows:
(c) Where one or more lighting outlet(s) are installed for ~~interior~~ stairways, there shall be a wall switch at each ~~floor~~ level, and landing level that includes an entryway, to control the lighting outlet(s) where the stairway between ~~floor~~ levels has six risers or more.
Exception to (A)(2)(a), (A)(2)(b), and (A)(2)(c): In hallways, in stairways, and at outdoor entrances, remote, central, or automatic control of lighting shall be permitted.
Substantiation: Section 210.70 points out that adequate lighting and proper control and location of switching are as essential to the safety of occupants of dwelling units, hotels, motels, and so on, as are proper wiring requirements. proper illumination ensures safe movement for persons of all ages, thus preventing many accidents. Since several hurricanes have hit the US and due to FEMA regulations, many house are being built anywhere from ten to fifteen feet above grade. it is just as important to provide control of lighting for exterior stairs as well as interior stairs.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that exterior stairs are required to have switches installed in the same manner as interior stairs. There are other security and related access concerns to the switches that are unique to exterior applications.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-291 Log #2538 NEC-P02 **Final Action: Reject**
(210.70(A)(2)(c))

Submitter: Peter Tokle, Coon Rapids, MN
Recommendation: Revise text to read as follows:
210.70 (A) Dwelling Units. In dwelling units, lighting outlets shall be installed in accordance with 210.70(A)(1), (A)(2), and (A)(3).
"...(c) Where one or more lighting outlet(s) are installed for interior stairways, <u>including attached garages</u>, there shall be a wall switch at each floor level, and landing level that includes an entryway, to control the lighting outlet(s) where the stairway between floor levels has six risers or more...".
Substantiation: Many split-level homes have stairways (with six or more risers) either leading up from the garage level into the main level of the home or stairways going down for entrance to the lower level. Lighting control is always located inside the door into the dwelling. Having another switch by the stairs in the garage is a safety issue, so occupants don't have to climb up or down the stairs in the dark.
Panel Meeting Action: Reject
Panel Statement: The stairs as described are interior stairways under the current rule.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-292 Log #671 NEC-P02 **Final Action: Reject**
(210.70(A)(3))

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Add new text to read as follows:
210.70(A)(3) Storage or Equipment Spaces. For attics, underfloor spaces, utility rooms, and basements, at least one lighting outlet containing a switch or controlled by a wall switch shall be installed where these spaces are used for storage or contain equipment requiring servicing. At least one point of control shall be at the usual point of entry to these spaces. The lighting outlet shall be provided at or near the equipment requiring servicing.
<u>Attic and Crawl Space Locations. Furnaces and air conditioning equipment shall be permitted to be located in attics and crawl spaces, provided there is an access door at least 900 mm by 562.5 mm (36 in. by 22 1/2 in.) and a passageway of at least 900 mm (3 ft) high by 900 mm (3 ft) wide by 900 mm (3 ft) with a suitable permanent walkway at least 600 mm (24 in.) wide extending from the point of entry to each component.</u>
Substantiation: When doing inspection service, maintenance, repair and replacement of furnaces and air conditioning equipment installed in attics and crawl spaces, the access to the equipment spaces and working spaces about the equipment that are provided are insufficient to allow for safe work on energized electrical equipment during troubleshooting of the equipment. Text inserted for change was taken from 600.21(E) with editorial changes to walkway with and width and depth of working space. Some of the proposed dimensions were adapted from the Oregon Residential Specialty code M1305.1.3 and 1.4, Copyright by International Code Council, Inc. ISBN 978-1-58001-517-2.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The ability to locate equipment in an attic or crawl space is dictated by the applicable mechanical code. This provision is not related to the electrical code provisions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-293 Log #673 NEC-P02 **Final Action: Reject**
(210.70(C))

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Add new text to read as follows:
210.70(C) Other Than Dwelling Units. For attics and underfloor spaces containing equipment requiring servicing, such as heating, air-conditioning, and refrigeration equipment, at least one lighting outlet containing a switch or controlled by a wall switch shall be installed in such spaces. At least one point of control shall be at the usual point of entry to these spaces. The lighting outlet shall be provided at or near the equipment requiring servicing.
<u>Attic and Crawl Space Locations. Furnaces and air conditioning equipment shall be permitted to be located in attics and crawl spaces, provided there is an access door at least 900 mm by 562.5 mm (36 in. by 22 1/2 in.) and a passageway of at least 900 mm (3 ft) high by 900 mm (3 ft) wide by 900 mm (3 ft) with a suitable permanent walkway at least 600 mm (24 in.) wide extending from the point of entry to each component.</u>
Substantiation: When doing inspection service, maintenance, repair and replacement of furnaces and air conditioning equipment installed in attics and crawl spaces the access to the equipment spaces and working spaces about the equipment that are provided are insufficient to allow for safe work on energized electrical equipment during troubleshooting of the equipment. Text inserted for change was taken from 600.21(E) with editorial changes to walkway with and width and depth of working space. Some of the proposed dimensions were adapted from the Oregon Residential Specialty code M1305.1.3 and 1.4, Copyright by International Code Council, Inc. ISBN 978-1-58001-517-2.
Note: Supporting material is available for review at NFPA Headquarters.
This is not original material; it's reference/source is as follows: Oregon Residential Specialty code M1305.1.3 and 1.4, Copyright by International Code Council, Inc., ISBN 978-1-58001-517-2. National Electrical Code NFPA 70, 2008, 600.21(E).
Panel Meeting Action: Reject
Panel Statement: The ability to locate equipment in an attic or crawl space is dictated by the applicable mechanical code. This provision is not related to the electrical code provisions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 215 — FEEDERS

2-294 Log #536 NEC-P02 **Final Action: Reject**
(215.2, FPN 2)

Submitter: Dennis J. Cox, Elkhart County Building Dept. / Rep. IAEI
Recommendation: Add new text as follows:
I propose that this section be changed to an enforceable code section. The text to read the same as it does in the NEC 2008 and to be code section 215.2(A)(4).
Substantiation: In the I.R.C. 2006 Code Section E3304.1 voltages throughout Chapters 33 through 42, the voltages considered shall be at which the circuit operates. So if the NEC 3% V.D. permitted for branch circuit and 5% total V.D. permitted will provide reasonable efficiency of operation. Then, if the voltage drop of a given circuit exceeds the 3% or 5% then the voltage is not at which the circuit operates and is a code violation.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been supplied to justify making a specific voltage drop
mandatory. See panel action and statement on Proposal 2-193.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-295 Log #2012 NEC-P02 **Final Action: Reject**
(215.2(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Consider the following: A 208/120 volt 3-phase 4-wire feeder run to an auxiliary gutter in a pump room with taps to a disconnecting means for a 100 hp 208 volt motor and a 15 ampere circuit breaker for a 120-volt receptacle and a lighting outlet. The feeder is protected by noontime-delay fuses with a rating 300 percent of the motor FLA (273 A. x 300%=819 amperes), plus 360 volt-amperes for the lighting and receptacle outlets for a total load of 822 amperes. If a standard fuse rating of 800 amperes is used the grounded conductor is required to be 1/0 copper or 3/0 aluminum, for a total calculated load of 3 amperes. If these conductors were service conductors (90 C. 350 kcmil copper, 230.42 *can apply and 250.24 (C)(1) indicates the grounded conductor can be 6 or 4 AWG. It is not reasonable that a feeder with overcurrent protection is* required to have the grounded conductor larger than a grounded service conductor where the load is identical for both. Tap conductors from a feeder are still feeders until overcurrent protection is provided and are covered by this rule which appears to conflict with 240.21(B). This rule does nothing to protect grounded conductors of other feeders or branch circuits which may be installed in the same raceway, where the grounded conductor may be much smaller than the largest feeder grounded conductor. This rule is only effective where one feeder is installed in a dedicated raceway or enclosure, and no other conductors are installed, or all other circuits have the same value of overcurrent protection. In the proposed scenario the grounded tap conductor to the 15-ampere circuit breaker is a feeder and 1/0 or 3/0 AWG which is unreasonable. The proposal which resulted in this provision provided no data to indicate burn-out of grounded feeder conductors is a particular widespread problem.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation does not give reasons for deleting all of 215.2(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-296 Log #2942 NEC-P02 **Final Action: Accept in Part**
(215.2(A)(1))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
(A) Feeders Not More Than 600 Volts.
(1) General. Feeder conductors shall have an ampacity not less than required to supply the load as calculated in Parts III, IV, and V of Article 220. The minimum feeder-circuit conductor size, <u>after</u> ~~before~~ the application of any adjustment or correction factors, shall have an allowable ampacity not less than the noncontinuous load plus 125 percent of the continuous load.
Exception No. 1: <u>If</u> ~~Where~~ the assembly, including the overcurrent devices protecting the feeder(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the feeder conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load.
Exception No. 2: Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the continuous and noncontinuous load.
<u>(2) Grounded Conductor.</u> The size of the feeder circuit grounded conductor shall not be smaller than that required by 250.122~~, except that 250.122(F) shall not apply where grounded conductors are run in parallel~~.
~~Additional minimum sizes shall be as specified in 215.2(A)(2) and (A)(3) under the conditions stipulated.~~
Renumber (2) and (3) to (3) and (4) respectively.
Substantiation: An attempt is being made to simplify the requirements as well as to revise the phrase, "<u>before</u> the application of any adjustment or correction factors" to, "<u>after</u> the application of any adjustment or correction factors." This is the way conductors are being selected in the field and complies with the intent of 110.14(C) to assure the conductors are sized not smaller than that required in Table 310.16 based upon the temperature rating of the terminations. The present language can be interpreted to require that the conductors be sized for the noncontinuous load plus 125 percent of the continuous load plus any adjustment or correction factors.
The sentence proposed for deletion is not necessary as the rules in existing (A)(2) and (A)(3) stand alone and modify the general requirements for the specific application.
A new title is being proposed for the paragraph on grounded conductors to comply with the NEC Style Manual. The reference to 250.122(F) regarding equipment grounding conductors run in parallel is proposed for deletion as the previous exception that permitted a reduced size equipment grounding conductor in some cases was deleted in the 2008 NEC.
Also, see 240.4(D) which used the phrase for Small Conductor overcurrent protection, "<u>after</u> any correction factors for ambient temperature and number of conductors have been applied." This seems to be the correct concept to ensure proper conductor ampacity.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Accept in Part
Revise text as follows:
Exception No. 1: <u>If</u> the assembly, including the overcurrent devices protecting the feeder(s), is listed for operation at 100 percent of its rating, the allowable ampacity of the feeder conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load.
<u>(2) Grounded Conductor.</u>
The remainder of the proposal is rejected.
Panel Statement: The panel accepts changing the word "Where" to "If" in Exception No. 1. The panel also accepts adding "(2)" and the title "Grounded Conductor". The remainder of the proposal is rejected. For the rejection of changing "before" to "after" see panel statement on Proposal 2-195. The panel rejects the deletion of the reference to 250.122(F) since the panel does not intend that the size of the grounded conductor has to be fully based on 250.122 in each parallel raceway.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-297 Log #1717 NEC-P02 **Final Action: Reject**
(215.2(A)(1), FPN No. 1 (New))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Add new text as follows:
<u>FPN No. 1: See 110.14(C)(1)(a) and (b) for termination provisions of equipment.</u>
Substantiation: Ignoring the temperature rating of equipment is the most common mistake being made in conductor sizing today. Entirely too many wiremen take no notice of the temperature limitations of 110.14(C) when sizing conductors. They disregard the temperature rating of equipment, and use the 90°C column of Table 310.16 when 90°C rated conductors, such as THHN, are being used. I've even had engineers stand up in seminars and yell "Larry, how are we supposed to know that!?"
At the very least, there should be a Fine Print Note directing the reader to the rules of 110.14(C)(1)(a) and (b).
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that there is a need for an additional reference to 110.14(C) as those provisions apply to all installations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-298 Log #3388 NEC-P02 **Final Action: Reject**
(215.2(A)(2))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
215.2(A)(2) Ampacity Relative to Service<u>-Entrance</u> Conductors. The feeder conductor ampacity shall not be less than that of the service<u>-entrance</u> conductors where the feeder conductors carry the total load supplied by the service<u>-entrance</u> conductors with an ampacity of 55 amperes or less.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: The definitions have not been agreed to at this point. Should CMP-4 revise the definitions and all of the rules associated with the use of the terms, CMP-2 can address the issue again at the comment stage. The panel notes that there appears to be no additional clarity added by the revision to the definitions.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-299 Log #3393 NEC-P02 **Final Action: Reject**
(215.2(A)(3))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

215.2(A)(3) Individual Dwelling Unit or Mobile Home Conductors. Feeder conductors for individual dwelling units or mobile homes need not be larger than service-entrance conductors. Paragraph 310.15(B)(6) shall be permitted to be used for conductor size.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-298.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-300 Log #3952 NEC-P02 **Final Action: Reject**
(215.2(A)(4), 215(B), and 220.87)

Submitter: James E. Degnan, Sparling

Recommendation: Add text as follows:

215.2(A)(4)Existing Feeder, Load Addition. Where the existing feeder load has been determined in accordance with 220.87 the feeder shall have an allowable ampacity of not less than 125% of the load determined by 220.87 plus the ampacity required for the new load by 215.2(A)(1).

Exception 1: Where the assembly, including the overcurrent devices protecting the feeders, is listed for operation at 100 percent of its rating, the allowable ampacity of the conductors shall be permitted to be not less than the sum of 110% of the existing load plus the new load.

220.87 Determining Existing Loads. The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period.

Exception: If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (measure of average power demand over a 15-minute period) continuously recorded over a minimum 30-day period using a recoding ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that may be periodic in nature due to seasonal or similar conditions.

~~(2) The maximum demand at 125 present plus the new load does not exceed the ampacity of the feeder or rating of the service.~~

(3) (2) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

Substantiation: The text of 220.87(2) identifies the minimum size of a feeder and belongs in Article 215, not Article 220. At its present location the text conflicts with the following:

215.1 Scope. This article covers the installation requirements, overcurrent protection requirements minimum size, and ampacity of the conductors for feeders supplying branch circuit loads.

220.1 Scope. This article provides requirements for calculating branch-circuit, feeder, and service loads.

220.1 General The calculated load…after any applicable demand factors permitted by Part II or IV…(the 125% is not a demand factor)

This change may also impact the loading of services as permitted by 230.90. The existing language required that the service size be a minimum of 125% of the measured load. This proposal changes the language, so that when 230.90 refers to "load", existing load in 220.87 is load and nothing more. I believe this is acceptable as service conductors could also be fully loaded in a new facility. The alternative would be to make arrangements for a change in Article 230 to keep the 125% margin.

The proposed text also makes an allowance for the use of continuously rated devices on existing systems, where the existing code is not clear on this issue.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with the submitter's substantiation. The 125 percent factor in 220.87 is intended to be a safety factor to increase the load. Relocating the text to Article 215 would be an improper application.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-301 Log #749 NEC-P02 **Final Action: Accept**
(215.3 Exception No. 2)

Submitter: Donald R. Cook, Shelby County Development Services

Recommendation: Revise text to read as follows:

Overcurrent protection for feeders over 600 volts, nominal, shall comply with Part ~~XI~~ IX of Article 240.

Substantiation: Revision for editorial change to correctly identify Part IX of Article 240 for over 600 volt overcurrent protection requirements.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-302 Log #2787 NEC-P02 **Final Action: Accept**
(215.3 Exception No. 2)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
215.3 Exception No. 2: Overcurrent protection for feeders over 600 volts, nominal, shall comply with Part ~~XI~~ IX of 240.4.
Substantiation: Revision for editorial change to correctly identify Part IX of Article 240 for over 600 volt overcurrent protection requirements.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-303 Log #314 NEC-P02 **Final Action: Reject**
(215.7(B) (New))

Submitter: Robert J. Walsh, City of Hayward
Recommendation: Add new text to read as follows:
215.X Feeder With No Common Neutral Conductors. Grounded conductors shall not be required to be run with feeder conductors supplying panelboards that do not, in turn, supply unbalanced neutral currents.
Substantiation: Many loads do not require a neutral conductor such as electric motors and electrical heaters. Some jurisdictions presently require the grounded to be installed even when it is not needed.
Panel Meeting Action: Reject
Panel Statement: There is no current code requirement to install a grounded conductor in a feeder where it is not utilized by the loads.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-304 Log #498 NEC-P02 **Final Action: Reject**
(215.9)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "Circuit" and "Interrupter" in the first sentence.
Substantiation: The addition of the hyphen provides consistency throughout the Code and correlates with the title of 215.9.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The usage of the term is in accordance with the NEC Style Manual. When the term is used as a noun, only the first pair of words is hyphenated. When used as an adjective, both pairs of words are hyphenated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-305 Log #3120 NEC-P02 **Final Action: Reject**
(215.9)

Submitter: Paul S. Hamer, Chevron Energy Technology Company
Recommendation: Renumber the existing wording of Section 215.9 and include as (A):
215.9 Ground-Fault Circuit-Interrupter Protection for Personnel.
(A) Ground-Fault Circuit-Interrupter Protection for 125-volts, Single-Phase Feeders.
Feeders supplying 15- and 20-ampere receptacle branch circuits shall be permitted to be protected by a ground-fault circuit interrupter in lieu of the provisions for such interrupters as specified in 210.8 and 590.6(A).
Add a new section, (B):
(B) Three-Phase Ground-Fault Circuit-Interrupter System (GFCIS-3Ph) Protection for Three-Phase Feeders.
(1) Supplying Lighting Outlets. Three-phase feeders that supply branch circuits for lighting outlets with an operating voltage exceeding 150 volts to ground shall be permitted to be protected by three-phase ground-fault circuit-interrupter systems in lieu of the provisions for such systems as specified in 210.8.
(2) Supplying Other Than Lighting Loads. Three-phase feeders that supply loads other than lighting shall be permitted to be protected by three-phase ground-fault circuit-interrupter systems in lieu of the provisions for such systems as specified in 210.8.
Substantiation: See my companion proposal for 210.8(D). If the proposal for 210.8(D) is accepted, this proposal would allow the alternative of using the three-phase ground-fault circuit-interrupter systems on the feeders – both for "supplying lighting outlets" and "supplying other than lighting loads" – in lieu of the branch circuit requirements of 210.8(D).
This proposal subdivides the existing 215.9 to accommodate single-phase and three-phase ground-fault protection. The proposed title of "A" is added to differentiate the existing "Ground-Fault Circuit-Interrupter Protection for 125-volts, Single-Phase Feeders" from the newly proposed provisions in "B" for "Ground-Fault Circuit-Interrupter System (GFCIS-3Ph) Protection for Three-Phase Feeders."
Provision B(1) is proposed to correspond with the proposal submitted for the proposed new section 210.8(D)(1). Provision B(2) is added to indicate an allowed option of using the three-phase ground-fault circuit-interrupter systems for loads other than lighting, corresponding to the proposed new section 210.8(D)(2).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-131.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-306 Log #3599 NEC-P02 **Final Action: Reject**
(215.9)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
215.9 Ground-Fault Circuit-Interrupter Protection for Personnel. Feeders supplying 15- and 20-ampere receptacle branch circuits shall be permitted to be protected by a ground-fault circuit interrupter in lieu of the provisions for such interrupters as specified in 210.8 and 590.6(A). Where ground-fault circuit interrupter protection for personnel is supplied by plug-and-cord-connection, it shall be listed as portable GFCI protection or provide a level of protection equivalent to a portable GFCI, whether assembled in the field or at the factory.
Substantiation: "Portable GFCIs" are required by the trinational *Standard for Ground-Fault Circuit-Interrupters, NMX-J-520-ANCE-2006* 1, *CSA C22.2 No. 144.1-06* 2, *ANSI/UL943-2005* 3, Clause 6.7.2.1, and construction-site portable power-distribution equipment is similarly required by standard *Portable Power-Distribution Equipment, UL1640* 3, Clauses 53.3 - 53.5 and 63.3 - 63.4, additionally to de-energize the "load" output contacts and terminals when one or more of the following defects occurs:
the grounded conductor to the power supply is opened
the grounded conductor is transposed with an ungrounded conductor to the power supply
one of the ungrounded conductors to the power supply on a polyphase system or on a single-phase, 3-wire system is opened
When Underwriters Laboratories (in UL product category KCXS) and CSA International (in CSA product class 1451-81) list such GFCI products, both certifiers specifically identify these as "portable GFCIs" to differentiate them from other GFCIs. Listed portable GFCIs can be embodied not only as GFCI plugs and in-line GFCI cord sets but even some GFCIs for permanent wiring such as SOME faceless GFCI receptacles can be additionally Listed and identified as portable GFCIs.
[1]Asociación de Normalización y Certificación (Association of Standardization and Certification),
[2]Canadian Standards Association
[3]Underwriters Laboratories Inc.
When conventional GFCIs intended for permanent, inspected hard-wiring are used in what should be portable GFCI applications, where the any of the indicated defect conditions occur, the ground-fault-detection circuitry is NOT powered and the GFCI protection cannot operate but power is nonetheless delivered UNinterrrupted EVEN IN THE PRESENCE OF A GROUND-FAULT. Any GFCI protection the user assumes is present is in fact UNAVAILABLE.
Amongst those NOT directly involved in GFCI manufacture who are nonetheless involved with this *Code*, there is a significant misperception that GFCI protection of personnel will provide a panacea against ALL causes of lethal electric shock. Due to their misunderstanding of the differences between GFCIs for permanent installation and portable GFCIs, a significant number of cord reel manufacturers unwittingly extrapolated their Listings for portable (cord-and-plug-connected) cord reels [having ordinary receptacles as outlet components] and their Listings for HARD-WIRED cord reels acceptably having GFCI receptacles as outlet components, without the overt knowledge of at least two major certifiers, to incorrectly encompass portable (cord-and-plug-connected) cord reels having GFCI receptacles (no open neutral protection) as outlet components where portable GFCI protection (with open neutral protection) was warranted.
It is also common to find cord-and-plug-connected field assemblies employing GFCI receptacles (no open neutral protection) as outlet components rather than portable GFCI protection (with open neutral protection) of the outlets. Some times, these are field repairs misperceived as safety upgrades where conventional receptacles in plug-and-cord-connected equipment are replaced with conventional GFCI receptacles. Furthermore, field repairs of plug-and-cord-connected equipment are occasionally encountered where portable GFCIs (faceless-receptacle-type) have been field-replaced with more-readily available, conventional GFCI receptacles under the mistaken belief that they are equivalent. In either situation, where the indicated defects occur, the user has a false sense of security because power is still delivered.
Companion proposals have been made to 100 "Ground-Fault Circuit Interrupter (GFCI), *Portable (as applied to ground-fault circuit interrupters)*" [NEW], to 210.8, to 518.3(B)*, and to 590.6.
* NOTE: That 518.3(B) proposal regarding portable GFCI protection is separate from another proposal I submitted for 518.3(B) involving GFCI protection required elsewhere in the *Code*.
Panel Meeting Action: Reject
Panel Statement: 215.9 refers to feeders and the proposal deals with portable GFCIs which would not be acceptable to meet the requirements of this section.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

ORLOWSKI, S.: In addition to the Panel Statement, the proposed provision seems to apply more to temporary wiring such as that used on a job site covered under Article 590 - Temporary Installations. Federal OSHA regulations already cover this use of these types of devices.

2-307 Log #223a NEC-P02 **Final Action: Reject**
(215.10)

Submitter: Kim Hovey, Howard R. Green Company
Recommendation: Where 1000A (or more) service or feeder terminates in a factory listed device distribution device, ground fault protection is not required. Where any branch circuit of the listed device is 1000A or more, provide ground fault detection.
Substantiation: I think the intent of the 1000A or more ground fault requirement is not clear, especially, when the handbook explanatory notes make it clear that the ground fault protection is only for the line side, not the supply. Since most service (or feeders) utilize the tap rules, and terminate at a main breaker of a factory listed device, it should be clarified whether the ground fault rule is necessary. To me, there is a large difference between factory distribution devices and field installed conduit and wires.

I have submitted the same proposal to sections 230.95, 240.13, and 240.21(C).
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-308 Log #4909 NEC-P02 **Final Action: Reject**
(215.10)

Submitter: James Brozek, Acton, MA
Recommendation: Delete 215.10 entirely. This is a companion proposal in association with a proposal covering new 240.27 and 240.28, which consolidates requirements from 240.13, 230.95, 700.26, 215.10, 517.17, and 708.52.
Substantiation: If the proposal for new 240.27 and 240.28 is accepted 215.10 will no longer be necessary.
Panel Meeting Action: Reject
Panel Statement: The provision is applicable to feeder disconnects and is appropriate in Article 215.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-309 Log #3929 NEC-P02 **Final Action: Reject**
(215.10 Exception No. 3 (New))

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Add a third exception.

Exception No 3: Ground fault relays on the normal source side (line side of the transfer switch) that supply emergency systems, legally required standby systems, or healthcare essential electrical systems, are permitted to be restrained from operating for ground faults on the loadside of the transfer switch if the system complies with both of the following:

(a) Ground fault protection relays on the normal source side (line side of the transfer switch) are not restrained from operation for ground faults on the normal source side (line side of the transfer switch)

(b) Audible and visual signal devices indicate -whenever a ground fault relay has been restrained. Instructions on the course of action to be taken in the event of an indicated ground fault shall be located at or near the sensor location.

Substantiation: For life-safety purposes and system reliability for the prevention of blackouts, it is desirable that a ground-fault on the load side of a transfer switch in an emergency system, legally required standby system, or healthcare essential electrical system, not take out the ground fault protection on the normal source. This proposal allows the ground fault protection on the normal source to be restrained from operating and taking down all or large portions of the normal system because of a ground fault on the load side of the transfer switch. For these critical life-safety-related applications, it requires both audible and visual signaling that a ground fault has occurred and that it is being restrained.

Restraining the normal system ground fault protection relays for faults on the load side of the transfer switch is consistent with the concept of continuity of service for emergency systems (700.26 & 700.7(D)), legally required standby systems (701.17), and healthcare essential electrical svstems (517.17(B)).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: The provisions for health care facilities are covered in 517.17. The selectivity aspects of the ground fault protection system is a design issue and is the responsibility of the designer.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-310 Log #538 NEC-P02 **Final Action: Reject**
(215.12(C))

Submitter: Joseph R. Penachio, Joe Penachio Electrician
Recommendation: Add new text to read as follows:

(C) Ungrounded Conductors. Where the premises wiring system has feeders supplied from more than one nominal voltage system, each ungrounded conductor of a feeder shall be identified by phase or line and system at all termination, connection, and splice points. The means of identification shall be permitted to be by separate color coding, marking tape, or other approved means. The method utilized for conductors originating within each feeder panelboard or similar feeder distribution equipment shall be documented in a manner that is readily available or shall be permanently posted at each feeder panelboard or similar distribution equipment. Where both system panelboards or distribution equipment are located in the same area, the identification shall also be located within each panelboard(s), or similar distribution equipment.
Substantiation: Several attendees in my continuing education classes have stated the fact that it is not uncommon to have the covers installed on the other nominal voltage system panelboard or distribution equipment when they are located adjacent to/or in the same area. Identifying them inside may minimize this error or at least make it more obvious to the electrician which system is in the panelboard or equipment. The covers could be properly identified as black/red/blue for the 480-277 volt wye system and brown/orange/yellow for the 208-120 volt wye system. But, if the panelboard cover(s) were previously installed on the opposite nominal voltage panelboard, an electrician could mistakenly assume the black/red/blue as the 208/120 volt wye system, or he could be the one who incorrectly reinstalls the panelboard cover(s), resulting in the same potential hazard. This would address this possible hazard.
Panel Meeting Action: Reject
Panel Statement: The recommended sentence would always require that the marking information be posted in the panelboard. The rule permits the marking information to be made readily available.

The substantiation does not justify the recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 220 — BRANCH-CIRCUIT, FEEDER, AND SERVICE CALCULATION

2-311 Log #1513 NEC-P02 **Final Action: Reject**
(220.3(C)(6))

Submitter: William Q. Cellini, Jr., Ardmore, PA
Recommendation: “Other” should be replaced by “General Purpose” in the term “other outlets”.
Substantiation: “General Purpose (GP)” is more specific and is clearer than “other”, which is ambiguous.
Panel Meeting Action: Reject
Panel Statement: The section referenced in the submitter’s proposal does not exist in the 2008 NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-312 Log #1515 NEC-P02 **Final Action: Reject**
(220.3(C)(6))

Submitter: William Q. Cellini, Jr., Ardmore, PA
Recommendation: Add new text to read as follows:

Maximum Permissible General Purpose (GP) Receptacle Outlets on GP Branch Ckts (15 AT, 20 AT) for continuous loads only (a) and (b) non-continuous loads only.
Substantiation: This table will clarify confusion regarding GP Branch-Ckt. loading.
Panel Meeting Action: Reject
Panel Statement: The section referenced in the submitter’s proposal does not exist in the 2008 NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-313 Log #1514 NEC-P02 **Final Action: Reject**
(220.4(e))

Submitter: William Q. Cellini, Jr., Ardmore, PA
Recommendation: Add new text to read as follows:

“(e) General Purpose (GP) Branch-Circuits”.
Substantiation: Addition of this paragraph will clarify use of GP branch-

circuits, plus enhance and facilitate.
Panel Meeting Action: Reject
Panel Statement: The section referenced in the submitter's proposal does not exist in the 2008 NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-314 Log #2776 NEC-P02 **Final Action: Reject**
(220.5(B))

Submitter: Chris Fackler, FSG Electric
Recommendation: As in 220.5(B) Fractions of an Ampere include this section in Article 210 so as to cover the entire code for dropping fraction less than 0.5.
Substantiation: Using a fraction less than 0.5 sometimes requires conductors to unnecessarily be up-sized per code.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-315 Log #3508 NEC-P02 **Final Action: Reject**
(220.5(B))

Submitter: Eric Deitchel, Safeway
Recommendation: Where calculations result in a fraction of an ampere that is less than.5, such friction shall be permitted to be dropped. If the fraction of an ampere results in more than.5, such fraction be permitted to be rounded up to the next whole ampere.
Substantiation: There would no longer be confusion over whether or not it should be left the same or rounded up.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the code and does not address rounding of a 0.5 calculation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-316 Log #4317 NEC-P02 **Final Action: Reject**
(220.5(B))

Submitter: Richard W. Becker, Engineered Electrical Systems, Inc.
Recommendation: Revise as follows:
Where calculations result in a fraction of an ampere ~~that is less than 0.5, such fractions shall be permitted to be dropped.~~ <u>the result shall be rounded to the nearest whole number.</u>
Substantiation: "Rounding" to whole numbers is a standard mathematical concept that is performed regularly and by most computer programs. The present language in the code is not in accordance with standard mathematical practice.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-317 Log #4588 NEC-P02 **Final Action: Reject**
(220.5(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows: Calculations shall be permitted to be rounded to the nearest whole ampere, with decimal fractions smaller than 0.5 dropped."
Substantiation: The recent volley of proposals on this point has convinced this submitter that this should be clarified. The proposal wording accords with usual rounding requirements, and also Annex D, Example D3(a) which uses this approach. The submitter, who sat on the Article 220 rewrite task group, intends this as a simple editorial clarification of existing intent.
Panel Meeting Action: Reject
Panel Statement: The code does not prohibit the calculation method proposed by the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-318 Log #180 NEC-P02 **Final Action: Reject**
(Table 220.12)

Submitter: Eric W. Dougan, Louis Perry and Associates
Recommendation: Table 220.12 values should be changed/updated to match the International Energy Conservation Code (IECC) or the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) lighting loads allowances.
Substantiation: The NEC values in Table 220.12 are much higher than the IECC or ASHRAE vales. Most states require energy compliance certificates based on IECC or ASHRAE values. If NEC values were used, most would fail the energy compliance study.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ORLOWSKI, S.: The provisions related to electric conservation contained in the IECC and ASHRAE 90.1 are not related to life-safety or electrical-safety concerns. The provisions in those standards are what are deemed "above code" considerations to provide a means to use less electrical energy. These standards also are not intended to supersede the life-safety regulations adopted into law. In addition, these energy conservation criteria are stated as performance criteria as one of many means to achieve a decided level of overall energy conservation for a whole building, not particularly only the electric energy usage.

2-319 Log #420 NEC-P02 **Final Action: Accept**
(Table 220.12)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Delete the words "per" in the column headings and revise the column headings to read:
"Volt-Amperes/Square Meter" and "Volt-Amperes/Square Foot".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-320 Log #3751 NEC-P02 **Final Action: Reject**
(220.12)

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Add a new exception following the FPN and before the Table in 220.12 to read as follows:
Exception: Where the building is designed and constructed to comply with an energy code adopted by the local authority, the lighting load shall be permitted to be calculated at the values specified in the energy code where the following conditions are met
a. A power monitoring system is installed that will provide continuous information regarding the total general lighting load of the building.
b. The power monitoring system will be set with alarm values alert the building owner or manager if the lighting load exceeds the values set by the energy code.
c. The demand factors specified in 220.42 are not applied to the general lighting load.
Substantiation: Energy efficiency is a critical issue faced by North American today. The objective of this new exception is to allow for some relief in the NEC calculations for lighting loads when an energy code is used to design and construct the building. For example in Table 220.12, office buildings are required to be calculated at 3.5 va/sq.ft. for the general lighting load. ASHRAE 90.1 specifies a maximum lighting load of XXX for office buildings constructed to comply with that code. For large office buildings, this can result in a significant reduction in the lighting load.
However, there have always been some issues that have been problematic with reducing these loading calculations to the lower levels. The issues related to maintenance and monitoring of the system. A building can be constructed today with good compliance to the energy code, but if the proper maintenance and monitoring are not provided the load can increase significantly over time and result in an overloaded service or feeder – something that our calculations in Article 220 try to avoid.
To address this issue, the exception is worded in a manner that it can only be applied where a complete power monitoring system is installed. The wording that indicates a "complete" power monitoring system is also intended to make it clear that simply putting a "meter" on the building is not sufficient. These systems are becoming very common place today and can be cost effectively installed. The exception is also worded to require that the system be monitored to ensure that the lighting loads remain at or below the specified values in the energy code. This requires some commitment on the part of the building owner, but is a reasonable system requirement in order to be able to reduce the load calculations.
This revision also "rewards" designers and building owners to allow lower service/feeder calculations (resulting in lower initial electrical system cost) if they commit to the energy efficiency aspects of the building. It should also be noted that the exception is worded to require that the entire building be constructed to the energy code and not just the electrical system.
A final sentence has been added to the exception to make it clear that if the exception is applied, then the lighting load demand factors should not be applied. This avoids "double dipping" of using the lower values and the demand factors.
While I agree that the panel should not reduce the load calculations without some conditions, this proposal provides a reasonable set of conditions to allow the trade-off.
Panel Meeting Action: Reject

Panel Statement: The energy codes are not uniformly applied throughout the country so no specific load requirements are possible based on these codes. The NEC specifies the minimum load requirements based on electrical safety.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

ORLOWSKI, S.: The provisions related to electric conservation contained in the IECC and ASHRAE 90.1 are not related to life-safety or electrical-safety concerns. The provisions in those standards are what are deemed "above code" considerations to provide a means to use less electrical energy. These standards also are not intended to supersede the life-safety regulations adopted into law. In addition, these energy conservation criteria are stated as performance criteria as one of many means to achieve a decided level of overall energy conservation for a whole building, not particularly only the electric energy usage.

In addition, the demand that is calculated in accordance with the NEC or engineering practices is only design criteria to determine service and feeder size, equipment, etc. These values have been determined using typical electric use over many decades. Just because the original electrical engineer for a building designs the appliances and lighting fixtures to use less electric than require by the NEC to calculate the service/feeder equipment does not mean that will always be load on the service, etc. As time goes by additional appliances or lighting loads may be added, or equipment changed-out are of a larger load. Anyone can install energy conserving appliances and lighting if they so desire. But, electrical safety should not be based on a possible installation, it should be based on the probable installation and history of electric use.

2-321 Log #4374 NEC-P02 **Final Action: Reject**
(220.12)

Submitter: Alan Manche, Square D Company/Schneider Electric
Recommendation: Revise the General Lighting Load unit load in Table 220.12 for Dwelling Units from 3VA to 6VA.

Table 220.12
Dwelling Units 33 ~~3VA~~ 6VA

Substantiation: I have had the privilege to participate in over 20 state adoption hearings for the 2008 National Electrical Code. The common topics that arise at these hearing include tamper resistant receptacles and AFCI protection usually brought to the table by the state home builders association opposing the protection. A clear message in the testimony that unfolds from the home builders in nearly every state is that the NEC is not sufficient in terms of the number of circuits that are required. When economic impact information is presented at the hearings, the home builders consistently argue the number of circuits in the analysis that is restricted to the NEC requirements is insufficient for a functional home.
I n general, the data and testimony presented by the home builders association show figures that are at least doubled the number of general lighting load circuits in the home as compared to the required number of circuits. Even NEMA promotional material on AFCI recognizes that there are likely more than the minimum number of circuits to ensure the functionality of the home.

CMP-2 has acted in the past to ensure functionality of the home such as requiring a 20A receptacle circuit for the bathroom. This proposal seeks to ensure appropriate functionality of the electrical system as repeatedly shared by the home builders and the home builders association across the country at government hearings.
Panel Meeting Action: Reject
Panel Statement: No substantiation was given to increase dwelling load. The substantiation addresses increasing the number of branch circuits not the general lighting load. The minimum number of branch circuits as specified by the code is adequate based on the 3 VA per square foot for dwelling units.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-322 Log #4857 NEC-P02 **Final Action: Reject**
(220.12)

Submitter: Mary Pat Dennis-Andre, Bothell, WA
Recommendation: Add text to read as follows:

220.12 Lighting Load for Specified Occupancies. A unit lighting load of not less than that specified in Table 220.12 for occupancies specified therein, or the lighting load as specified in the currently adopted energy code, shall constitute the minimum lighting load. (The rest of the section to remain unchanged.)
Substantiation: The current table 220.12 is out of date with modern lighting design and products. For instance, the International Energy Conservation Code, adopted in many states and municipalities, allows a maximum lighting load of 1VA/sf for offices, yet Table 220.12 requires capacity for 3.5VA/sf. This discrepancy results in over estimating the electrical demands, equipment that is larger than it needs to be, and consumes more nonrenewable resources than necessary (copper, aluminum, steel, etc.). Energy conservation is now a serious matter and a matter of national security. Energy codes are becoming more stringent and more widely enforced. This allowance has been in effect in Washington State for many years with no capacity or safety problems reported. It is time the NEC recognized the immediate need to conserve energy and scarce resources.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-320.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-323 Log #2532 NEC-P02 **Final Action: Reject**
(220.13)

Submitter: Arturo Gaspar Molina Canales, Sta Catarina, NL
Recommendation: Add exact drop Voltage Calculation Method.
Substantiation: According to Mexican laws, voltage drop accepted for main power lines is maximal 1 percent. Comparative calculations between this method and accepted method can result to select a different cable.

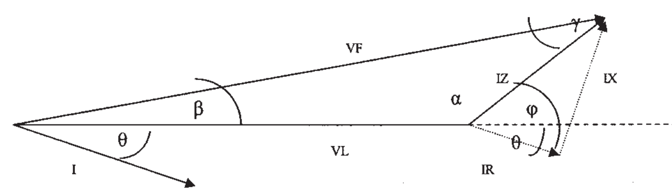
EDV can be called as the difference between the absolute values of VF and VL.

Where VF = Source side voltage
And VL = load side voltage

DV AS A VECTORIAL DIFFERENCE
Important notes respect this difference represented by IZ

When IZ = I*square root (r2 + x2)	Mathematically this value is correct but Really doesn't have sense.
And when IZ = I* (rcosΦ + xsenΦ)	Calculated value is approximate

PROCESS OF EXACT DELTAV CALCULATION
Triangle of load
I have forwarded an Interactive Calculator sheet.



The method for exact drop voltage calculation uses two concepts:
1. EDV as the difference between absolute value of Foint voltage (VE) and load voltage (VL)
2. Application and solution according the law of sinus that is:

$$\frac{VE}{\text{Sen }\alpha} = \frac{IZ}{\text{Sen }\beta} = \frac{VL}{\text{Sen }\gamma}$$

Solution:

$$\alpha = \pi - (\theta - \phi) \text{ Where } \theta = \text{arc cos } (\text{F.P.}) \text{ and } \phi = \text{arc tan } (X/R)$$

$$\beta = \text{arc sen} \frac{IZ * \text{sen } \alpha}{VE}$$

$$\gamma = \pi - \alpha - \beta$$

$$VL = VF \ \frac{\text{Sen }\gamma}{\text{Sen }\alpha}$$

$$EDV = \frac{VF\text{- }VL}{VL} * 100$$

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-324 Log #4920 NEC-P02 **Final Action: Reject**
(220.14)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 18 for comment.
Submitter: Robert Kopelman, Rockville Centre, NY
Recommendation: Revise text to read as follows:
II 220.14-Other Loads--- All Occupancies
(H) Fixed Multioutlet Assemblies. Fixed multioutlet assemblies used in other than dwelling units or the guest rooms or guest suites of hotels or motels shall be calculated in accordance with (H)(1) or (H)(2). For the purposes of this section, the calculation shall be permitted to be based on the portion that contains receptacle outlets. Multioutlet Assembly. A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory (.All multioutlet assemblies shall have thermal sensing built in protection for all outlets).
Substantiation: There is a major problem called a glowing connection. As UL 1699 Scope states – AfCI's " 1.3 These devices are not intended to detect glowing connections" Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. Attached are documents showing that an AFCI starts to detect Arcs at 5 amps. Also attached are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time do to the differential of expansion and contraction of the metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connections.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: These products are currently listed as receptacles with no evaluation of their ability to enhance the safety of wiring devices. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. Installation of these devices is not currently prohibited by the NEC. In addition, if the submitter is proposing a specific feature to a receptacle, the proposal should be forwarded to CMP-18 since they have responsibility for receptacle construction requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-325 Log #293 NEC-P02 **Final Action: Reject**
(220.14(1))

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.
Recommendation: Revise text to read as follows:
This provision shall not be applicable to the receptacle outlets specified in 210.11(C)(1), (C)(2) and (C)(3).
Substantiation: Code Uniformity - for a more accurate calculation of dwelling unit(s) total connected general lighting loads and the consideration given to the demands of specific required loads of Article 220.
Since the inception of the individual 20 amp branch circuit requirement for dwelling unit bathroom receptacle outlet(s) in 1996 NEC 210.52(D), it has been unclear why the Code-Making Panel refuses to consider this circuit as an "other than lighting load". The CMP simply states in their rejection comment that dwelling unit bathroom outlet(s) are lighting loads and are calculated under the square footage rule for general-use outlets. There is a conflict in the NEC concerning this.
210.11 (new in the 1999 NEC) was a major recognition of the importance of special 20 amp loads for dwelling units; in particular small appliances, laundry and bathrooms. Prior to this new Section in 210, small appliances and laundry load requirements were in 220.4. However, when the CMP relocated these loads to Article 210 their significant load contribution to the Service/Feeder demand factors was recognized. At the same time, the bathroom load requirements were moved to 210.11(C)(3). The 1999 CMP made it clear in 220.3(B)(10)(a) - (1999 code section at the time) - that the 20 amp bathroom circuit now required in 210.11(C)(3) must be included in the general-use outlet requirements for dwelling unit square footage calculations.
There have been numerous attempts during each code cycle to have this required 20 amp bathroom dwelling unit receptacle outlet load be recognized as a 1.5 kva addition to the Service/Feeder demand calculations as with its counterparts of the same code article. 220.42 of the 2008 NEC states that demand factors for general lighting shall not be applied in determining the number of branch circuits. This is clearly a conflict since 210.11(C)(3) is considered a lighting load and requires a minimum of "one" 20-amp branch circuit that can have no other loads. In fact, the code language in 210.11(C)(3) is almost exactly like that of 210.11(C)(1) & (C)(2) which requires 1.5 kva for each 2-wire circuit installed. It cannot be both ways, first calling the dwelling unit bathroom receptacle outlet(s) a lighting load and then requiring an individual circuit to supply it without taking into consideration the connected load.
This one word change submitted for review would also require changes to Articles 210 and 220 to allow a coherent flow to the change.
Panel Meeting Action: Reject
Panel Statement: As the panel has stated in previous code cycles, the requirement for the 20A circuit to supply bathroom receptacle outlets is not intended to be included as a separate load calculation. Although a separate circuit is required, the loading is permitted to be part of the general lighting load calculation in 220.12.
The panel recognizes that the proposal is for 220.14(I).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-326 Log #339 NEC-P02 **Final Action: Accept in Principle**
(220.14(B))

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
(B) Dwelling Unit(s) electric dryers and ~~Household~~ Dwelling Unit(s) electric cooking appliances.
Substantiation: As presently written, it can be interpreted that all occupancies would have to comply with 220.14(B) as it applies to electric dryers. Changing "Household" to dwelling unit(s) reflects the format used throughout Article 220.
Panel Meeting Action: Accept in Principle
Revise title of 220.14(B) as follows:
"(B) Electric Dryers and Electric Cooking Appliances in Dwelling Units."
Panel Statement: The panel has revised the title to meet the intent of the submitter. The panel notes that the term "household" is used in 220.54 and 220.55.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-327 Log #341 NEC-P02 **Final Action: Accept**
(220.14(G))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In (1) and (2), change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-328 Log #342 NEC-P02 **Final Action: Accept**
(220.14(I))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the second sentence, change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-329 Log #2558 NEC-P02 **Final Action: Reject**
(220.14(I), FPN (New))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Add the following FPN after 220.14(l):
FPN: The load calculation in 220.14(l) does not limit the number of receptacles on a single branch circuit.
Substantiation: This section is a perennial topic of misunderstanding, and deserves clarification. The proposed wording is similar to the FPN following 410.151(B).
Panel Meeting Action: Reject
Panel Statement: The material proposed is not appropriate for a FPN since it contains an interpretation. In addition, the submitter is incorrect in that 220.14(I) does limit the number of receptacles on a branch circuit for applications other than dwelling units covered in 220.14(J) and banks and office buildings covered in 220.14(K).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-330 Log #292 NEC-P02 **Final Action: Reject**
(220.14(J)(1))

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.
Recommendation: Revise text to read as follows:
All general-use receptacle outlets of 20 ampere rating or less, ~~including~~ excluding receptacles connected to the circuits in 210.11(C)(3).
Substantiation: Code Uniformity - for a more accurate calculation of dwelling unit(s) total connected general lighting loads and the consideration given to the demands of specific required loads of Article 220.
Since the inception of the individual 20 amp branch circuit requirement for dwelling unit bathroom receptacle outlet(s) in 1996 NEC 210.52(D), it has been unclear why the Code-Making Panel refuses to consider this circuit as an "other than lighting load". The CMP simply states in their rejection comment that dwelling unit bathroom outlet(s) are lighting loads and are calculated under the square footage rule for general-use outlets. There is a conflict in the NEC concerning this.
210.11 (new in the 1999 NEC) was a major recognition of the importance of special 20 amp loads for dwelling units; in particular small appliances, laundry and bathrooms. Prior to this new Section in 210, small appliances and laundry load requirements were in 220.4. However, when the CMP relocated these loads to Article 210 their significant load contribution to the Service/Feeder demand factors was recognized. At the same time, the bathroom load requirements were moved to 210.11(C)(3). The 1999 CMP made it clear in 220.3(B)(10)(a) - (1999 code section at the time) - that the 20 amp bathroom circuit now required in 210.11(C)(3) must be included in the general-use outlet requirements for dwelling unit square footage calculations.
There have been numerous attempts during each code cycle to have this required 20 amp bathroom dwelling unit receptacle outlet load be recognized as a 1.5 kva addition to the Service/Feeder demand calculations as with its counterparts of the same code article. 220.42 of the 2008 NEC states that demand factors for general lighting shall not be applied in determining the number of branch circuits. This is clearly a conflict since 210.11(C)(3) is considered a lighting load and requires a minimum of "one" 20-amp branch circuit that can have no other loads. In fact, the code language in 210.11(C)(3) is almost exactly like that of 210.11(C)(1) & (C)(2) which requires 1.5 kva for each 2-wire circuit installed. It cannot be both ways, first calling the dwelling unit bathroom receptacle outlet(s) a lighting load and then requiring an individual circuit to supply it without taking into consideration the connected load.
This one word change submitted for review would also require changes to Articles 210 and 220 to allow a coherent flow to the change.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-325.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-331 Log #343 NEC-P02 **Final Action: Accept**
(220.14(L))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-332 Log #2298 NEC-P02 **Final Action: Accept in Principle**
(220.18(B))

TCC Action: The Technical Correlating Committee understands that the action on this proposal is to "Accept in Principle" since the title was changed.
Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 220.18(B) – Revised to
"(B) Inductive Lighting Loads. For circuits supplying lighting units that have ballasts, transformers, ~~or~~ autotransformers, or LED drivers, the calculated load shall be based on the total ampere ratings of such units and not the in the total watts of the lamps."
Substantiation: LED driver loads should also be calculated by adding their currents. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.
Panel Meeting Action: Accept
The text shall now read as follows:
"**(B) Inductive and LED Lighting Loads.** For circuits supplying lighting units that have ballasts, transformers, autotransformers, or LED drivers, the calculated load shall be based on the total ampere ratings of such units and not on the total watts of the lamps."
Panel Statement: The panel accepted the submitter's revision and revised the title to make it clear what is covered by the section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-333 Log #4891 NEC-P02 **Final Action: Reject**
(220.18(B))

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Revise text as follows:
~~**Inductive Lighting Loads.**~~ **Electric-discharge or HID Lighting Loads.** For circuits supplying lighting units that have ballasts, transformers, or autotransformers, the calculated load shall be based on the total ampere ratings of such units and not on the total watts of the lamps.
Substantiation: This section should also reference lighting units that have ballasts, etc. that are not inductive loads, such as electronic-type ballasts.
Panel Meeting Action: Reject
Panel Statement: The proposed title "electric discharge or HID lighting" is too restrictive for inductive-lighting load. There is no substantiation for the change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-334 Log #4819 NEC-P02 **Final Action: Reject**
(220.40, FPN No. 2 (New))

Submitter: George Ferguson, Technical Education & Safety Institute
Recommendation: Add text to read as follows:
FPN No. 2: To assure adequate quality of power, the available supply to the feeder or service conductors should be capable of continuously supplying a minimum of 70 percent of the calculated load.
Substantiation: Typically the serving utility provides a facility with transformer capacity below the calculated load. This has the potential of introducing power quality problems within the facility.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated the recommendation. In addition, the FPN is improper since requirements are not permitted in FPNs.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-335 Log #148 NEC-P02 **Final Action: Accept in Principle**
(220.43(B) Exception (New))

Submitter: Gerald L. Binkley, Larson Binkley Inc. Consulting Engineers
Recommendation: Add an exception to read as follows:
"Exception: If a facility is governed by local energy code standards, additional wattage load shall not exceed the maximum calculated track load as prescribed in the energy code."
Substantiation: The minimum load requirement for track lighting was adopted when there were no enforceable energy codes in the United States. Since that time 64% of all the states have adopted energy codes that reduce the lighting wattage connected to light track installations. See schedule as of 9-26-07:

See TABLE (SCHEDULE) on page171

Light track is still an important part of retail lighting design and based on the present NEC requirements services, transformers and panels are designed based on a minimum capacity of 150 watts per two foot section of track. But based on energy codes, many installations are only allowed to install track lighting with half (or less) of that capacity being used.
National retail chains are installing hundreds of feet of light track so as to create flexibility within their light system, but being told by their engineers that oversized transformers are necessary for the installation. An example of a retail store installing, 150 feet of track within the state of Alabama would be limited to a maximum of 4,500 watts per ASHRAE 90.1 2001. But according to the NEC 220.43(B) the load that must be accounted for as a demand load would be 11,250 watts. This added load could increase the size of a step-down transformer, panelboard and service entrance. Energy codes have encouraged building designs to load transformers as much as possible so as to make them as energy efficient as possible.
All of this seems to be a conflict between NEC and local energy codes. We need to bring the National Electrical Code more in line with Energy codes and not force the building owners to pay for capacity that will never (legally) be used.
Panel Meeting Action: Accept in Principle
Add a new exception to read:
"Exception: If the track lighting is supplied through a device that limits the current to the track, the load shall be permitted to be calculated based on the rating of the device used to limit the current."
Panel Statement: The panel has added an exception that compromises between the current code requirement and a reduced load for energy

State	Energy Code	Track Load (watts)
Alabama	ASHRAE 90.1-2001	30 W/Lin. Ft.
Alaska	None	None
Arizona	ASHRAE 90.1-1999	None
Arkansas	IECC 2003	30 W/Lin. Ft.
California	Title 24, 2005	45 W/Lin. Ft.
Colorado	IECC 2003	30 W/Lin. Ft.
Connecticut	IECC 2003	30 W/Lin. Ft.
Delaware	ASHRAE 90.1-1999	None
District of Columbia	IECC 2000	None
Florida	Florida Building Code	None
Georgia	None	None
Hawaii	ASHRAE 90.1-1989	None
Idaho	IECC 2003	30 W/Lin. Ft.
Illinois	IECC 2000	None
Indiana	MEC 1992	None
Iowa	IECC 2006	30 W/Lin. Ft.
Kansas	IECC 2006	30 W/Lin. Ft.
Kentucky	IECC 2003	30 W/Lin. Ft.
Louisiana	ASHRAE 90.1-2004	30 W/Lin. Ft.
Maine	IECC 2003	30 W/Lin. Ft.
Maryland	IECC 2006	30 W/Lin. Ft.
Massachusetts	780 CMR	30 W/Lin. Ft.
Michigan	ASHRAE 90.1-1999	None
Minnesota	ASHRAE 90.1-1989	None
Mississippi	IECC 2003	30 W/Lin. Ft.
Missouri	ASHRAE 90.1-1989	None
Montana	IECC 2003	30 W/Lin. Ft.
Nebraska	IECC 2003	30 W/Lin. Ft.
Nevada	IECC 2003	30 W/Lin. Ft.
New Hampshire	IECC 2006	30 W/Lin. Ft.
New Jersey	ASHRAE 90.1-2004	30 W/Lin. Ft.
New Mexico	IECC 2003	30 W/Lin. Ft.
New York	ECCCNYS 2002	None
North Carolina	IECC 2003	30 W/Lin. Ft.
North Dakota	ASHRAE 90.1-1989	None
Ohio	IECC 2006	30 W/Lin. Ft.
Oklahoma	IECC 2003	30 W/Lin. Ft.
Oregon	OSSC Ch. 13	37.5 W/Lin. Ft.
Pennsylvania	IECC 2006	30 W/Lin. Ft.
Rhode Island	IECC 2006	30 W/Lin. Ft.
South Carolina	IECC 2003	30 W/Lin. Ft.
South Dakota	ASHRAE 90.1-2004	30 W/Lin. Ft.
Tennessee	ASHRAE 90.1-1980	None
Texas	IECC 2000	None
Utah	IECC 2006	30 W/Lin. Ft.
Vermont	2005 Vermont Guidelines	30 W/Lin. Ft.
Virginia	IECC 2003	30 W/Lin. Ft.
Washington	Washington State Energy Code	50 W/Lin. Ft.
West Virginia	IECC 2003	30 W/Lin. Ft.
Wisconsin	IECC 2000	None
Wyoming	MEC 1989	None.

conservation. By simply basing the value on the energy code, there is no limit to the number of heads that could be installed on the track. In a number of states, the issue has been resolved by supplying the track through devices that limit the amount of current drawn by the track. The new exception would allow any length of track, but would require that the load be based on the rating of the devices used to limit the current.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ORLOWSKI, S.: The provisions related to electric conservation contained in the IECC and ASHRAE 90.1 are not related to life-safety or electrical-safety concerns. The provisions in those standards are what are deemed “above code” considerations to provide a means to use less electrical energy. These standards also are not intended to supersede the life-safety regulations adopted into law. In addition, these energy conservation criteria are stated as performance criteria as one of many means to achieve a decided level of overall energy conservation for a whole building, not particularly only the electric energy usage.
In addition, the demand that is calculated in accordance with the NEC or engineering practices is only design criteria to determine service and feeder size, equipment, etc. These values have been determined using typical electric use over many decades. Just because the original electrical engineer for a building designs the appliances and lighting fixtures to use less electric than require by the NEC to calculate the service/feeder equipment does not mean that will always be load on the service, etc. As time goes by additional appliances or lighting loads may be added, or equipment changed-out are of a larger load. Anyone can install energy conserving appliances and lighting if they so desire. But, electrical safety should not be based on a possible installation, it should be based on the probable installation and history of electric use.

2-336 Log #3272 NEC-P02 **Final Action: Reject**
(220.45 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:
220.xx Continuous Load. Luminaires and lampholders shall be considered a continuous load where installed as follows:
(1) In commercial and industrial premises
(2) In common areas of multifamily dwellings such as, but not limited to, hallways, stairwells, exits, recreation areas, meeting rooms, dining rooms, laundry rooms, vehicle parking, exterior lighting.
Substantiation: Continuous load has not generally been applied to lighting in dwellings. Examples for multifamily dwelling in Annex D do not indicate continuous load provisions, whereas many areas may have lighting operating continuously for 3 hours or more.
Panel Meeting Action: Reject
Panel Statement: The determination of whether or not a load is continuous is dictated by its application and determined on a case by case basis. The examples in Annex D are intended to be basic examples of load calculations and are not intended to be all encompassing.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-337 Log #3304 NEC-P02 **Final Action: Reject**
(220.51)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change 100 percent to 125 percent in the text and exception. And “connected” to “calculated”.
Substantiation: 424.3(B) states electric heating loads are continuous loads.
215.2(A)(1) requires a feeder ampacity not less than 125 percent of continuous load.
Example D3(a) in Annex D, under Overcurrent Protection (for feeders), indicates overcurrent protection not less than 125 percent of the load is required.
The reason for the 125 percent requirement for branch circuits equally applies to feeders and service conductors.
220.40 states calculated feeder or service loads shall not be less than the sum of branch circuit loads.
“Calculated” load is well covered; “connected” load is not defined; is it the same or different than calculated load?
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any substantiation to indicate that the feeder or service load should be increased.
The 125 percent for continuous loads is a factor of the conductor and overcurrent device selection and not a factor in the load calculation. As such, it is not required to add 25 percent for the load calculation itself.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-338 Log #3381 NEC-P02 **Final Action: Reject**
(220.51 Exception)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
220.51 *Exception: Where reduced loading of the conductors results from units operating on duty-cycle, intermittently, or from al units not operating at the same time, the authority having jurisdiction may grant permission for feeder and service-entrance conductors to have an ampacity less than 100 percent, provided the conductors have an ampacity for the load so determined.*
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-298.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-339 Log #3271 NEC-P02 **Final Action: Reject**
(220.52(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
In each dwelling unit the load shall be calculated at ~~1500~~ 3000 volt-amperes for ~~each 2-wire~~ the small-appliance branch circuits covered by 210.11(C)(1). Where the load is subdivided through one or more feeders the calculated load for each shall include not less than the ~~1500~~ 3000 volt-amperes for ~~each 2-wire~~ the small appliance branch circuits. The load shall be permitted to be included with the general lighting load and subject to the demand factors provided in Table 220.42.
Exception: the individual branch circuit permitted by 210.52(B)(1) Exception No. 2 and additional small appliance branch circuits shall be permitted to be excluded from the calculation required by 220.52.
Substantiation: Section 210.11(C)(1) doesn’t specify a 2-wire circuit; a multiwire circuit is not prohibited. Since no additional load is specified for the branch circuit of Exception No. 2 for 210.52(B)(1) (presumably because there is no additional load) the same consideration should be applied where more than two small appliance branch circuits are installed and no actual additional load is installed. Where additional general lighting circuits are which exceed the minimum 3 va/sq.ft requirement no additional load is imposed on feeders and services.
Panel Meeting Action: Reject
Panel Statement: The submitter’s substantiation is incorrect. 1500VA is required for each small appliance branch circuit including those beyond the two that are required. The reference to 2-wire is appropriate and not in conflict with the use of a multi-wire circuit since 210.4 specifies that these shall be permitted to be considered as individual circuits.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-340 Log #4892 NEC-P02 **Final Action: Reject**
(220.52(A) and (B))

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Delete section 220.52(A) & (B) and move the text contained in 220.52(A) & (B) to 220.14 in Part II Branch circuit load requirements.
Substantiation: The requirements contained in 220.52(A) & (B) are branch circuit load requirements similar to the requirements in 220.14(F). The scope of article 220 states part II is to be used for branch circuit loads and part III or IV are to be used for feeder or service loads. The first section in part III (220.40) states the calculated load of a feeder or service shall not be less than the sum of the loads on the branch circuits supplied, as determined by part II of this article, after any applicable demand factors permitted by part III or IV or required by part V. The last sentence in both (A) & (B) allows this load to be included with the general lighting load and subjected to the demand factors provided in Table 220.42. The general lighting load is calculated in part II. This change would make article 220 more “user friendly” without changing any of the current requirements.
Panel Meeting Action: Reject
Panel Statement: The provisions in 220.52 are loads for the feeder and service calculation. The 1500 VA load addition does not limit the small appliance branch circuit loading.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-341 Log #297 NEC-P02 **Final Action: Reject**
(220.52(C))

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.
Recommendation: Add new text as follows:
(C) Bathroom Circuit Load. A load of not less than 1500 volt-amperes shall be included for each 2-wire branch circuit as covered by 210.11(C)(3). This load shall be permitted to be included in the general lighting load and subjected to the demand factors provided in Table 220.42.
Exception: The outlet(s) for other equipment within the same bathroom permitted in 210.11(C)(3) Exception, shall be permitted to be excluded from the calculations required by 220.52.
Substantiation: Code Uniformity - for a more accurate calculation of dwelling unit(s) total connected general lighting loads and the consideration given to the demands of specific required loads of Article 220.
Since the inception of the individual 20 amp branch circuit requirement for dwelling unit bathroom receptacle outlet(s) in 1996 NEC 210.52(D), it has been unclear why the Code-Making Panel refuses to consider this circuit as an “other than lighting load”. The CMP simply states in their rejection comment that dwelling unit bathroom outlet(s) are lighting loads and are calculated under the square footage rule for general-use outlets. There is a conflict in the NEC concerning this.
210.11 (new in the 1999 NEC) was a major recognition of the importance of special 20 amp loads for dwelling units; in particular small appliances, laundry and bathrooms. Prior to this new Section in 210, small appliances and laundry load requirements were in 220.4. However, when the CMP relocated these loads to Article 210 their significant load contribution to the Service/Feeder demand factors was recognized. At the same time, the bathroom load requirements were moved to 210.11(C)(3). The 1999 CMP made it clear in 220.3(B)(10)(a) - (1999 code section at the time) - that the 20 amp bathroom circuit now required in 210.11(C)(3) must be included in the general-use outlet requirements for dwelling unit square footage calculations.
There have been numerous attempts during each code cycle to have this required 20 amp bathroom dwelling unit receptacle outlet load be recognized as a 1.5 kva addition to the Service/Feeder demand calculations as with its counterparts of the same code article. 220.42 of the 2008 NEC states that demand factors for general lighting shall not be applied in determining the number of branch circuits. This is clearly a conflict since 210.11(C)(3) is considered a lighting load and requires a minimum of “one” 20-amp branch circuit that can have no other loads. In fact, the code language in 210.11(C)(3) is almost exactly like that of 210.11(C)(1) & (C)(2) which requires 1.5 kva for each 2-wire circuit installed. It cannot be both ways, first calling the dwelling unit bathroom receptacle outlet(s) a lighting load and then requiring an

individual circuit to supply it without taking into consideration the connected load.

This one word change submitted for review would also require changes to Articles 210 and 220 to allow a coherent flow to the change.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-325.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-342 Log #3906 NEC-P02 **Final Action: Reject**

(220.53)

Submitter: Eugene F. Swisher, City of Tampa / Rep. IBEW Local 915

Recommendation: Revise text as follows:

..., other than electric ranges, clothes dryers, space heating equipment, water heaters) or air conditioning equipment.

Substantiation: The new tankless type water heaters for residential use can range up to 29,000 watts, 340 amp circuits feeding them all on when water is being heated. Applying the 25% demand can result in inadequate service or feeder.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided substantiation to add water heaters to the list of appliances where the 75 percent factor is not permitted to be used.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-343 Log #1769 NEC-P02 **Final Action: Reject**

(220.54)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: ELECTRIC CLOTHES DRYERS ~~DWELLING UNITS~~. The load for ~~household~~ 208-volt and 240-volt electric clothes dryers ~~in a dwelling unit~~ shall be either 5000 watts (volt-amperes) or the nameplate rating, whichever is greater, for each outlet ~~dryer~~ served. The use of the demand factors in Table 220.54 shall be permitted for household 208-volt and 240-volt electric dryers. (remainder unchanged)

Substantiation: Present literal wording requires a 5000 watt load calculation for electric dryers which includes those connected for 120 volts, where a 208-volt or 240-volt outlet is not installed. Since commercial laundromats may not be installed at time of final inspection, the minimum 5000 watt requirement is reasonable. Since an outlet may be installed without a dryer being actually installed, the calculated load should apply to the outlet.

Panel Meeting Action: Reject

Panel Statement: Electric clothes dryers are calculated at the nameplate rating in other than dwelling units. The submitter has not supplied adequate substantiation to allow applying the demand factors to anything other than dwelling units. The term “household” is the appropriate term for dryers designed for use in dwelling units.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-344 Log #2036 NEC-P02 **Final Action: Reject**

(220.54)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: ELECTRIC CLOTHES DRYERS. ~~DWELLING UNITS.,~~ The load for ~~household~~ 208-volt and 240-volt electric clothes dryers ~~in a dwelling unit~~ shall be either 5000 watts (volt-amperes) or the nameplate rating, whichever is larger, for each dryer served. (remainder unchanged).

Substantiation: Present 5000 watt minimum should only apply to 208 and 240-volt dryers. Some dryers are 120-volt connected and covered by the 1500 watt calculation for the laundry circuit receptacles. Minimum requirement should apply to commercial Laundromats where at the time of circuit installation the nameplate ratings are not known. Present wording indicates 120-volt electric dryers are calculated at 5000 watts.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-343.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-345 Log #2144 NEC-P02 **Final Action: Reject**

(Table 220.55)

Submitter: Joe Penachio, Peabody, MA

Recommendation: Revise text as follows:

Table 220.55 Demand Factors and Loads for Household Electric Ranges, Wall-Mounted Ovens, Counter-Mounted Cooking Units, and Other Household Cooking Appliances over 1 ¾ kW Rating (Column C to be used in all cases except as otherwise permitted in Note 3.)

	Demand Factor (%) (See Notes)		
	40	~~16~~ **14**	Column C
Number of		~~16~~ **13**	Maximum Demand (kW) (See
Appliances	39		Notes) (Not over 12 kW Rating)
	38		8
1	37		11
2	36		14
3	35		17
4			20
5	34		
	33		21
6	32		22
7	31		23
8	30		24
9			25
10	30		
	30		26
11	30		27
12			28
13	30		29
14	30		30
15	30		
	30		31
16	30		32
17			33
18			34
19	Column B		35
20	(3½ kW through		
	8¾ kW Rating)		36
21			37
22	80		38
23	65		39
24	55		40
25	50		
	45		15 kW + 1 kW for each range
~~26-30~~ **26-29**			
~~31-40~~ **30-35**	43		
36-40	~~40~~ **39**		25kW + ¾ kW for each range
	~~36~~ **35**		
~~41-50~~ **41-47**	~~35~~ **33**		
~~51-60~~ **48-55**	~~34~~ **31**		
~~61 and over~~			
56-67	~~32~~ **29**		
68 and over	~~32~~ **28**		
	~~32~~ **27**		
	~~32~~ **26**		
Column A	~~32~~ **25**		
(Less then			
3½ kW Rating)	~~28~~ **24**		
	~~28~~ **23**		
80	~~28~~ **23**		
75	~~28~~ **22**		
70	~~28~~ **22**		
66			
62	~~26~~ **21**		
	~~26~~ **21**		
59	~~26~~ **20**		
56	~~26~~ **20**		
53	~~26~~ **19**		
51			
49	~~24~~**19**		
	~~22~~**18**		
47	~~22~~**17**		
45			
43	~~20~~ **16**		
41	~~18~~ **15**		

Substantiation: When you calculate the kW load for ranges using the percentages in Column B for more than 6 ranges the calculation for 7 and 8 kW ranges is higher than the kW load in Column C for the same number of ranges. The new percentages are a more accurate calculation. It doesn’t make sense that 20 – 7 kW ranges at 28% equals 39.2 kW which is greater than 28 – 12 kW at 35 kW in Column C. I know the heading states to use Column C unless in all cases except as otherwise permitted in Note 3, but the percentages should be changed to be more accurate without having to correlate the calculation to Column C and then use Column C because it is lower.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The submitter has not substantiated revising the table percentages. The higher kW ranges have more diversity than the lower kW models.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-346 Log #3521 NEC-P02 **Final Action: Reject**

(Table 220.55, Note 4)

Submitter: Tim Henry, Code Electrical Classes Inc.

Recommendation: Delete the first sentence of Note 4 of Table 220.55

4. Branch Circuit Load. ~~It shall be permissible to compute the branch circuit load for one range in accordance with Table 220.55.~~

Substantiation: This is the only place in the NEC that allows a demand factor to be applied to a branch circuit. Table 220.55 permits a reduction to the connected load of household cooking equipment on feeders and service entrance conductors based on not all the cooking equipment being on at the same time in an apartment complex which makes sense. But to allow a reduction of a single range on a branch circuit is encouraging a future violation of the NEC. As an example: by using Note 4 for sizing a branch circuit to a single 12kw household electric range the 12kw range is permitted to be reduced to 8kw. 8000 watts / 240 volts = 33.3 amperes versus the nameplate of the range which would be 12,000 watts / 240 volts = 50 amperes. Instead of being wired to the nameplate connected load using a #6 conductor the NEC permits this single range to be installed with a #8 conductor on a 40 ampere circuit breaker. I also understand that in general not all 4 burners on the cook top and the oven are on at the same time. But what about in the case of Thanksgiving dinners when all 4 burners and the oven can be turned on at the same time and full current is drawn until the oven has reached its preset

temperature. We now have sized our conductor and circuit breaker based on an 33.3 ampere load versus the 50 ampere load we now have. The violation of the NEC now occurs when the serviceman replaces the 40 ampere breaker with a 50 ampere breaker protecting a #8 wire.
Panel Meeting Action: Reject
Panel Statement: There is no substantiation that the current rule is resulting in branch circuits that are undersized for the application. The range is not a continuous load.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-347 Log #802 NEC-P02 **Final Action: Reject**
(Table 220.55 Note 4)

Submitter: Richard J. Cripps, Association of Home Appliance Manufacturers
Recommendation: Revise text to read as follows:
Note 4: Branch-Circuit Load. It shall be permissible to calculate the branch-circuit load for one range <u>or one multi-cavity wall-mounted oven</u> in accordance with Table 220.55. The branch-circuit load for one <u>single cavity</u> wall-mounted oven or one counter-mounted cooking unit shall be the name plate rating of the appliance. The branch-circuit load for a counter-mounted cooking unit and not more than two wall-mounted ovens, all supplied from a single branch circuit and located in the same room, shall be calculated by adding the nameplate rating of the individual appliance and treating this total as equivalent to one range.
Substantiation: In Note 4, it is permissible to calculate the branch-circuit load for one range in accordance with Table 220.55. While it takes into account a range, which consists of two cooking zones - a cooktop and an oven - it does not differentiate between the wall-mounted oven types. A double oven or combination oven like a range consists of two or more cooking zones.
This proposal is to differentiate between a single cavity wall-mounted oven and a mulit-cavity wall-mounted oven. With this differentiation, a mulit-cavity wall-mounted oven should be treated like one range and a single cavity wall-mounted oven should be treated like a single counter-mounted cooking unit.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the concept is intended to apply to “cooking zones”. The original rule was based on the diversity achieved by a range consisting of an oven and a cooktop. There is no substantiation that the same level of diversity exists with dual wall mounted ovens when they are in use at the same time.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-348 Log #1730 NEC-P02 **Final Action: Reject**
(220.60)

Submitter: Lawrence R. Walsh, MTA Bridges and Tunnels
Recommendation: Replace “unlikely” with “impossible”.
Substantiation: Utilization of the word “unlikely” opens an excessive loophole in the preparation of calculations since “unlikely is not defined in 100” and outside sources are commonly utilized for the definition of these words.
A common definition of “unlikely” is improbable. Loads that operate less than 4380 hours of the 8760 hour year fit the definition of “unlikely” since, at any point in time it is improbable that they will be operating.
Most lighting, appliance and motor loads are operated less than 4380 hours per year.
The utilization of the adjective “noncoincident” in the same sentence does not reduce the scope of the loophole since it is impossible for a load operated less than 4380 hours per year to be operated consistently with any other load for more than 4380 hours per year.
Panel Meeting Action: Reject
Panel Statement: The term “unlikely” is intended to provide sufficient latitude to apply the rule in a broad set of situations. For example, if air conditioning and baseboard heat is installed, it is unlikely that they will operate at the same time, but it would not be “impossible”.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-349 Log #2011 NEC-P02 **Final Action: Reject**
(220.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part: “...it shall be permitted to use only the largest load that will be used at one time for calculating the ~~total~~ <u>branch circuit</u>, feeder, and service load.
Substantiation: This provision is appropriate for branch circuits, but does not apply to total load on the feeder or service since they may also supply other loads.
Panel Meeting Action: Reject
Panel Statement: This provision is in Part III, which is feeder or load service calculations. As such it is inappropriate to reference the provision for branch circuits.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-350 Log #3109 NEC-P02 **Final Action: Reject**
(220.82)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Delete Section 220.82.
Delete Examples D2(a), D2(b) and D2(c) in Annex D
Substantiation: The NEC should not recognize two parallel load calculation rules that result in different calculated loads for the same dwelling unit. This is confusing to the users of the NEC. Either the Standard or Optional methods should be allowed but not both.
The optional calculation method provided in 220.82 is most often misapplied as the General Loads in 220.82(B)(3) require the use of nameplate information. This is most often not available at the time the load calculation is being made. So, those doing the load calculations either use the default loads provided for in Tables in Article 220 intended for load calculations under the “Standard Method” or loads from someone’s book as typical loads.
The Optional Calculations in 220.83 for adding loads to existing dwelling units, for multifamily dwellings in 220.84 and for two dwelling units in 220.85 seem legitimate.
Section 3.3.4 of the NEC Style Manual states that “where” should not be used to mean “when” or “if.” This proposal intends to use the word “if” where appropriate.
Panel Meeting Action: Reject
Panel Statement: The optional calculation serves an appropriate purpose when the conditions specified in the section are met and the calculation is performed as stated by the section. If the nameplate information is not available or not used, then 220.82 would not be applicable.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-351 Log #2313 NEC-P02 **Final Action: Reject**
(220.82(A))

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add after the last sentence...<u>Where the total load calculated according to this section is carried by a single set of service or feeder conductors the total shall be permitted to be reduced by 10%.</u>
Substantiation: This is a companion to a proposal to one that would delete Table 310.15(B)(6) and will resolve a situation where ampacity of conductors is adjusted based on load diversity. That adjustment, which recognizes a pattern of usage by the occupants, properly belongs in load calculations not conductor ampacity. Since that pattern of usage is not affected by the phase arrangement of the system there is no need to restrict it to single phase systems. The calculation of the neutral conductor is properly addressed by other sections of this article.
Panel Meeting Action: Reject
Panel Statement: The 10 percent load reduction is arbitrary and not substantiated. The provisions of 310.15(B)(6) permit a specific size conductor to supply a dwelling unit service as calculated by Article 220. It does not modify the load calculation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-352 Log #3377 NEC-P02 **Final Action: Reject**
(220.82(A))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
220.82(A) Feeder and Service Load. This section applies to a dwelling unit having the total connected load served by a single 120/240-volt or 208Y/120-volt set of 3-wire service<u>-entrance</u> or feeder conductors with an ampacity of 100 or greater. (The remainder of the text is unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles.

That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-298.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-353 Log #294 NEC-P02 **Final Action: Reject**

(220.82(B)(2))

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.

Recommendation: Revise text to read as follows:

(2) 1500 volt-amperes for each 2-wire, 20-ampere branch circuit covered in 210.11(C)(1), (C)(2) and (C)(3) as follows:

a. small appliances

b. laundry

c. bathroom(s).

Substantiation: Code Uniformity - for a more accurate calculation of dwelling unit(s) total connected general lighting loads and the consideration given to the demands of specific required loads of Article 220.

Since the inception of the individual 20 amp branch circuit requirement for dwelling unit bathroom receptacle outlet(s) in 1996 NEC 210.52(D), it has been unclear why the Code-Making Panel refuses to consider this circuit as an "other than lighting load". The CMP simply states in their rejection comment that dwelling unit bathroom outlet(s) are lighting loads and are calculated under the square footage rule for general-use outlets. There is a conflict in the NEC concerning this.

210.11 (new in the 1999 NEC) was a major recognition of the importance of special 20 amp loads for dwelling units; in particular small appliances, laundry and bathrooms. Prior to this new Section in 210, small appliances and laundry load requirements were in 220.4. However, when the CMP relocated these loads to Article 210 their significant load contribution to the Service/Feeder demand factors was recognized. At the same time, the bathroom load requirements were moved to 210.11(C)(3). The 1999 CMP made it clear in 220.3(B)(10)(a) - (1999 code section at the time) - that the 20 amp bathroom circuit now required in 210.11(C)(3) must be included in the general-use outlet requirements for dwelling unit square footage calculations.

There have been numerous attempts during each code cycle to have this required 20 amp bathroom dwelling unit receptacle outlet load be recognized as a 1.5 kva addition to the Service/Feeder demand calculations as with its counterparts of the same code article. 220.42 of the 2008 NEC states that demand factors for general lighting shall not be applied in determining the number of branch circuits. This is clearly a conflict since 210.11(C)(3) is considered a lighting load and requires a minimum of "one" 20-amp branch circuit that can have no other loads. In fact, the code language in 210.11(C)(3) is almost exactly like that of 210.11(C)(1) & (C)(2) which requires 1.5 kva for each 2-wire circuit installed. It cannot be both ways, first calling the dwelling unit bathroom receptacle outlet(s) a lighting load and then requiring an individual circuit to supply it without taking into consideration the connected load.

This one word change submitted for review would also require changes to Articles 210 and 220 to allow a coherent flow to the change.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-325.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-354 Log #3843 NEC-P02 **Final Action: Reject**

(220.82(B)(3) and (4))

Submitter: Ted "Smitty" Smith, Electrical Experts Consulting

Recommendation: Revise text to read as follows:

(3) The nameplate rating of the following, excluding any motor loads:

a. b. c. d. No change.

(4) ~~The nameplate ampere or kVA rating of all permanently connected motors not included in item (3).~~ 125 percent of the nameplate ampere rating or kVA rating of the largest motor as determined by the full load current and 100 percent of the nameplate ampere or kVA rating of all other motor loads.

Substantiation: Article 430 requires that the largest motor be calculated at 125 percent and all other loads at 100 percent. The current wording in this section does not account for the 125 percent for the largest motor and is therefore in conflict with Article 430 and 440. Using the method in Part III of Article 220 this is accounted for and should also be accounted for in Part IV Methods.

Panel Meeting Action: Reject

Panel Statement: It is not necessary to add the 25 percent factor for feeder or service load calculations, which is what 220.82 covers. There is no conflict with Article 430 since the provisions in Article 430 are for calculating the conductor size specific to motor circuits.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-355 Log #289 NEC-P02 **Final Action: Accept**

(220.83(A))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "formula" to "percentages" in the first sentence.

Substantiation: There is no formula or equation, the table provides the percentage to be applied when calculating the load.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-356 Log #290 NEC-P02 **Final Action: Accept**

(220.83(B))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "formula" to "percentages" in the first sentence.

Substantiation: There is no formula or equation, the tables provides the percentage to be applied when calculating the load.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-357 Log #344 NEC-P02 **Final Action: Accept**

(220.84(A)(2) Exception)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise text to read as follows:

Change "per" to "for each".

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-358 Log #3384 NEC-P02 **Final Action: Reject**

(220.84(A)(3))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

220.84(A)(3) Each dwelling unit is equipped with electric space heating or air conditioning, or both. Feeders and service-entrance conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 220.61.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-298.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-359 Log #3303 NEC-P02 **Final Action: Accept**
(220.84(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “connected” to “calculated” in the heading.
Substantiation: The text addresses calculated load which is clearly indicated in the Code; connected load is not. Is there a difference? A “connected” load of 100 amperes many be “calculated” at less than 100 amperes if a demand factor is permitted, or if provisions are permitted to prevent all the load from being energized simultaneously.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-360 Log #295 NEC-P02 **Final Action: Reject**
(220.84(C)(2))

Submitter: Mario L. Mumfrey, Inspection Bureau Inc.
Recommendation: Revise text to read as follows:

(2) 1500 volt-amperes for each 2-wire, 20-ampere branch circuit covered in 210.11(C)(1), (C)(2) and (C)(3) as follows:

a. small appliances
b. laundry
c. bathroom(s).

Substantiation: Code Uniformity - for a more accurate calculation of dwelling unit(s) total connected general lighting loads and the consideration given to the demands of specific required loads of Article 220.

Since the inception of the individual 20 amp branch circuit requirement for dwelling unit bathroom receptacle outlet(s) in 1996 NEC 210.52(D), it has been unclear why the Code-Making Panel refuses to consider this circuit as an “other than lighting load”. The CMP simply states in their rejection comment that dwelling unit bathroom outlet(s) are lighting loads and are calculated under the square footage rule for general-use outlets. There is a conflict in the NEC concerning this.

210.11 (new in the 1999 NEC) was a major recognition of the importance of special 20 amp loads for dwelling units; in particular small appliances, laundry and bathrooms. Prior to this new Section in 210, small appliances and laundry load requirements were in 220.4. However, when the CMP relocated these loads to Article 210 their significant load contribution to the Service/Feeder demand factors was recognized. At the same time, the bathroom load requirements were moved to 210.11(C)(3). The 1999 CMP made it clear in 220.3(B)(10)(a) - (1999 code section at the time) - that the 20 amp bathroom circuit now required in 210.11(C)(3) must be included in the general-use outlet requirements for dwelling unit square footage calculations.

There have been numerous attempts during each code cycle to have this required 20 amp bathroom dwelling unit receptacle outlet load be recognized as a 1.5 kva addition to the Service/Feeder demand calculations as with its counterparts of the same code article. 220.42 of the 2008 NEC states that demand factors for general lighting shall not be applied in determining the number of branch circuits. This is clearly a conflict since 210.11(C)(3) is considered a lighting load and requires a minimum of “one” 20-amp branch circuit that can have no other loads. In fact, the code language in 210.11(C)(3) is almost exactly like that of 210.11(C)(1) & (C)(2) which requires 1.5 kva for each 2-wire circuit installed. It cannot be both ways, first calling the dwelling unit bathroom receptacle outlet(s) a lighting load and then requiring an individual circuit to supply it without taking into consideration the connected load.

This one word change submitted for review would also require changes to Articles 210 and 220 to allow a coherent flow to the change.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-325.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-361 Log #3842 NEC-P02 **Final Action: Reject**
(220.84(C)(3) and (4))

Submitter: Ted “Smitty” Smith, Electrical Experts Consulting
Recommendation: Revise text to read as follows:

(3) The nameplate rating of the following, excluding any motor loads:

a. b. c. d. No change.

(4) ~~The nameplate ampere or kVA rating of all permanently connected motors not included in item (3).~~ 125 percent of the nameplate ampere rating or kVA rating of the largest motor as determined by the full load current and 100 percent of the nameplate ampere or kVA rating of all other motor loads.

Substantiation: Article 430 requires that the largest motor be calculated at 125 percent and all other loads at 100 percent. The current wording in this section does not account for the 125 percent for the largest motor and is therefore in conflict with Article 430 and 440. Using the method in Part III of Article 220 this is accounted for and should also be accounted for in Part IV Methods.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-354.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-362 Log #313 NEC-P02 **Final Action: Reject**
(Table 220.86)

Submitter: Robert J. Walsh, City of Hayward
Recommendation: Revise text to read as follows:

Table 220.86 Optional Method-Demand Factors for Feeders and Service-Entrance Conductors for Schools

Connected Load	Demand Factor (Percent)
First 33 VA/m^2	(3 VA/m^2) at 100
~~Over 33 to~~ The next 220 VA/m^2	(~~3 to~~ 20 VA/ft^2) at 75
Remainder ~~over 220 VA/m^2~~	~~(20 VA/ft^2)~~ at 25

Substantiation: The original wording to calculate the demand factors in Table 220.86 can be interpreted two ways. For example, a 12,000 ft^2 school has a calculated load of 300,000 VA. By dividing 300,000 VA by 12,000 ft^2, the dividend is 25 VA/ft^2. After calculating the 1st 3000 VA at 100%, the next step could be to subtract the 1st 3 VA/ft^2 from 25 VA/ft^2 leaving a remainder of 22 VA/ft^2. The next step could be to multiply the next 20 VA/ft^2 at 75% and subtract 20 VA/ft^2 from 22 VA/ft^2 leaving a remainder of 2 VA/ft^2 that is multiplied by 25%. This method of calculation is consistent with example D1A in Annex D and the use of Table 220.42 when calculating the demand factors for dwelling lighting loads. After calculating the 1st 3000 VA at 100%, the next step is to subtract 3000 VA from 9000 and multiply the remaining 6000 VA at 35%.

However, the second way to interpret the calculations in Table 220.86 could be to calculate the 1st 3000 VA at 100% and multiple the next 17 VA/ft^2 (3 to 20 VA/ft^2) at 75%. The remaining 5 VA/ft^2 would be multiplied at 25%. This method of calculation is not consistent with the use of Table 220.42 as demonstrated in Example D1A in Annex D.

Therefore, I am submitting this proposal to simplify and clarify the proper method of calculating the demand factors for school feeders and service-entrance conductors for schools from Table 220.86 by revising the Table’s instruction for calculation. The proposed revision would coincide with existing published educational texts.

Panel Meeting Action: Reject
Panel Statement: The panel agrees that the second method in the substantiation is correct and that the first method is inconsistent with the table.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-363 Log #2559 NEC-P02 **Final Action: Accept**
(Table 220.86)

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise text as follows:

Over 33 through ~~to~~ 220 VA/m^2 (3 through ~~to~~ 20 VA/ft^2) at...”.

Substantiation: This change would clarify the intent that 220 VA/m^2 (20 VA/ft^2) is included in the wording. The revised wording would be consistent with the wording in Table 220.55 and Note 3 to Table 220.55. In addition, 2-326 Log #2153 of the 2008 proposals included the following comment on affirmative (Note to TCC: This should be done to all tables in the NEC).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-364 Log #4901 NEC-P02 **Final Action: Reject**
(220.86 Exception (New))

Submitter: Michael A. Anthony, University of Michigan
Recommendation: Add an exception to 220.86 as shown below:

220.86 Schools.

(1) The calculation of a feeder or service load for schools shall be permitted in accordance with Table 220.86 in lieu of Part III of this article where equipped with electric space heating, air conditioning, or both. The connected load to which the demand factors of Table 220.86 apply shall include all of the interior and exterior lighting, power, water heating, cooking, other loads, and the larger of the air-conditioning load or space-heating load within the building or structure.

Exception: If the installation will be similar to the type of installation already under management, with a 3-year baseline of historical electrical demand data, the calculated feeder or service load shall be permitted to be based on calculations made under the supervision of a registered professional engineer.

(2) Feeders and service conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 220.61. Where the building or structure load is calculated by this optional method, feeders within the building or structure shall have ampacity as permitted in Part III of this article; however, the ampacity of an individual feeder shall not be required to be larger than the ampacity for the entire building.

(3) This section shall not apply to portable classroom buildings.

Substantiation: Electrical demand data, gathered from up-to-the moment electrical metering technologies installed in many educational facilities, reveals that there is a substantial gap between the actual measured electrical load at the building service and the capacity of the service required by the basic and optional branch, feeder and service sizing rules that appear in Article 220. Article 220 demand factors that apply to schools has neither been informed by recent energy saving end-use equipment, nor by the building environmental controls that are now deployed in many educational facilities, nor by the energy codes now being adopted in many jurisdictions.

Table 220.86, in particular, originated in another era of the electrical industry when its conservatism could be financed. Initiatives undertaken by NEMA, EPRI and DOE on reducing the energy consumption of transformers suggest that the National Electric Code should fall in line, starting with the way it prescribes load calculations. A new era in the electrical industry is open us and our leading practices need to be aligned more closely with the products of experience and observation.

For example, at many educational institutions, unit substations sized with a 1000 kVA transformer using the rules of Article 200 will never see even a 300 kW load throughout a 50 year life-cycle. Engineers submit load letters to the serving utility asking for an X-kVA transformer based upon NFPA fire safety rules, and the serving utility will install a 50% X-kVA transformer (with space provisions for a fully sized transformer in the future). Dollar loss associated with 1-percent no-load losses alone, on 500 kVA of over-capacity for a year are on the order of $4380.

I have tracked other proposals of this nature that have been submitted to the committee, among them, 2-356 Log #2683 NEC-PO2 submitted by the American Chemistry Council in 2008. Ans I share the panel's concern that open ended approaches to load calculations may not establish minimum levels of safely. But the panel should not have rejected the American Chemistry Council's proposal for lack of technical substantiation data when it could not present any technical substantiation of its own. How else can the NEC change with the times (and allow Owners put that $4380 to work keeping a riskier part of the electrical system safe).

This proposal puts to work the wealth of data available to educational facility managers and engineers that has come from sophisticated metering systems. When the energy management experts at educational facility management organizations can present to an electrical engineer a clear pattern of 1.5 VA per square foot of peak demand, an 1.0 VA of average demand for all the schools in this district, or all the colleges and universities in the state, the engineer ought to be able to secure approval for a design based upon those numbers, allowing some additional capacity for future growth.

Panel Meeting Action: Reject

Panel Statement: There is no clear definition on how "similar" the installation would need to be in order for the demand data to be accurately applied in a new installation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-365 Log #3403 NEC-P02 **Final Action: Reject**
(220.88)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

220.88 New Restaurants. Calculation of a service or feeder load where the feeder serves the total load, for a new restaurant shall be permitted in accordance with Table 220.88 in lieu of Part III of this article.

The overload protection of the service-entrance conductors shall be in accordance with 230.90 and 240.4.

Feeder conductors shall not be required to be of greater ampacity than the service-entrance conductors.

Service-entrance or feeder conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 220.61.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-298.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-366 Log #2256 NEC-P02 **Final Action: Reject**
(220.89 (New))

Submitter: Michael J. Pomerleau, Target

Recommendation: Add text as follows:

220.89 Prototype Buildings

The calculation of feeder or service load for a new installation of the same building plan shall be permitted to use actual demand of the existing building's load under the following conditions:

(1) The buildings are of the same size, layout and equipment.

(2) The new installation has the same or higher efficiency within major electrical systems. (Lighting, HVAC, Refrigeration...).

(3) Maximum demand data of the existing building is available for a 1-year period.

(4) The maximum demand at 125 percent does not exceed the ampacity of the feeder or rating of the service.

(5) The feeder has overcurrent protection in accordance with 240.4 and the service has overload protection in accordance with 230.90.

Substantiation: An engineer having data of multiple buildings of the same design should be able to size the service within a safety factor of the known load of multiple existing prototype buildings. The extra service capacity due to sizing per current NEC calculations creates unnecessary waste of copper and a larger than required carbon footprint for our corporation. Our store loads per NEC calculations require using a 3,000 amp service. We have utility data from 1,675 stores showing a maximum demand of approximately 1,200 amps and would like to reduce the service size to 2000 amps. We now have submetering in our stores and measure the actual load of our systems.

Panel Meeting Action: Reject

Panel Statement: The panel disagrees with reducing the minimum load calculations required for feeders and services using the demand data as a basis. The calculation methods provided in this article provide a means to determine adequate feeder and service ampacities but do not require that the entire capacity be connected. The term "prototype building" is not defined.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

2-367 Log #2353 NEC-P02 **Final Action: Reject**
(220.90 (New))

Submitter: Timothy Croushore, Allegheny Power
Recommendation: Add a new 220.90 to read as follows:
220.90 Engineering Supervision. Feeder and service load calculations for new or existing loads shall be permitted by a qualified Registered Professional Engineer. Feeder conductors shall not be required to be of greater ampacity than the service conductors. Service or feeder conductors shall be permitted to have neutral load determined by 220.61.
Substantiation: The purpose of this change is to add the provision to permit a qualified Registered Professional Engineer to perform load calculations to use appropriate demand/diversity factors for occupancies of similar loads to calculate the feeder or service load. This proposal would allow the load calculation work of the advisory committee on Electrical Safety Research to be used by qualified engineering professionals.

The requirement for a qualified Registered Professional Engineer is similar to the requirement proposed in 645.25 for a qualified Registered Professional Engineer to perform load calculations for computer facilities. The requirement for a qualified Registered Professional Engineer is the most stringent requirement for the capabilities of the individual to calculate the load. This Code accepted term is more limiting to the requirements and capabilities of the engineer than does the Code accepted term "engineering supervision." Using this term in this new section will assure that calculations done by the requirements of this section will be done carefully and accurately.

This provision would also provide the capabilities of a qualified registered professional engineer to calculate loads for similar occupancies in a manner similar to the way Section 220.87 does for existing loads. The qualified registered professional engineer will have the ability to apply demand or diversity factors to the loads of feeders or services. These demand or diversity factors are for similar uses and similar occupancies and are either published or are available from sources of data that meter such loads. For example, this new section may be used by an electrical engineer with a Professional Engineering registration calculating the service or feeder size for commercial occupancies such as a Lowes, Home Depot, Wal-Mart, Target, K-Mart, Cold Stone, Walgreens, Rite-Aid, Krogers, Wynn-Dixie, Supervalue, PetSmart, Petco, etc. and other occupancies based on previously installed and monitored electrical metering. This section could also be used for industrial occupancies under the supervision of a qualified registered professional engineer where demand/diversity factors are accepted by industry for process loads and manufacturing loads.

The last two sentences of this new section are the same as the last two sentences of 220.88 for New Restaurants.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree with eliminating all references to the load calculations in the NEC and relying only on the engineers judgment. The panel notes that the submitter can still accomplish the objective by working with the authority having jurisdiction to accept different calculations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-368 Log #3845 NEC-P02 **Final Action: Accept**
(Table 220.102)

Submitter: Ted "Smitty" Smith, Electrical Experts Consulting
Recommendation: Revise text to read as follows:

~~Loads expected to operate simultaneously, but not less than 125 percent full load current of the largest motor and not less than 60 amperes of the load.~~ ~~100~~

The greater of the following: All loads that are expected to operate simultaneously, 125 percent of the full load current of the largest motor, or the first 60 amperes of the load. 100

No changes to remainder of table.
Substantiation: I am an instructor for apprenticeship and for journeyman continuing education in Colorado. We have a large number of farms in Colorado and so load calculations for farms is something that is frequently required of us. I have taught these calculations for years and I have yet to have a student that grasps the intent of this table without a great deal of explanation. I understand that the NEC is not meant for instructional purposes or as an instruction manual but that does not mean we have to word things in such a way as to make them as confusing as possible. The above wording does not change the intent of the requirement, but does make it clearer.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-369 Log #3387 NEC-P02 **Final Action: Reject**
(220.102(B))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

220.102(B) Other than Dwelling Unit. Where a feeder or service supplies a farm building or other load having two or more separate branch circuits, the load for feeders, service-entrance conductors, and service equipment shall be calculated in accordance with demand factors not less than indicated in Table 220.102.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-298.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-370 Log #3385 NEC-P02 **Final Action: Reject**
(220.103)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

220.103 Farm Loads. Where supplied by a common service, the total load of the farm for service-entrance conductors and service equipment shall be calculated in accordance with the farm dwelling unit load and demand factors specified in Table 220.103. (The remainder of the text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 2-298.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 225 — OUTSIDE BRANCH CIRCUITS AND FEEDERS

4-21 Log #678 NEC-P04 **Final Action: Accept in Principle**
(225.2)

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comment expressed in the voting.

The text must comply with the NEC Style Manual.

The proposed text includes definitions in 225.2 that are not used in Article 225 or in the NEC. All text must be written in accordance with 90.5(A) in mandatory language.

This action will be considered by the panel as a public comment.

Submitter: Technical Correlating Committee on National Electrical Code®,

Recommendation: Revise text to read as follows:

225.2 Definitions.

Electric Supply Station. Any building, room, or separate space within which electric supply equipment is located and the interior of which is accessible only to qualified persons. This includes generating stations and substations, including their associated generator, storage battery, transformer, and switchgear rooms or enclosures, but does not include facilities such as pad-mounted equipment and installations in manholes and vaults.

1. Generating Station. A plant wherein electric energy is produced by conversion from some other form of energy (e.g., chemical, nuclear, solar,mechanical, or hydraulic) by means of suitable apparatus. This includes all generating station auxiliaries and other associated equipment required for the operation of the plant. Not included are stations producing power exclusively for use with communications systems.

2. Substation. An enclosed assemblage of equipment, e.g., switches, circuitbreakers, buses, and transformers, under the control of qualified persons,through which electric energy is passed for the purpose of switching or modifying its characteristics.

225.3~~2~~ Other Articles.

Editorially relocate 225.2 to 225.3 to create a new 225.2.

225.8~~3~~ Calculation of Loads 600 Volts, Nominal, or Less.

Editorially relocate 225.3 to 225.8 to create a new 225.2.

III. Over 600 Volts

225.50 Sizing of Conductors. The sizing of conductors over 600 volts shall be in accordance with 210.19(B) for branch circuits and 215.2(B) for feeders.

225.51 Isolating Switches. Where oil switches or air, oil, vacuum, or sulfur hexafluoride circuit breakers constitute a building disconnecting means, an isolating switch with visible break contacts and meeting the requirements of 230.204(B), (C), and (D) shall be installed on the supply side of the disconnecting means and all associated equipment.

Exception: The isolating switch shall not be required where the disconnecting means is mounted on removable truck panels or metal-enclosed switchgear units that cannot be opened unless the circuit is disconnected and that, when removed from the normal operating position, automatically disconnect the circuit breaker or switch from all energized parts.

225.52 Disconnecting Means

(A) Location. A building or structure disconnecting means shall be located in accordance with 225.32, or it shall be electrically operated by a similarly located remote control device.

(B) ~~225.53~~ Type. Each building or structure disconnect shall simultaneously disconnect all ungrounded supply conductors it controls and shall have a fault-closing rating not less than the maximum available short-circuit current available at its supply terminals.

Exception: Where the individual disconnecting means consist of fused cutouts, the simultaneous disconnection of all ungrounded supply conductors is not required provided that there is a means to disconnect the load before opening the cutouts. A permanent legible sign shall be installed adjacent to the fused cutouts indicating the above requirement.

Where fused switches or separately mounted fuses are installed, the fuse characteristics shall be permitted to contribute to the fault closing rating of the disconnecting means.

(C) Locking

Disconnecting means shall be capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.

Exception: Where an individual disconnecting means consist of fused cutouts, a suitable enclosure, capable of being locked and sized to contain all cutout fuse holders shall be installed at a convenient location to the fused cutouts.

(D) Indicating

Disconnecting means shall clearly indicate whether they are in the open "off" or closed "on" position.

(E) Uniform Position

Where disconnecting means handles are operated vertically the "up" position of the handle shall be the "on" position.

Exception: A switching device having more than one "on" position, such as a double throw switch, need not comply with this requirement.

(F) Identification. Where a building or structure has any combination of feeders, branch circuits, or services passing through it or supplying it, a permanent plaque or directory shall be installed at each feeder and branch circuit disconnect location denoting all other services, feeders,, or branch circuits supplying that building or structure or passing through that building or structure and the area served by each.

225.56 Inspections and Tests

(A) Pre-Energization and Operating Tests. The complete electrical system shall be performance tested when first installed on site. Each protective, switching, and control circuit shall be adjusted in accordance with recommendations of the protective device study and tested by actual operation using current injection or equivalent methods as necessary to ensure that each and every such circuit operates correctly to the satisfaction of the authority having jurisdiction.

(1) Instrument Transformers. All instrument transformers shall be tested to verify correct polarity and burden.

(2) Protective Relays. Each protective relay will be demonstrated to operate by injecting current (and/or voltage) at the associated instrument transformer output terminal and observing that the associated switching and signaling functions occur correctly and in proper time and sequence to accomplish the protective function intended.

(3) Switching Circuits. Each switching circuit will be observed to operate the associated equipment being switched.

(4) Control and Signal Circuits. Each control or signal circuit will be observed to perform it's proper control function or produce a correct signal output.

(5) Metering Circuits. All metering circuits will be verified to operate correctly from potential and current sources similarly to protective relay circuits.

(6) Acceptance Tests. Complete acceptance tests shall be performed after the station installation is completed, on all assemblies, equipments, conductors, control and protective systems as applicable to verify the integrity of all the systems.

(7) Relays and Metering Utilizing Phase Differences. All relays and metering which use phase differences for operation shall be verified by measuring phase angles at the relay under actual load conditions after operation commences, which may be at a later date than Pre-energization tests.

(B) Test Report. A test report covering the results of the tests required in 225.56(A) shall be delivered to the authority having jurisdiction prior to energization.

F.P.N. For acceptance specifications refer to NETA ATS-2007 Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems published by the InterNational Electrical Testing Association.

225.60 Clearances over Roadways, Walkways, Rail, Water, and Open Land.

(A) 22 kV, Nominal, to Ground or Less. The clearances over roadways, walkways, rail, water, and open land for conductors and live parts up to 22 kV, nominal, to ground or less shall be not less than the values shown in Table 225.60.

Table 225.60 Clearances over Roadways, Walkways, Rail, Water, and Open Land

Location	Clearance m	Clearance ft
Open land subject to vehicles, cultivation, or grazing	5.6	18.5
Roadways, driveways, parking lots, and alleys	5.6	18.5
Walkways	4.1	13.5
Rails	8.1	26.5
Spaces and ways for pedestrians and restricted traffic	4.4	14.5
Water areas not suitable for boating	5.2	17.0

(B) Over 22 kV Nominal to Ground. Clearances for the categories shown in Table 225.60 shall be increased by 10 mm (0.4 in.) per kV above 22,000 volts.

(C) Special Cases. For special cases, such as where crossings will be made over lakes, rivers, or areas using large vehicles such as mining operations, specific designs shall be engineered considering the special circumstances and shall be approved by the authority having jurisdiction.

Table 225.61 Clearances over Buildings and Other Structures

Clearance from Conductors or Live Parts from:	**Horizontal**		**Vertical**	
	m	**ft**	**m**	**ft**
Building walls, projections, and windows	2.3	7.5	—	—
Balconies, catwalks, and similar areas accessible to people	2.3	7.5	4.1	13.5
Over or under roofs or projections not readily accessible to people	—	—	3.8	12.5
Over roofs accessible to vehicles but not trucks	—	—	4.1	13.5
Over roofs accessible to trucks	—	—	5.6	18.5
Other structures	2.3	7.5	—	—

FPN: For additional information, see ANSI C2-2007, National Electrical Safety Code.

225.61 Clearances over Buildings and Other Structures.

(A) 22 kV Nominal to Ground or Less. The clearances over buildings and other structures for conductors and live parts up to 22 kV, nominal, to ground or less shall be not less than the values shown in Table 225.61.

(B) Over 22 kV Nominal to Ground. Clearances for the categories shown in Table 225.61 shall be increased by 10 mm (0.4 in.) per kV above 22,000 volts.

FPN: For additional information, see ANSI C2-2007, National Electrical Safety Code.

225.70 Substations

(A) Warning Signs.

(1) General. A permanent, legible warning notice carrying the wording “DANGER — HIGH VOLTAGE” shall be placed in a conspicuous position in the following areas:

(a) At all entrances to electrical equipment vaults, electrical equipment rooms, areas, or enclosures; and

(b) At points of access to conductors on all high voltage conduit systems and cable systems; and

(c) On all cable trays containing high-voltage conductors with the maximum spacing of warning notices not to exceed 3 m (10 ft.); and

(2) Isolating Equipment. Permanent legible signs shall be installed at isolating equipment warning against operating it while carrying current, unless the equipment is interlocked so that it cannot be operated under load.

(3) Fuse Locations. Suitable warning signs shall be erected in a conspicuous place adjacent to fuses, warning operators not to replace fuses while the circuit is energized.

(4) Backfeed. The following steps shall be taken where the possibility of backfeed exists:

(a) Each group-operated isolating switch or disconnecting means shall bear a warning notice to the effect that contacts on either side of the device may be energized; and

(b) A permanent, legible, single-line diagram of the station switching arrangement, clearly identifying each point of connection to the high-voltage section, shall be provided in a conspicuous location within sight of each point of connection.

(5) Metal Enclosed and Metal Clad Switchgear. Where metal enclosed switchgear is installed the following steps shall be taken:

(a) A permanent, legible, single-line diagram of the switchgear shall be provided in a readily visible location within sight of the switchgear and this diagram shall clearly identify interlocks, isolation means, and all possible sources of voltage to the installation under normal or emergency conditions, including all equipment contained in each cubicle, and the marking on the switchgear shall cross-reference the diagram.

Exception to (a): Where the equipment consists solely of a single cubicle or metal-enclosed unit substation containing only one set of high-voltage switching devices, diagrams are not required.

(b) Permanent, legible signs shall be installed on panels or doors that give access to live parts over 600 volts carrying the wording “DANGER — HIGH VOLTAGE” to warn of the danger of opening while energized.

(c) Where the panel gives access to parts that can only be de-energized and visibly isolated by the serving utility, the warning shall add that access is limited to the serving utility or following an authorization of the serving utility.

Substantiation: This proposal is the work of the “High Voltage Task Group” appointed by the Technical Correlating Committee. The task group consisted of the following members: Alan Peterson, Paul Barnhart, Lanny Floyd, Alan Manche, Donny Cook, Vince Saporita, Roger McDaniel, Stan Folz, Eddie Guidry, and Jim Dollard.

The following substantiation is separated to provide clarity:

225.2

A new.2 section is created for definitions in accordance with the NEC Manual of Style. The term “Electric Supply Station” is defined with a definition in ANSI/IEEE C2-2007, National Electrical Safety Code.

225.3 & 225.8

In order to add a new 225.2 for definitions, it is necessary to editorially relocate 225.2 to 225.3 and 225.3 to 225.8.

225.52

The existing text of this section is editorially separated into two new first level subdivisions for clarity and usability. The text is separated into (A) Location and (B) Type to logically separate the information in accordance with the NEC Manual of Style.

A new first level subdivision “(C) Locking”, is added to require that the disconnecting means addressed in 225.52 be capable of being locked in the open position for safety. This text mirrors the text that presently exists in 490.44(C) and is necessary in Part III of Article 225. A high voltage substation may rely on different types of disconnects as well as isolation switches for the purposes of this section and this requirement is necessary in Article 225.

A new first level subdivision “(D) Indicating”, is added to require that the disconnecting means addressed in 225.52 clearly indicate whether they are in the open “off” or closed “on” position. This text mirrors the text that presently exists in 240.81and is necessary in Part III of Article 225. The requirements of 240.81 exist in Part VII of Article 240 and apply only to circuit breakers. The requirement in 404.7 does not adequately address indication requirements for high voltage disconnecting means.

A new first level subdivision “(E) Uniform Position”, is added to require that the disconnecting means handles addressed in 225.52 are operated vertically so that the “up” position of the handle shall be the “on” position. This text mirrors the text that presently exists in 240.81and is necessary in Part III of Article 225. The requirements of 240.81 exist in Part VII of Article 240 and apply only to circuit breakers.

225.56

The installation of substations requires that the overcurrent protection be provided with a designed system consisting of instrument transformers, protective relays, switching circuits, conrol circuits, signal circuits, metering circuits, as well as relays and metering utilizing phase differences. This type of installation requires pre-energization and operating tests to verify proper operation and for the submission of acceptance test criteria to the AHJ. The FPN refers the code user to the industry standard, NETA ATS-2007 for acceptance testing.

225.70

The text in this section is derived primarily from the Ontario Code, Section 36 High-Voltage Installations. This document is attached to the proposal for your information.

First level subdivision “(A) Warning Signs”, provides prescriptive requirements for signage in different areas of a substation as outlined below:

(1) General. This second level subdivision provides general signage requirements throughout the substation.

(2) Isolating Equipment. This signage requirement is intended to prevent someone from opening an isolation switch under load.

(3) Fuse Locations. This signage requirement is intended to prevent the replacement of fuses while the supply circuit is energized.

(4) Backfeed. This signage requirement is intended to prevent injury and damage to equipment where a potential backfeed situation exists.

(5) Metal Enclosed Switchgear. This signage requirement is intended to provide installer/maintainers with necessary information including, single line diagram, interlocks, isolation means, all possible sources of voltage and signs on equipment which allow access to energized parts.

Panel Meeting Action: Accept in Principle

Revise 225.56(A)(2) of the submitter's text as follows follows: (2) Protective Relays. Each protective relay will be demonstrated to operate by injecting current (and/or voltage) at the associated instrument transformer output terminal <u>(or test switch)</u> and observing that the associated switching and signaling functions occur correctly and in proper time and sequence to accomplish the protective function intended.

Panel Statement: The general practice is to inject current at the test switch to prove protective relay connections and functions.

The panel accepts the remainder of the recommendation as submitted.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

MCDANIEL, R.: **EEI Negative Ballot Statement on Proposal 4-21:**

I am balloting negative on this proposal, but do recognize that there are benefits to include medium and high voltage premises wiring installation requirements in the NEC. My reasons for negative ballot on the Panel's action are on items in this proposal that need to be addressed to improve safety and clarity. These are:

1. In 225.2 Definitions, the two terms, "Electric Supply Stations" and "Generating Station" do not occur as terms used in the Code nor used two or more times. In addition, these terms as defined in this proposal are not covered by the NEC as specified in 90.2(B). The term "substation" is used in Article 490 Part III and Article 530 Part VI and, therefore, the definition should move to Article 100.

2. Requirements for an electric substation apply to both outdoor and indoor applications and do not fall under the scope of Article 225. These requirements should be considered under either Article 110 or 490.

3. In 225.52, Exception, using fuses as a non-simultaneous disconnect can result in a ferroresonant condition.

4. In 225.52(C), requirements that only applied to metal-enclosed switchgear in 490.44(C) are proposed to be applied in a general case without technical substantiation. In addition, the proposed exception contains vague and unenforceable language such as "at a convenient location" that is not permitted according to 3.2.1 in the NEC Style Manual.

5. Proposed 225.52(D) and (E) do not address all possible switching configurations. In addition, this language came from 240.81, which is only for circuit breakers and applied generally here. Configurations are possible where one side or another can be energized, regardless of the switch orientation.

6. Regarding proposed 225.56; there are a number of occurrences in this proposed section where the words "will be" or "may be" are used and do not meet the requirements of 3.1.1 and 3.1.2 of the NEC Style Manual. "May" is specifically prohibited unless it recognizes a discretionary judgment on the part of the AHJ. In addition, inspections and tests as described in this proposed section are work practices outside the purpose of the Code; see 90.1(C). The information as proposed is better suited in NFPA 70B and/or NFPA 70E.

7. The proposed 225.70 contains vague and unenforceable language such as "in a conspicuous location" that is not permitted according to 3.2.1 in the NEC Style Manual. Also, in 225.70(A)(4) backfeed is an issue, but as written it applies only to over 600 Volt and not to under 600 Volt applications. It may be more appropriate to be considered in a general area such as Article 110. Additionally, the proposed section mentions "steps shall be taken" which is written as a procedure and outside the purpose of the Code; see 90.1(C). Although there is no objection in using information for this proposed text as derived primarily from other codes such as the Ontario Code, it does not necessarily constitute sufficient technical substantiation for inclusion into the NEC.

4-22 Log #4804 NEC-P04 **Final Action: Accept**
(Table 225.2)

Submitter: Leo F. Martin, Jr., Martin Electrical Code Consultants

Recommendation: In Table 225.2 application of other Article add after the word Grounding <u>and Bonding</u>.

Substantiation: To be consistent with the Title and Scope of Article 250.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-23 Log #4364 NEC-P04 **Final Action: Reject**
(225.4 Exception)

Submitter: Donald W. Zipse, Electrical Forensics, LLC

Recommendation: Delete the following words from Section 225.4, Exception, "and grounded circuit conductors"

Substantiation: By continuing to allow the "grounded circuit conductors", commonly referred to as the neutral to be installed bare allows the neutral current to flow uncontrolled over the earth. This uncontrolled flow of "stray current" results in the potential to harm not only humans but to cows and pigs.

"In order to have and maintain an electrical installation safe from electrical shocks and to prevent electrocution from stray current: All continuously, flowing man made electric current shall be contained within a conductor, insulated from earth, except at one place within the system and only one place can the neutral be connected to earth."

This is accomplished within industrial facilities since they do not make the bastardized electrical transformer connection between the primary neutral and the secondary neutral, which allows the continuous flow of dangerous and hazardous high voltage neutral current over the earth and ground conductors. The industrial facilities keep the neutral insulated and carry the ground conductor with the phase conductors. (See IEEE Standard 141, "Electrical Power Distribution", The Red Book.)

Within the past three years 4 young people were injured due to the uncontrolled flow of neutral current in the earth. Two suffered permanent brain damage and another was declared dead due to electrocution from neutral current (Bryan K. Fitzpatrick ("Bryan") and Diana J. Fitzpatrick ("Diana"), individually, and Timothy Sean Fitzpatrick ("Timothy"), a minor, by and through his Next Friend Bryan K. Fitzpatrick).

Over thirty years ago the Code Making Panel charged with trailers realized persons were being killed by neutral current flowing uncontrolled on the trailers and the over the earth. That panel required an insulated neutral conductor run to all trailers. The next code cycle the panel responsible for marinas adopted the same requirement for insulated neutrals. For 21 years code proposals were submitted to a third panel to make the neutral insulated, which after seven (7) code cycles they did.

Am I going to have to submit this code proposal multiple times until this code panel follows the actions of three previous Code Making Panels making the neutral an insulated conductor, based on safety to the public? I hope NOT.

Panel Meeting Action: Reject

Panel Statement: The conductors are outdoor overhead conductors. They are not installed in the earth and as such they can be bare.

The exception that the submitter has referenced refers to overhead conductors and only if such an installation is specifically permitted elsewhere in the NEC. Installations in existing facilities commonly utilize this exception where feeders are run between buildings and overhead cables are installed that utilize a bare support conductor that also serves for feeder circuit neutral and grounding purposes. The new requirements found in Section 250.32 limit installations such as this to existing installations only, and this exception is required for these existing installations.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-24 Log #274 NEC-P04 **Final Action: Accept**
(225.7(B))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "computed" to "calculated".

Substantiation: The term "calculated" more accurately describes the operation. It is not necessary to have a computer to do the calculations, they can also be done manually.

This is one of a series of proposals to provide consistent terminology throughout the code.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-25 Log #4589 NEC-P04 **Final Action: Accept**
(225.7(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Delete the clause "where the luminaires are not less than 900 mm (3 ft) from windows, platforms, fire escapes, and the like."

Substantiation: With current luminaire construction and grounding requirements the continuing presence of this rule is very difficult to defend. Consider, for example, the conventional bollard-style luminaires operating at 277 volts that mount on grade. Any two-year old can toddle up to one of those and hug it with no code objection. There are no branch-circuit limitations in 210.6(C) that correlate with this rule, so there are no placement limitations for these luminaires indoors, even in environmentally challenging areas such as commercial locker rooms. However, woe betides an installer who places such a luminaire near a fire escape landing, or even near a window.

This proposal is a modest step; a more comprehensive step (not proposed at this time) would be to delete both this paragraph and also (D) in their entirety on the grounds that 210.6 adequately covers the topic. Certainly 210.6(D) does not leave much for 225.7(D) to do, and 210.6(C) covers 225.7(C) except for a spacing limit for certain locations that is very difficult to explain. This section carried a minimum height above grade limitation until the 1987 NEC, however, that has now been gone over two decades and these limits should keep it company.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-26 Log #1001 NEC-P04 **Final Action: Reject**
(225.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Wiring methods on the exterior of buildings and structures shall be identified as suitable for the use.
Substantiation: Present listed wiring methods do not include other suitable methods such as raceways, cable trays, auxiliary gutters, structures other than "buildings" should be included.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient documentation as to what text is recommended for deletion. He also has not submitted any documented problem with the existing requirement.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-27 Log #2413 NEC-P04 **Final Action: Accept in Principle**
(225.10)

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follows:
As open wiring on insulators, as multi conductor, as Type MC cable as Type UF cable, as type MI Cable, as messenger-supported wiring in rigid metal conduit, in intermediate metal conduit, in rigid ~~nonmetallic~~ PVC conduit
Substantiation: Conforming to style manual Article 352.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement in Proposal 4-28.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-28 Log #4728 NEC-P04 **Final Action: Accept in Principle**
(225.10)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
225.10 Wiring on Buildings.
The installation of outside wiring on surfaces of buildings shall be permitted for circuits of not over 600 volts, nominal, as open wiring on insulators, as multiconductor cable, as Type MC cable, as Type UF cable, as Type MI cable, as messenger-supported wiring, in rigid metal conduit, in intermediate metal conduit, in ~~rigid nonmetallic conduit~~ rigid polyvinyl chloride Conduit (PVC), reinforced thermosetting resin conduit (RTRC), in cable trays, as cablebus, in wireways, in auxiliary gutters, in electrical metallic tubing, in flexible metal conduit, in liquidtight flexible metal conduit, in liquidtight flexible nonmetallic conduit, and in busways. Circuits of over 600 volts, nominal, shall be installed as provided in 300.37.
Substantiation: This is an addition from the result of the 2008 adding of new code sections for specific nonmetallic raceways and the conditions for their intended us. Both rigid polyvinyl chloride conduit (PVC) and reinforced thermosetting resin conduit (RTRC) are now separate articles are allowed to be installed on buildings as permitted uses.
Panel Meeting Action: Accept in Principle
Revise the text as follows: The installation of outside wiring on surfaces of buildings shall be permitted for circuits of not over 600 volts, nominal, as open wiring on insulators, as multiconductor cable, as Type MC cable, as Type UF cable, as Type MI cable, as messenger-supported wiring, in rigid metal conduit, in intermediate metal conduit, in ~~rigid nonmetallic conduit~~ rigid polyvinyl chloride (PVC) conduit, in reinforced thermosetting resin conduit (RTRC), in cable trays, as cablebus, in wireways, in auxiliary gutters, in electrical metallic tubing, in flexible metal conduit, in liquidtight flexible metal conduit, in liquidtight flexible nonmetallic conduit, and in busways. Circuits of over 600 volts, nominal, shall be installed as provided in 300.37.
Panel Statement: The panel revised the text for clarification.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-29 Log #4738 NEC-P04 **Final Action: Accept in Principle**
(225.10)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
225.10 Wiring on Buildings.
The installation of outside wiring on surfaces of buildings shall be permitted for circuits of not over 600 volts, nominal, as open wiring on insulators, as multiconductor cable, as Type MC cable, as Type UF cable, as Type MI cable, as messenger-supported wiring, in rigid metal conduit, in intermediate metal conduit, in ~~rigid nonmetallic conduit~~ rigid polyvinyl chloride Conduit (PVC), reinforced thermosetting resin conduit (RTRC), in cable trays, as cablebus, in wireways, in auxiliary gutters, in electrical metallic tubing, in flexible metal conduit, in liquidtight flexible metal conduit, in liquidtight flexible nonmetallic conduit, and in busways. Circuits of over 600 volts, nominal, shall be installed as provided in 300.37.
Substantiation: This is an addition from the result of the 2008 adding of new code sections for specific nonmetallic raceways and the conditions for their intended us. Both rigid polyvinyl chloride conduit (PVC) and reinforced thermosetting resin conduit (RTRC) are now separate articles are allowed to be installed on buildings as permitted uses.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement in Proposal 4-28.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-30 Log #2745 NEC-P04 **Final Action: Reject**
(225.18)

Submitter: Allen L. Clapp, Power & Communication Utility Training Center
Recommendation: Revise text to read as follows:
225.18 Clearance for Overhead Conductors and Cables.
Overhead spans of open conductors and open multiconductor cables of not over 600 volts, nominal, shall have a clearance of not less than the following when at maximum final sag resulting from ice loading or thermal line losses, whichever is greater:
FPN: New, unstretched wires are installed at initial sag conditions. Over time, the weight, wind, and ice loading received in service will cause inelastic (nonrecoverable) deformation (permanent stretching) in the wire. Final sag conditions occur when further inelastic deformation is reduced to a negligible amount. Maximum sag occurs when the combination of (a) elastic (recoverable) deformation due to thermal or ice loading and (b) inelastic deformation is the greatest. Rule 230A4, Rule 232A, and Appendix B of the National Electrical Safety Code ANSI C2-2007 contain information on (a) calculating the inelastic deformation due to conductor/cable weight, ice loading, and wind loading that is appropriate for various loading areas and useful in calculating maximum final sag and (b) appropriate conductor temperatures and ice loading useful in determining conditions that will produce maximum final sag, respectively.
(1) 3.0 m (10 ft) — above finished grade, sidewalks, or from any platform or projection from which they might be reached where (a) the voltage does not exceed 150 volts to ground and (b) the area is accessible to pedestrians only
(2) ~~3.7 m (12.0 ft)~~ 3.8 m (12.5 ft) — over portions of residential property and residential driveways~~, and those commercial areas~~ where (a) such portions are not subject to truck traffic and ~~where~~ (b) the voltage does not exceed 300 volts to ground
EXCEPTION: This clearance may be reduced to 3.7 m (12.0 ft) for cables with insulated conductors cabled together with an effectively grounded, bare neutral or messenger; this exception does not apply for cables having an insulated neutral or messenger
(3) 4.5 m (15 ft) — for those areas listed in the 3.7-m (12-ft) classification where the voltage exceeds 300 volts to ground
(4) 5.5 m (18 ft) — over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, portions of driveways on residential property subject to truck traffic, and other land traversed by vehicles, such as cultivated, grazing, forest, and orchard.
Substantiation: This proposal contains three types of changes. The first addresses the need to assure that the conductors will not sag enough after installation to produce vertical clearances less than those required by this NEC section. The second addresses the need to recognize that the front portions of most residential driveways are general-use driveways and subject to truck traffic. The third prohibits use of the reduced clearance of 12 ft for service drops to commercial buildings.
To assure that conductors and cables are installed high enough to maintain the required clearance throughout their life, and not just at installation, consideration of sag changes due to their own weight, ice loading, and thermal loading is necessary. The National Electrical Safety Code contains appropriate information for use in calculating maximum final sags to assure that vertical clearances are met and is, therefore, a good reference.
Many portions of residential property are subject to truck traffic. In particular, the front portion of most residential driveways is subject to moving vans, delivery trucks, and ambulances. As a result of hundreds of service drops being torn down in the 1980s, the NESC raised the clearances required for service drops above driveways and limited the application of the reduced clearance of 12 ft (applicable only to service drops) to only those *residential* buildings where the height of the building did not allow achieving the full clearance value of 16.0 ft required by NESC Table 232-1. Some of the service-drop teardown accidents reviewed had serious safety consequences. In some cases, service drops torn down by moving vans and delivery trucks (which often exceed 12 ft in height) were touched in a damaged area by personnel trying to move them out of the way. In others, ambulances cut off the lights and power to houses to which they were making an emergency response call. Since this NEC section does not cover service drops, there is no reason to allow less than the normal line clearances.
The NESC clearances to ground are based upon review of more than twenty years of accident data, as well as the general history of above-ground clearances. Clearances for open wire (whether bare or covered) are required to be greater than those for multiplex cable (duplex, triplex, and quadruplex) with an effectively grounded bare neutral or messenger. Those NESC Table 232-1, Category 5 clearances are 12.0 ft for multiplex cable with bare neutrals/

messengers and 12.5 ft for open wire (bare or covered wire) above areas not subject to trucks (vehicles defined as being greater than 8 ft in height), riders on horseback or other large animals, etc.. Where subject to trucks, riders on horseback, etc., NESC clearances are 16.0 ft and 16.5 ft, respectively. It is recommended that, at a minimum, the NEC match the NESC clearances. Thus, the clearances in 225.18(2) should be increased for open wire to match those of NESC Table 232-1, Category 5.

The above proposal was worded in a manner to make the least changes to the existing language as practical. However, you may find that the following language may be preferable for subpart 4:

4) 5.5 m (18 ft) — over public streets, alleys, roads, parking areas, driveways (excluding portions of driveways on residential property not subject to truck traffic), and other lands (such as cultivated, grazing, forest, and orchard lands) subject to truck traffic, ~~driveways on other than residential property, and other land such as cultivated, grazing, forest, and orchard~~

I am a licensed Professional Engineer with over 400 electric and communication utilities and large industrial complexes as clients. I am a member of NFPA, IEEE, and IAEI. I have used both the National Electrical Code and the National Electrical Safety Code in my work since 1964. I have been a member of NESC subcommittees since 1971 and have served several times over the years on NESC/NEC coordination task forces. I have reviewed over 20 years of electrical accident data in that capacity. I have also been involved in over 600 accident investigation and litigation assignments over the years. The above proposal is made to (a) improve safety and (b) harmonize certain requirements of the NEC with those of theNESC to limit the opportunity for confusion.

Panel Meeting Action: Reject

Panel Statement: The submitter has submitted a proposal whereby the only calculation formula is defined in a different ANSI Standard, the National Electrical Safety Code. This additional standard is not uniformly adopted and it would be impossible for local AHJs to enforce this requirement and installers to comply with it. Article 225 applies to outside feeders and branch circuits, both are clearly premises wiring systems and are on the customer side of the "Service Point," and these particular installations have nothing to do with service drops at the interface of residential driveways and streets as referenced by the submitter. In addition these conductors have to have properly sized short circuit, ground fault, and overload protection at their point of supply and thus are not as susceptible to personnel hazard as utility supply conductors would be. The submitter has not defined any documented problems with the existing requirements.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-31 Log #3 NEC-P04 **Final Action: Accept in Part**
(225.18(5) (New))

NOTE: This proposal appeared as Comment 4-8 on Proposal 4-12 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 4-12 was:

Revise text to read as follows:

225.18 Clearance from Grade ~~Ground~~.

Overhead spans of open conductors and open multiconductor cables of not over 600 volts, nominal, shall have a clearance of not less than the following:

(1) 3.0 m (10 ft) - above finished grade, sidewalks, or from any platform or projection from which they might be reached where the voltage does not exceed 150 volts to ground and accessible to pedestrians only

(2) 3.7 m (12 ft) - over residential property and driveways, and those commercial areas not subject to truck traffic where the voltage does not exceed 300 volts to ground

(3) 4.5 m (15 ft) - for those areas listed in the 3.7-m (12 ft) classification where the voltage exceeds 300 volts to ground

(4) 5.5 m (18 ft) - over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, and other land traversed by vehicles, such as cultivated, grazing forest, and orchards.

Submitter: Joseph A. Hertel, Rep. Safety and Buildings

Recommendation: Add the following to 225.18 Clearance from Grade:

"(5) 7.5 m (24.5 ft) - over track rails of railroads."

Substantiation: There is currently no specified height for these conductors above a railroad. We have many industrial facilities where rail is used throughout the facility and the conductors are owned and maintained by the facility. The height requirements are from tables found in ANSI C2, National Electrical Safety Code, which we have used since there is no mention in the NEC.

Panel Meeting Action: Accept in Part

Add the following text:

The panel accepts the addition of text: "(5) 7.5 m (24.5 ft) - over track rails of railroads." and rejects the title change. The title already was changed in the 2008 code.

Panel Statement: The panel accepts the addition of text "(5) 7.5 m (24.5 ft) - over track rails of railroads" and rejects the title change. The title already was changed in the 2008 code.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-32 Log #2746 NEC-P04 **Final Action: Reject**
(225.19(A), (B), and (C))

Submitter: Allen L. Clapp, Power & Communication Utility Training Center

Recommendation: Revise text to read as follows:

225.19 Clearances from Buildings for Conductors of Not over 600 Volts, Nominal, Passing but Not Attaching To Buildings or Other Nonbridge Installations .

The following clearances apply to conductors and cables passing but not attaching to buildings.

FPN: For service drop clearances, see 230.24.

Horizontal clearances shall be not less than the following values when at rest without wind deflection. Vertical clearances shall be not less than the following values when at maximum final sag.resulting from ice loading or thermal line losses, whichever is greater:

FPN: New, unstretched wires are installed at initial sag conditions. Over time, the weight, wind, and ice loading received in service will cause inelastic (nonrecoverable) deformation (permanent stretching) in the wire. Final sag conditions occur when further inelastic deformation is reduced to a negligible amount. Maximum sag occurs when the combination of (a) elastic (recoverable) deformation due to thermal or ice loading and (b) inelastic deformation is the greatest. Rule 230A4, Rule 232A, and Appendix B of the National Electrical Safety Code ANSI C2-2007 contain information on (a) calculating the inelastic deformation due to conductor/cable weight, ice loading, and wind loading that is appropriate for various loading areas and useful in calculating maximum final sag and (b) appropriate conductor temperatures and ice loading useful in determining conditions that will produce maximum final sag, respectively.

(A) Vertical Clearances Above Building Roofs. Overhead spans of open conductors and open multiconductor cables shall have a vertical clearance of not less than ~~2.5 m (8 ft)~~ 3.0 m (10 ft) above the roof surface (if the surface is not readily accessible to pedestrians) or 3.4 m (11 ft) above the roof surface (if the surface is readily accessible to pedestrians). The vertical clearance above the roof level shall be maintained ~~for a distance not less than 900 mm (3 ft) in all directions from the edge of the roof.~~ as a diagonal arc from the edge of the roof over to a vertical extension of the horizontal clearance required by (B) below.

Exception No. 1: The area above a roof surface subject to pedestrian or vehicular traffic shall have a vertical clearance from the roof surface in accordance with the clearance requirements of 225.18.

~~Exception No. 2: Where the voltage between conductors does not exceed 300, and the roof has a slope of 100 mm in 300 mm (4 in. in 12 in.) or greater, a reduction in clearance to 900 mm (3 ft) shall be permitted.~~

~~Exception No. 3: Where the voltage between conductors does not exceed 300, a reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.8 m (6 ft) of the conductors, 1.2 m (4 ft) horizontally, pass above the roof overhang and (2) they are terminated at a through-the-roof raceway or approved support.~~

~~Exception No. 4: The requirement for maintaining the vertical clearance 900 mm (3 ft) from the edge of the roof shall not apply to the final conductor span where the conductors are attached to the side of a building.~~

(~~B~~C) Clearances From Nonbuilding or Nonbridge Structures. From signs, chimneys, radio and television antennas, tanks, and other nonbuilding or nonbridge structures, clearances ~~— vertical, diagonal, and horizontal —~~ shall not be less than ~~900 mm (3 ft).~~ the following. The diagonal clearance in the transition zone between vertical and horizontal clearances shall be not less than the vertical clearance requirement.

	Catwalks and other surfaces upon which personnel walk	Other portions of such installations
Vertical	3.4 m (11.0 ft)	1.7 m (5.5 ft)
Horizontal	1.5 m (5.0 ft)	1.5 m (5.0 ft)

(~~C~~ B) Horizontal Clearances from Buildings. Clearances shall not be less than ~~900 mm (3 ft)~~ 1.5 m (5.0 ft).

Substantiation: Exceptions 2, 3, and 4 apply only to service drops, which are covered in 230.24 and should not be duplicated here. Having the duplicate here causes confusion, in that some think that ordinary secondary wires or cable passing by a building can have the lower clearances.

I have also proposed adding language relative to final sag at this location similar to that recommended in separate proposals for 225.18 and 230.24(B). Wires must be installed high enough at installation to allow the required clearances to be met under all conditions of expected loading. The effect of both inelastic deformation and elastic deformation must be considered.

The remainder of this proposal is to harmonize the NEC clearance values with those of the NESC.

As a part of my NESC Clearances Subcommittee work, I led the review of electrical accidents relating to construction and maintenance of buildings and other installations adjacent to energized power lines in the 1970s and again in the 1980s. In each case, we had a solid 10 years of accident data gathered from state public service commissions and electric utilities across the nation, with the outlying and overlapping information spanning approximately 24 years. The review was performed by a special task force of utility engineers, consulting engineers, and public service commission engineers familiar with both building construction and maintenance and utility line construction.

This work was done as a part of a complete coordination of NESC line clearances to assure that appropriate amounts of clearance were required in each type of area. Several NESC clearances to buildings and other installations were adjusted at that time to match the accident data. The history of these changes is written up in the NESC Handbook at the discussion of Rule 234C. The basis for the 1990 and later NESC clearances, including the electrical and mechanical components of clearance and the dimensions of expected conflicting activity, can be found in Appendix A of the NESC.

The above proposals are made to adjust NEC clearances to match the accident data that was available to us and assure that appropriate clearances are required by the NEC, based upon both the expected activity in the area over which or beside which the conductor exists and the relative voltage of the conductor.

The values that are not adjusted either match or exceed those required by the NESC and are not proposed to be changed. The values for portions of signs, etc., upon which personnel walk are new to the NEC. The changes in other values are necessary to limit contact by those working or playing on the surfaces of the buildings, signs, etc., as applicable.

I am a licensed Professional Engineer with over 400 electric and communication utilities and large industrial complexes as clients. I am a member of NFPA, IEEE, and IAEI. I have used both the National Electrical Code and the National Electrical Safety Code in my work since 1964. I have been a member of NESC subcommittees since 1971 and have served several times over the years on NESC/NEC coordination task forces. I have also been involved in over 600 accident investigation and litigation assignments over the years. The above proposal is made to (a) improve safety and (b) harmonize certain requirements of the NEC with those of the NESC to limit the opportunity for confusion.

Panel Meeting Action: Reject

Panel Statement: The submitter has submitted a proposal whereby the only calculation formula is defined in a different ANSI Standard, the National Electrical Safety Code. This additional standard is not uniformly adopted and it would be impossible for local AHJs to enforce this requirement and installers to comply with it. Article 225 applies to outside feeders and branch circuits, both are clearly premises wiring systems and are on the customer side of the "Service Point," and these particular installations have nothing to do with service drops at the interface of residential driveways and streets as referenced by the submitter. In addition these conductors have to have properly sized short circuit, ground fault and overload protection at their point of supply and thus are not as susceptible to personnel hazard as utility supply conductors would be. The submitter has not defined any documented problems with the existing requirements.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-33 Log #4893 NEC-P04 **Final Action: Reject**

(225.21)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal with respect to "agreeing" with the submitter, yet providing no specific reason for the panel action.

This action will be considered by the panel as a public comment.

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services

Recommendation: Revise text as follows:

~~225.31 Multiconductor Cables on Exterior Surfaces of Buildings. Supports for multiconductor cables on exterior surfaces of buildings shall be as provided in 230.51.~~ <u>225.21 Support of Multiconductor Cables and Raceways. Multiconductor cables and raceways mounted on or attached to the exterior surface of a building or structure shall be supported under the conditions described in their respective articles and sections.</u>

Substantiation: Branch circuits and feeders located in areas covered by the scope of article 225 may be installed using any of the wiring methods appropriate for the location. These wiring methods include both cables and raceways. The revised text addresses both cables and raceways, as well as buildings and structures.

Panel Meeting Action: Reject

Panel Statement: The panel agrees that all required information is not in Chapter 3.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-34 Log #3703 NEC-P04 **Final Action: Accept**

(225.22)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise 225.22 as follows:

225.22 Raceways on Exterior Surfaces of Buildings or Other Structures.

Raceways on exteriors of buildings or other structures shall be arranged to drain and shall be ~~raintight~~ <u>suitable for use in wet locations</u>.

Substantiation: Acceptance of this proposal would correlate with the Panel's action on 230.53 during the 2008 NEC cycle. With respect to the raceways specified in the wiring methods in 225.10, the individual articles identify such raceways for their suitability for use in "wet locations." The word "raintight" in 225.22 is overridden, or introduces confusion as to which is the true requirement.

The definition of "raceway" in Article 100 does not include fittings. Section 314.15(A) requires that "... fittings installed in wet locations shall be listed for use in wet locations," not "raintight". The definition of "raintight" in Article 100 contains unenforceable language "...will not result in entrance of water under specified test conditions" verifiable only for listed raceways. Raceways suitable for use in wet locations are listed for use in wet locations, not "raintight".

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-35 Log #307 NEC-P04 **Final Action: Accept**

(225.27 (New))

Submitter: Joel A. Rencsok, Scottsdale, AZ

Recommendation: Add a new section to Article 225 which states:

225.X Raceway Seal. Where a feeder raceway enters a building or structure from an underground distribution system, it shall be sealed in accordance with 300.5(G). Spare or unused raceways shall also be sealed. Sealants shall be identified for use with the cable insulation, shield or other components.

Substantiation: Feeders entering buildings or other structures are no different than services. The requirements should be the same. See NEC 230.8.

I have provided a few photos of what can happen when an underground metal mole damaged a feeder trying to install a cable for digital cable. The sustaining arc generated hydrogen gas and the 600-ampere fuses did not blow.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

SIGMUND, J.: I am voting against the panel action to accept. In industrial locations, where conditions of maintenance and supervision would preclude unintended underground objects entering electrical equipment, an exception should be included stating that for industrial locations, where conditions of maintenance and supervision ensure that only qualified persons will be maintaining and installing this equipment, the requirement to seal all underground conduits does not apply.

4-36 Log #4 NEC-P04 **Final Action: Accept**

(225.30 (New))

NOTE: This proposal appeared as Comment 4-12 on Proposal 4-16 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 4-16 was:

Revise the text in the main paragraph of 225.30 as follows:

~~Where more than one building or other structure is on the same property and under single management, each additional building or other structure that is served by a branch circuit or feeder on the load side of the service disconnecting means shall be supplied by only one feeder or branch circuit.~~ <u>A building or other structure shall be permitted to be supplied by one set of feeder conductors or by one set of branch circuit conductors</u> unless <u>otherwise</u> permitted in 225.30(A) through (E). For the purpose of this section, a multiwire branch circuit shall be considered a single circuit. <u>Feeders or branch circuits shall be permitted to run from one building or other structure to another building or other structure where the buildings or other structures are on the same property and under single management.</u>

Submitter: Henry A. Jenkins, Wake County, Inspections Development / Rep. N.C. Ellis Cannady Chapter of I.A.E.I

Recommendation: The Panel should have Accepted in Principle. We suggest the addition of a new second paragraph to read as follows:

"Where a branch circuit or feeder originates in these additional buildings or other structures, only one feeder circuit shall be permitted to supply power back to the original building or structure, unless permitted in 225.30(A) through (E)."

Insert it between the existing first sentence and the last sentence. Making the existing sentence into a separate third paragraph. The new text to read as follows:

225.30 Number of Supplies. Where more than one building or other structure is on the same property and under single management, each additional building or other structure that is served by a branch circuit or feeder on the load side of the service disconnecting means shall be supplied by only one feeder or branch circuit unless permitted in 225.30(A) through (E).

<u>Where a branch circuit or feeder originates in these additional buildings or other structures, only one feeder or branch circuit shall be permitted to supply power back to the original building or structure, unless permitted in 225.30(A) through (E).</u>

Substantiation: The existing text only covers one feeder or branch circuit to supplying an additional building or structure where there is more than one building on the same property and under single management. The text does not address bringing more than one feeder or branch circuit from one of these peripheral buildings back to the original building. The present text would permit an unlimited number of feeders or branch circuits to be brought back to the original building. For example, a generator could provide power for an emergency branch circuit panel in building No. 2 and any number of branch circuits could be fed from that emergency panel back to the original building to supply any number of emergency loads. The same would hold true for a feeder distribution panel.
Panel Meeting Action: Accept
Panel Statement: The panel recognizes that the new text is to be inserted between the first sentence and the last sentence. The result will be that the last sentence will become a third paragraph.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-37 Log #5 NEC-P04 **Final Action: Accept**
(225.30 (New))

NOTE: This proposal appeared as Comment 4-13 on Proposal 4-16 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 4-16 was:
Revise the text in the main paragraph of 225.30 as follows:
~~Where more than one building or other structure is on the same property and under single management, each additional building or other structure that is served by a branch circuit or feeder on the load side of the service disconnecting means shall be supplied by only one feeder or branch circuit.~~ <u>A building or other structure shall be permitted to be supplied by one set of feeder conductors or by one set of branch circuit conductors</u> unless <u>otherwise</u> permitted in 225.30(A) through (E). For the purpose of this section, a multiwire branch circuit shall be considered a single circuit. <u>Feeders or branch circuits shall be permitted to run from one building or other structure to another building or other structure where the buildings or other structures are on the same property and under single management.</u>
Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Panel should have Accepted in Principle in Part. We suggest the adding of a new second paragraph to read as follows:
"Where a branch circuit or feeder originates in these additional buildings or other structures, only one feeder circuit shall be permitted to supply power back to the original building or structure, unless permitted in 225.30(A) through (E)." Insert it between the existing first sentence and the last sentence making the existing sentence into a separate third paragraph. The new text to read as follows:
225.30 Number of Supplies. Where more than one building or other structure is on the same property and under single management, each additional building or other structure that is served by a branch circuit or feeder on the load side of the service disconnecting means shall be supplied by only one feeder or branch circuit unless permitted in 225.30(A) through (E). <u>Where a branch circuit or feeder originates in these additional buildings or other structures, only one feeder or branch circuit shall be permitted to supply power back to the original building or structure, unless permitted in 225.30(A) through (E).</u>
Substantiation: The existing text only covers one feeder or branch circuit to supplying an additional building or structure where there is more than one building on the same property and under single management. The text does not address bringing more than one feeder or branch circuit from one of these peripheral buildings back to the original building. The present text would permit an unlimited number of feeders or branch circuits to be brought back to the original building.
For example, a generator could provide power for an emergency branch circuit panel in Building No. 2 and any number of branch circuits could be fed from that emergency panel back to the original building to supply any number of emergency loads. The same would hold true for a feeder distribution panel.
Panel Meeting Action: Accept
Panel Statement: See the panel statement on Proposal 4-36.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-38 Log #3753 NEC-P04 **Final Action: Accept in Principle**
(225, Part II and 225.30)

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise the title of Part II to Article 225 to read as follows:
II. ~~More than One Building or Other Structure~~ <u>Buildings or Other Supplied by a Feeder(s) or Branch Circuit(s)</u>
In addition, revise the text of 225.30 to read as shown:
225.30 Number of Supplies. ~~Where more than one~~ <u>A</u> building or other structure ~~is on the same property and under single management, each additional building or other structure~~ that is served by a branch circuit or feeder on the load side of ~~the~~ <u>a</u> service disconnecting means shall be supplied by only one feeder or branch circuit unless permitted in 225.30(A) through (E). For the purpose of this section, a multiwire branch circuit shall be considered a single circuit.
Substantiation: The overall intent of Part II of Article 225 needs to be clarified. The present wording is leading to a significant amount of time being spent arguing over whether or not a building is supplied from another building or from a structure or from something else. It would appear that the ultimate intent of these provisions in Article 225 is to require that we have appropriate disconnecting means at any building or structure that is supplied by a branch circuit or feeder. If that is the case, why not simply revise the language to make that clear.
For example, take a building that has the service disconnect located away from the building by some distance (i.e. determined by the AHJ to not be at the building itself). The conductors from the service disconnect to the building are an outside feeder. We would expect that the provisions of Part II apply to that feeder when it gets to the building.
The problem is with the present wording that says "each additional building or structure". If the service disconnect is a pad mounted single switchboard section, the only way you can argue that Part II of 225 applies is to argue that the switchboard is a "structure". I believe that it only adds confusion to say that a piece of electrical equipment is a structure.
The proposed revision to both the Part II title and to 225.30 would simply the text to simply say that if you have a building supplied by a feeder or branch circuit, you have to comply with Part II. Note that the proposed title for Part II is identical to the title used by CMP 5 for 250.32. The use of the same terminology in both parts of the code would greatly benefit users in applying the proper rules.
The suggested revision to 225.30 that changes "…of the service disconnecting…" to …of a service disconnecting… is to simply recognize that there may be more than one service disconnecting means on the premises.
Panel Meeting Action: Accept in Principle
Revise the title as follows: Buildings or Other Structures Supplied by a Feeder(s) or Branch Circuit(s).
The panel accepts the changes to the first sentence of Section 225.30.
Panel Statement: The panel accepted in principle the title change but revised the wording. The panel accepted the remainder of the proposal.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-39 Log #3894 NEC-P04 **Final Action: Reject**
(225.30(F))

Submitter: Kris Dobler, E Light Electric Services
Recommendation: Add new text as follows:
<u>(F) Modular temporary school rooms or offices that consist of a single disconnecting means for each module shall be permitted to be served by a separate feeder for each module. The documented switching procedures required in section (E) shall apply when two or modules are combined to make a single structure.</u>
Substantiation: Many schools and construction sites are now using modular school and office buildings for temporary classroom and office space. These modules often can be combined to make large office or classroom space. Each module typically comes with a separate disconnecting means because the manufacturer does not know how they will combined at the time of manufacture. The current requirements of the NEC often times require the installer to remove the single disconnect or make the installation of multiple modules work. This change would allow multiple feeds, one to each module, for a temporary office or classroom were multiple modules are installed without decreasing safety or increasing cost to the customer.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any technical or factual data to support the requested reduction in safety requirements. The concerns expressed by the submitter are really design and installation concerns and these issues are no different when feeders are the source of supply than they are if a service is the source of supply.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-40 Log #664 NEC-P04 **Final Action: Reject**
(225.32)

Submitter: Joe Penachio, Joe Penachio Electrician
Recommendation: Revise text to read as follows:
Location. The disconnecting means shall be installed either inside or outside of the building or structure served or where the <u>raceway, cable or</u> conductors pass through the building or structure. The disconnecting means shall be at a readily accessible location nearest the point of entrance of the <u>raceway, cable or</u> conductors. For the purpose of this section, the requirements in 230.6 shall be utilized.
Substantiation: This is a companion proposal to a proposal to 230.70(A)(1) submitted in June 2008.

As stated, the nearest point of entrance of these conductors is where the conductors exit the raceway or cable. A legal argument can be made that a disconnect could be installed 20, 30, or even 50 ft inside a building or structure because it would still be installed at the nearest point of entrance of the conductors as stated.

Adding the wording "raceway, cable, or" ahead of the word "conductors" clarifies the code's intent that the disconnect be at the nearest point of entrance to the building or structure.

Panel Meeting Action: Reject

Panel Statement: The existing language mandates what the submitter is requesting. The term conductors is used and this generic term applies to all conductors entering a building or structure regardless of the wiring method that has been selected to contain the conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-41 Log #4139 NEC-P04 **Final Action: Reject**

(225.32)

Submitter: Larry LeVoir, City of Irvine

Recommendation: Add new text to read as follows:

<u>Where the disconnecting means is located outside the building and is within sight of the building, an additional disconnecting means shall not be required where conductors enter the building.</u>

Substantiation: This addition would permit the disconnect to be located up to fifty feet away from the building. Under current wording, if the disconnect is located outside and not mounted on the building, then the rules in Article 225 would require an additional disconnecting means inside the building where the conductors enter. This would seem needlessly restrictive in my opinion. This proposal also parallels the existing requirements in 700.12(B)(6), 701.11(B)(5), and 702.11 which allow the disconnecting means for a feeder to be remote from the building.

Panel Meeting Action: Reject

Panel Statement: Over the past several code cycles, CMP 4 has had to grapple with this issue of what distance from a building or structure is a safe distance for locating a disconnecting means whether it be for service conductors or feeder conductors and no agreeable distance has been found. The submitter has not presented and documented technical rationale for changing this opinion.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-42 Log #594 NEC-P04 **Final Action: Reject**

(225.32, FPN (New))

Submitter: Paul Guidry, Fluor Enterprises, Inc.

Recommendation: Add the following FPN under main paragraph:

<u>FPN: For corresponding grounding requirements, see 250.32(D).</u>

Substantiation: It's been my experience that 250.32(D) grounding requirements are missed often. Adding this FPN may aid the user by alerting them to the fact that there is more to consider when utilizing 225.32.

Panel Meeting Action: Reject

Panel Statement: Section 225.2 and its table already provide a generic reference to Article 250. Section 225.32 provides requirements for the location of a disconnecting means and would not be an appropriate area to reference grounding and bonding requirements.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-43 Log #345 NEC-P04 **Final Action: Accept**

(225.33(A))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise text to read as follows:

Change "per" to "for each".

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-44 Log #2528 NEC-P04 **Final Action: Reject**

(225.34(B))

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Revise text to read as follows:

(B) Additional Disconnecting Means. The one or more additional disconnecting means for fire pumps or for <u>the</u> emergency <u>or</u> legally required ~~or optional standby~~ system permitted by 225.30 shall be installed sufficiently remote from the one to six disconnecting means for normal supply to minimize the possibility of simultaneous interruption of supply.

Substantiation: For the purpose of "locating" the disconnecting means for "optional standby systems" **remote from other disconnecting means**, the treatment of optional standby systems as though they were critical loads to be maintained in the ON condition in all possible cases is unnecessary. In fact, safety would be INCREASED if the disconnecting means for "optional loads" was grouped with the other "normal load" disconnecting means where fire incidences are concerned. Electrical feeders (or services) that do NOT supply life safety equipment or other legally required loads should be capable of being quickly de-energized during emergency events by locating all of the disconnecting means in close proximity. Added words are for grammatical accuracy.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented any technical rationale to support his assumption that locating the disconnects adjacent to one another enhances safety. Even though the systems he references are not legally required, these optional systems could provide assistance to building occupants or responding emergency personnel. There are requirements for proper labeling of these disconnects as to where other disconnects are located this should provide the additional safety the submitter has mentioned.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-45 Log #3282 NEC-P04 **Final Action: Reject**

(225.34(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete and substitute:

The supply conductors and disconnecting means for circuits permitted in 225.30(A) for fire pumps, emergency systems, and legally required or optional standby systems shall be installed remote from all other supply systems to minimize the likelihood of an occurrence in one system affecting the supply of another system.

Substantiation: Edit. the supply wiring system, including supply conductors, not just disconnecting means should be separated for reliability. "Sufficiently" is subjective and a term to be avoided per the Style Manual. The panel statement for Proposal 4-21 (Log 1103) in the 2007 ROP indicated disconnects for these loads (systems) must be located remote from ANY other disconnects.

Panel Meeting Action: Reject

Panel Statement: The purpose of this requirement is to prevent accidental operation of the switches. Separation of circuits is adequately covered in 700 and 701.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-46 Log #4591 NEC-P04 **Final Action: Reject**

(225.36)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Revise to read as follows:

The disconnecting means specified in 225.31 shall be comprised of a circuit breaker, molded case switch, or a general use switch. Where applied in accordance with 250.32(B) Exception, the disconnecting means shall be suitable for use as service equipment.

Substantiation: The suitability for use as service equipment means it is capable of providing for regrounding of the neutral supply conductor. This is only permitted in accordance with the exception, and in other applications it is unnecessary. The syntax of this proposal makes it possible to leave the wording of the exception unchanged.

Panel Meeting Action: Reject

Panel Statement: There are more requirements for a device to be suitable for service use, including larger spacing. The submitter has not made it clear as to his proposed changes in accordance with Section 4.3.3 content of proposals.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-47 Log #4706 NEC-P04 **Final Action: Reject**

(225.36, FPN (New))

Submitter: Clyde V. Carl, North Carolina Dept. of Administration/State Construction Office

Recommendation: Add new text as follows:

<u>FPN: Refer to UL 869A, *Reference Standard for Service Equipment*, fourth edition, for the criteria that determines a disconnecting means to be "Suitable for Service Equipment."</u>

Substantiation: Common misunderstandings are that service entrance equipment is manufactured with special bracing and that breakers for service entrance equipment are especially listed for use in service entrance equipment. In UL 869A, *Reference Standard for Service Equipment*, fourth edition, one learns in Section 14.2, <u>Insulated neutral</u>, Paragraph 14.2.1, that, "Equipment having a neutral insulated from the enclosure, intended for use as service equipment, and that can accommodate not more than six main disconnecting means shall be marked "Suitable for use as service equipment."

Panel Meeting Action: Reject

Panel Statement: Equipment that is suitable for use as service equipment is investigated and marked accordingly as part of the listing. A user does not need to reference UL 869A. If the equipment is not marked "suitable for use as service equipment" or "service equipment" it cannot be used as such.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-48 Log #1869 NEC-P04 **Final Action: Reject**
(225.36 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise exception: For garages and ~~outbuildings on residential property~~ accessory buildings or structures for a dwelling unit(s) snap switches ~~or sets~~ of ~~3-way or 4-way snap switches~~ shall be permitted to be the disconnecting means provided they comply with 404.14. Such switches installed in the supply circuit from its origin to and including the disconnecting switch for the building or structure shall have an ampere rating not less than the circuit rating.
Substantiation: The provision should cover buildings and structures not deemed buildings. "Residential" may be perceived as not including dwellings on a farm. "Snap switches" covers all types and referencing 3-way and 4-way types is superfluous. A snap switch used as the main building or structure disconnecting means should have a rating not less than the supply circuit since the calculated load on a va/sq. ft. or per outlet may not require such rating but the load capability of the circuit could be equal to its rating.
Panel Meeting Action: Reject
Panel Statement: The reference to 3-way and 4-way switches should be retained. These may be snap switches but the disconnecting functionality of these devices is quite different and could be interpreted as not being acceptable as a disconnect for a building.
In this proposal the submitter has made an effort to mark the additional wording and the deleted wording but there is wording in the proposal that is not identified as new or changed that is not in the Code.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal. I recommend that the submitter change the proposal to simply address potential safety concerns with allowing 3 way or four way switches to serve as a building disconnecting means and resubmit i in the comment period.

4-49 Log #2943 NEC-P04 **Final Action: Reject**
(225.36 Exception)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
225.36 Suitable for Service Equipment.
The disconnecting means specified in 225.31 shall be suitable for use as service equipment.
Exception: For garages and outbuildings on residential property, a snap switch ~~or a set of 3-way or 4-way snap switches~~ shall be permitted as the disconnecting means.
Substantiation: The portion of the exception that permits a set of 3-way or 4-way switches to be used as the disconnecting means for garages and outbuildings should be deleted as it violates the very reason behind requiring disconnecting means which is that the electrical circuit can be safely isolated while work is being performed on conductors and equipment.
Panel Meeting Action: Reject
Panel Statement: The reference to 3-way and 4-way switches should be retained. These may be snap switches but the disconnecting functionality of these devices is quite different and could be interpreted as not being acceptable as a disconnect for a building.
In this proposal the submitter has made an effort to mark the additional wording and the deleted wording but there is wording in the proposal that is not identified as new or changed that is not in the code.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 8 Negative: 2
Explanation of Negative:
ROGERS, J.: I agree with the submitter that if a switch is to be used as a disconnecting means it should truly disconnect the energized conductors.
STAFFORD, T.: This panel member determines that submitter's substantiation is correct as provided in original proposal.

4-50 Log #3396 NEC-P04 **Final Action: Reject**
(225.37)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
Section 225.37 Identification. Where a building or structure has any combination of feeders, branch circuits, service-entrance conductors, or services passing through it or supplying it, a permanent plaque or directory shall be installed at each feeder and branch disconnect location denoting all other services, feeders, or branch circuits supplying that building or structure and the area served by each. (Text to remain the same.)
Substantiation: Service-entrance conductors is one of the items to be considered that is associated with the existing text "or services". Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: These conductors are not always service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-51 Log #2946 NEC-P04 **Final Action: Reject**
(225.38 Exception)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
225.38 Disconnect Construction.
Disconnecting means shall meet the requirements of 225.38(A) through (D).
Exception: For garages and outbuildings on residential property, a snap switch ~~or a set of 3-way or 4-way snap switches~~ shall be permitted as the disconnecting means.
Substantiation: The portion of the exception that permits a set of 3-way or 4-way switches to be used as the disconnecting means for garages and outbuildings should be deleted as it violates the very reason behind requiring disconnecting means which is that the electrical circuit can be safely isolated while work is being performed on conductors and equipment.
Panel Meeting Action: Reject
Panel Statement: The reference to 3-way and 4-way switches should be retained. These may be snap switches but the disconnecting functionality of these devices is quite different and could be interpreted as not being acceptable as a disconnect for a building.
In this proposal the submitter has made an effort to mark the additional wording and the deleted wording but there is wording in the proposal that is not identified as new or changed that is not in the code.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 8 Negative: 2
Explanation of Negative:
ROGERS, J.: I agree with the submitter that if a switch is to be used as a disconnecting means it should truly disconnect the energized conductors.
STAFFORD, T.: This panel member determines that submitter's substantiation is correct as provided in original proposal.

4-52 Log #1770 NEC-P04 **Final Action: Reject**
(225.39(A), (B), and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (A) ONE CIRCUIT INSTALLATION. For installations ~~to supply only limited loads~~ consisting of a single branch circuit, the feeder and branch circuit disconnecting means shall have a rating not less than 15 amperes.

(B) TWO CIRCUIT INSTALLATION. For installations consisting of ~~not more than~~ two 2-wire circuits or a 2-wire feeder ~~branch circuit~~ disconnecting means shall have a rating not less than 30 amperes and not less than the calculated load. The disconnecting means for a feeder supplying two multiwire branch circuits or two three-phase branch circuits shall have a rating not less than 30 amperes and not less than the calculated load.

(D) For all other installations the branch circuit and feeder disconnecting means shall have a rating not less than the calculated load ~~60 amperes.~~
Substantiation: In (A), the feeder disconnecting means should be included in the 15 ampere minimum rating. A 15 ampere circuit supplying a 15 ampere circuit breaker or fused switch is a feeder by definition.

In (B), the phrase "not more than two 2-wire circuits" includes "one" branch circuit, which is covered by (A). Two 2-wire 15 ampere branch circuits supplied by a 15 ampere 3-wire circuit (feeder) does not warrant a 30 ampere feeder disconnecting means or a 30 ampere branch circuit disconnecting means, and where a circuit breaker is used as the disconnecting means does not warrant a 30 ampere rating for a feeder rated 15 or 20 amperes.

In (D), "all other installations" includes two multiwire branch circuits or two 3-phase branch circuits, which if rated 15 amperes requires a 60 ampere disconnect which is excessive and not required for safety.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any technical data to support the recommended changes he has presented. There is no reason to limit Part B to buildings with 2-wire feeders. The existing language allows 1 or 2 branch circuits to be installed for single circuits larger than specified in Part A and anything other than two 2-wire circuits is intended to require a minimum rating of 60 amperes for the disconnecting means.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-53 Log #3557 NEC-P04 **Final Action: Reject**
(225.41)

Submitter: James T. Dollard, Jr., IBEW Local 98
Recommendation: Add new text to read as follows:
225.41 Dwelling Unit Surge Protection.
(A) Surge Protective Device. All dwelling units shall be provided with a surge protective device (SPD) installed in accordance with Article 285.
(B) Location. The surge protective device shall be an integral part of the service disconnecting means or shall be located immediately adjacent thereto.
(C) Type. The surge protective device shall be a Type 1 or Type 2 SPD.
(D) Replacement. Where equipment is upgraded, all of the requirements of this section shall apply.
Substantiation: This proposed requirement is submitted for consideration by the Technical Committee for the sole purpose of personnel safety. The NEC requires GFCI and AFCI protective devices throughout dwelling units. Additionally, 120-smoke alarms are required by most local building codes in all new dwelling units. In essence we have mandated electronic based protection, designed to prevent shock, fire and to alarm residents in the event of a fire. These devices have all proven that when installed and maintained properly, they will and have saved lives. This proposal seeks a level of protection for these life saving devices as well as general surge protection throughout the home.

All GFCI's, AFCI's and smoke alarms may be damaged when a surge occurs due to lighting or other sources. In many cases these devices can be damaged and rendered inoperable by a surge.

It is practical to require a "whole house" SPD to provide a general level of protection. Home owners regularly buy and use Type 3 (point of utilization) SPD's which are cord and plug connected to protect computers, plasma TV's and other electronic equipment. However, in almost all new installations as well as upgrades, no consideration is given to providing a general level of protection to the "whole house."

Typical homeowners have no problem buying multiple Type 3 (point of utilization) SPD's to protect equipment for entertainment purposes, the additional cost of a Type 1 or Type 2 SPD for the purpose of personnel safety will not represent a financial burden.

First level subdivision (D) is included to require that when an upgrade occurs, an SPD is to be installed. Residents of existing dwelling units deserve the same level of protection as those in new homes.

Note that a sister proposal has been submitted as a new 230.67.
Panel Meeting Action: Reject
Panel Statement: The submitter has not submitted any technical data that supports the statement relative to the installation of SPDs saving lives. These devices may protect some electronic equipment but there is no submitted documentation relative to smoke detector failures due to surges with or without SPDs. In addition, the proposal as written requires these devices as a part of a service installation and Article 225 does not address service installations.

This is not an appropriate item for Article 225, which covers outside branch circuits and feeders.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:

STAFFORD, T.: This panel member determines that submitter's substantiation is correct as provided in original proposal.

4-54 Log #346 NEC-P04 **Final Action: Accept**
(225.60(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-55 Log #347 NEC-P04 **Final Action: Accept**
(225.61(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

ARTICLE 230 — SERVICES

4-56 Log #3368 NEC-P04 **Final Action: Reject**
(230.1)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

230.1 Scope. This article covers service-entrance conductors and equipment for control and protection of services and their installation requirements.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Article 230 still covers all service conductors that are

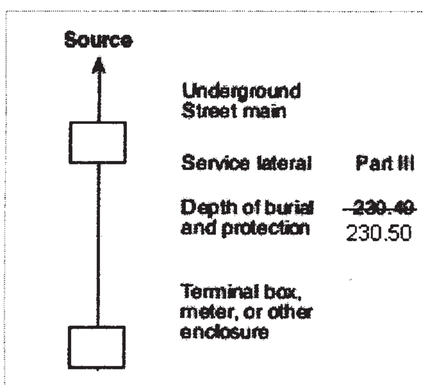
installed on the customer side of the service point, not just service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-57 Log #2141 NEC-P04 **Final Action: Accept**
(Figure 230.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: William Svensson, National Fuel Gas
Recommendation: Revise text as follows:
~~Source~~ Serving Utility
The word "Source" near the top of Figure 230.1 Services is incorrect, it should be deleted and replaced with the words "Serving Utility".
Substantiation: The use of the word "Source" is not defined, whereas the "serving utility" is contained in the definition of "Service" in Article 100.
By definition, the "Service" is supplied only from the "Serving Utility".
This correction will help to eliminate confusion and misapplication of Article 230 to Article 215. This correction will also help to remove confusion of when to apply 250.24 or 250.30, especially with the installation of distributed generation systems.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-58 Log #3687 NEC-P04 **Final Action: Accept in Principle**
(Figure 230.1)

Submitter: Thomas A. Domitrovich, Eaton Corp.
Recommendation: Replace "230.49" with "230.50" in Figure 230.1.



Substantiation: This figure references section 230.49 which previously, as per the 2005 NEC, was entitled "Protection Against Physical Damage - Underground". This section has been moved into section 230.50, "Protection Against Physical Damage". Figure 230.1 should accurately reference the current section.
Panel Meeting Action: Accept in Principle
Replace "230.49" with "230.32" in Figure 230.1.
Panel Statement: The correct reference is 230.32 under part III of Article 230.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-59 Log #2052 NEC-P04 **Final Action: Reject**
(230.2)

Submitter: Joseph Amato, Delaware County Code Compliance
Recommendation: Revise text to read as follows:
For the purpose of 230.2, Exception No. 2. only, underground sets of conductors, ~~1/0 AWG and larger,~~ running to the same location and connected together at their supply end but not connected together at their load end shall be considered to be supplying one service.
Substantiation: My thought is 1.0 or larger is intended for service laterals only. The way it is worded in 230.2 in the same paragraph that refers to 230.40, Exception No. 2 confuses people. It sounds like even underground service conductors have to be 1/0 or larger. Article 230.42 addresses size of service conductors. I don't think their size should be any different if underground, unless paralleled (that is addressed in 310.4).
Panel Meeting Action: Reject
Panel Statement: The original language for requiring 1/0 as a minimum size appeared in the 1978 NEC. Research that the panel performed at that time utilized that size based on a combination of a minimum physical size, fault currents at the service disconnecting means, and industry practice. The submitter has not presented any technical data for reducing the minimum size of the conductors when utilizing Section 230.40 Exception No. 2 for multiple sets of service conductors from one lateral. When using this allowance the conductors must be a minimum of 1/0. These conductors are not parallel conductors since they are not connected at the load end.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-60 Log #3397 NEC-P04 **Final Action: Reject**
(230.2)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
Section 230.2 Number of Services. A Building or other structure served shall be supplied by only one service unless permitted in 230.2(A) through (D). For the purpose of 230.40, Exception No. 2 only, underground sets of service-entrance conductors, 1/0 AWG and larger, running to the same location and connected together at their supply end but not connected together at their load end shall be considered to be supplying one service. (Text to remain the same.)
Substantiation: Service-entrance conductors are what are considered for the underground sets. Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: These conductors are not always service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-61 Log #4408 NEC-P04 **Final Action: Reject**
(230.2)

Submitter: Dean Hunter, Hunter Electric
Recommendation: Revise text as follows:
230.2 Number of Services.
(C) Capacity Requirements. Additional services shall be permitted under any of the following conditions:
(1) Where the capacity requirements are calculated load is in excess of 2000 amperes at a supply voltage of 600 volts or less
Substantiation: Enforcement of the term "capacity" is an enforcement challenge. Some inspectors believe that if the existing service is rated 1200 amperes at 480/277 an additional 800 amp 480/277 volt service can be installed using this allowance regardless of the demand on the original service. Does "capacity" mean the actual electrical demand of the facility or the amp rating of the service disconnect switch(es)?
Panel Meeting Action: Reject

Panel Statement: The submitter is incorrect in the assumption that the existing language is not clear. The only way to determine "capacity requirements" is to calculate the loads to be supplied by the service.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-62 Log #1692 NEC-P04 **Final Action: Reject**
(230.2(C)(2)(1))

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise text to read as follows:
230.2 Number of Services.
(C) Capacity Requirements. Additional services shall be permitted under any of the following:
(1) Where the ~~capacity requirements are~~ numerical sum of the service mains will be at least ~~in excess of~~ 2000 amperes at a supply voltage of 600 volts or less.
Substantiation: This proposal is a clarification of the requirement in 230.2(C)(1) that the total sum of the service mains, after an additional service is installed for the building or structure, will be more than 2000 amperes at 600 volts or less. Some jurisdictions require the existing load plus the additional load to be calculated and exceed 2000 amperes, before an additional service is permitted. This clarification will make 230.2(C)(1) easier to understand and to apply correctly.
Panel Meeting Action: Reject
Panel Statement: The panel agrees that the requirement is clear as written. The submitter is incorrect in the use of the allowance for because use of this requirement is not simply based on the additive sum of the service disconnecting means, it is based on capacity requirements due to the load on the service.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, the panel statement should be revised by changing the second sentence to read as follows: "The submitter is incorrect in his assertion that this allowance should be based on over-current device ratings rather than calculated loads. This is well defined in existing Sections 230.79 and 230.90."

4-63 Log #3376 NEC-P04 **Final Action: Reject**
(230.3)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.3 One building or Other Structure Not to be Supplied Through Another. Service-entrance conductors supplying a building or other structure shall not pass through the interior of another building or other structure.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: These conductors are not always service entrance-conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-64 Log #3144 NEC-P04 **Final Action: Reject**
(230.6)

Submitter: Timothy M. Croushore, Allegheny Power
Recommendation: Add a new list item (5) and (6) as shown below to 230.6
230.6 Conductors Considered Outside the Building.
Conductors shall be considered outside of a building or other structure under any of the following conditions:
(1) Where installed under not less than 50 mm (2 in.) of concrete beneath a building or other structure
(2) Where installed within a building or other structure in a raceway that is encased in concrete or brick not less than 50 mm (2 in.) thick
(3) Where installed in any vault that meets the construction requirements of Article 450, Part III
(4) Where installed in conduit and under not less than 450 mm (18 in.) of earth beneath a building or other structure
(5) Where installed physically outside the building including attached to the wall surface on the outside of the building
(6) Where installed in overhead service masts on the outside surface of the building traveling through the eave of that building to meet the requirements of 230.24.
Substantiation: This new list item (5) clarifies that conductors installed on the outside of a building including ones that are attached to the wall surface on the outside of the building are "outside the building."
During a deposition, I had to make an argument that conductors actually installed on the wall surface outside of a building were considered as conductors installed outside of the building. It seemed common sense to me. However, the opposing discussion related to a conductor on wall whose construction was not concrete, brick or masonry. Since the first four conditions of this section are related to concrete, brick or masonry construction, was a conductor installed on an outside surface of a wall not constructed by these materials actually considered "outside the building"?
The purpose of this proposal is to clear up this issue that it does not relate to the type of wall construction and that conductors physically outside the building are considered outside the building.
The new list item (6) is necessary to discuss the standard practice of installing a service mast through the eave of a building. One could argue that penetrating the roof eave with a service mast brings the service entrance conductors inside the building at this point and therefore requiring a service disconnecting means per 230.70.
Panel Meeting Action: Reject
Panel Statement: The panel agrees that the requirement is clear as written. The panel agrees that the submitter's proposal does not add clarification to the rules with regard to the outside of the building. The conditions that the submitter has proposed are clearly outside the building.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-65 Log #2821 NEC-P04 **Final Action: Reject**
(230.6(2))

Submitter: James Harvey, University of Michigan Hospitals / Rep. Manager of Electrical Engineering
Recommendation: Add text to read as follows:
(2) Where installed within a building or other structure in a raceway in concrete or brick not less that 50 mm (2 in) thick or in rigid metal conduit that is properly supported and enclosed within a architectural enclosure having a three hour (minimum) fire smoke rating.
Substantiation: Installing concrete or brick encased raceways is very difficult, especially when these service conductors must ascend many floors into a building to reach the service entrance switch gear on an upper floor and/or on the roof. The weight, installation difficulties, and costs associated with the concrete (or brick) enclosure are often extreme.
I am reasonably sure reason for the 50 mm (2 in) of concrete (or brick) encasement was to protect the building from the energy that would be released into the building, if the service conductors were to fault on the line side of the building's service disconnect. While protecting the service cables is important, this was not the driving force for these requirements.
Panel Meeting Action: Reject
Panel Statement: The existing requirement serves to provide additional protection for the service conductor installation and not simply limit the potential of fire spread either onto or from the service conductors.

The concrete or brick is to provide physical protection. A 3-hr rated enclosure may not provide this protection.

Service-entrance conductors are subject to high arc flash energies that may burn through metallic conduit and blow through architectural treatments that provide a 3-hour fire rating (typically 2 layers of ½-inch dry wall). The masonry requirement has effectively protected buildings from service-entrance conductor failures and the resulting generation of heat and gas. The masonry requirement should remain. Designs should consider service-entrance disconnects and overcurrent devices to be located as close as practical to the entry of the service conductors into the building. Feeders extending up into the building will have overcurrent protection to protect the building from conductor failures.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-66 Log #1325 NEC-P04 **Final Action: Reject**

(230.7)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Conductors other than service conductors <u>of the same class</u> shall not be installed in the same raceway, <u>auxiliary gutter,</u> service cable, or other enclosure.

<u>*Exception: Enclosures for metering equipment.*</u>

Substantiation: Auxiliary gutters are not indicated in the definition of raceway and should be included, likewise boxes and other enclosures that are not part of the service. Service conductors include those for ac, dc, single-phase, 3-phase, 600 volts or less, over 600 volts. 300.3(1) permits ac and dc circuits in the same wiring enclosure and 490.35(B) has provisions where low-voltage and high-voltage can be in the same compartment. Metering equipment such as current transformers may have conductors installed to remote meter and this equipment doesn't meet the definition of service as it doesn't deliver energy.

Panel Meeting Action: Reject

Panel Statement: The requirement is intended to allow only service conductors in a service raceway or service cable. It has nothing to do with other enclosures.

An auxiliary gutter used for service conductors is a wiring method recognized in Section 230.43. Section 490.35 (B) does not pertain to service conductors and recognizes that wiring rated 600 Volts or less is required to be located in medium voltage equipment enclosures for control and metering such as relaying, metering, cubicle heaters, etc.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal as the section referenced does deal with raceways and auxiliary gutters could be considered raceways as the definition of raceways in Article 100 does state not limited to and includes wireways. Section 230.43 of course does recognize auxiliary gutters but the proposal needs to be more expansive in my opinion. The current code requirements do not address medium voltage just 600 volts and under and over 600 volts and the proposal should be reviewed in that manner. The submitter is correct in the necessity for some clarification on the requirements for possible separation for different classifications of service in the same raceway as 230.7 does not address that if all of the conductors are service conductors. The submitter should modify the proposal and resubmit it in the comment period.

4-67 Log #3392 NEC-P04 **Final Action: Reject**

(230.7)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.7 Other Conductors in Raceway or Cable. Conductors other than service<u>-entrance</u> conductors shall not be installed in the same service raceway or service<u>-entrance</u> cable. (Exception No. 1 and No. 2 text to remain the same.)

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.

Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: These conductors are not always service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-68 Log #3383 NEC-P04 **Final Action: Reject**

(230.9)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.9 Clearances on Buildings. Service<u>-entrance</u> conductors and final spans shall comply with 230.9(A), (B), and (C).

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.

Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: These conductors are not always service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-69 Log #2145 NEC-P04 **Final Action: Reject**
(230.9 Exception No. 3 and 225.39)

Submitter: Michael Wright, Township of Clinton
Recommendation: Add text as follows:
The ampacities of feeders shall be documented on the distribution equipment.
Substantiation: The feeder conductors could be overloaded even though none of the panels are overloaded as additional loads get added.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that the recommendation meets the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the problem that the submitter has presented is really one of proper design, installation and inspection.

4-70 Log #3433 NEC-P04 **Final Action: Reject**
(230.9(A))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.9 (A) Clearances. Service drop conductors installed in open conductors or multi-conductor cable without an overall outer jacket shall have a clearance of not less than 900 mm (3 ft) from windows that are designed to be opened, doors, porches, ladders, stairs, fire escapes, or similar locations. (Exception text to remain the same.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: These conductors are not always service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-71 Log #3394 NEC-P04 **Final Action: Reject**
(230.9(C))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.9 (C) Building Openings. Overhead service-entrance conductors shall not be installed beneath openings through which materials may be moved, such as openings in farm and commercial buildings, and shall not be installed where they obstruct entrance to these building openings.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: These conductors are not always service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-72 Log #3382 NEC-P04 **Final Action: Reject**
(230.10)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.10 Vegetation as Support. Vegetation such as trees shall not be used as support of overhead service-entrance conductors.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: These conductors are not always service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-73 Log #2340 NEC-P04 **Final Action: Accept in Principle**
(230, Part II)

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Revise Part II of Article 230 as follows: **II. ~~Overhead~~ Service-Drop Conductors.**

Substantiation: Article 100 defines "service drop" as being "overhead" so the inclusion of the word "overhead" in the title of Part II of Article 230 is redundant and unnecessary. This change provides clarity through brevity.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 4-75 to revise wording.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: See comment on 4-75.

4-74 Log #3371 NEC-P04 **Final Action: Reject**
(230, Part II)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

Article 230 Part II Overhead Service-~~Drop~~-Entrance Conductors.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: These conductors are not always service -entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-75 Log #3500 NEC-P04 **Final Action: Accept**
(230, Part II)

Submitter: James J. Rogers, Bay State Inspectional Agency

Recommendation: Revise text to read as follows:

II. Overhead Service ~~Drop~~ Conductors.

Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to Code-Making Panel 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-76 Log #317 NEC-P04 **Final Action: Accept**
(230.24)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal since the text does not comply with the NEC Style Manual requiring mandatory text and including the subject of the rules being referenced.

This action will be considered by the panel as a public comment.

Submitter: Thomas A. Rorro, Parsippany Bldg. Dept.

Recommendation: Add text to read as follows:

230.24(E) Clearance from Communication Wires and Cables. See 800.44(A)(4).

Substantiation: Service upgrades are often installed without consideration to communication lines separation requirements of 880.44.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

ROGERS, J.: The proposal as submitted is not necessary nor does it meet the requirements for proposals as it does not provide a specific requirement "see 800.44 (A)(4)" is not an enforceable requirement. There was not technical data presented for the proposal only an anecdotal statement. If this is a problem in the field the AHJ already has the ability to enforce the separation requirement using the two existing code sections.

4-77 Log #3364 NEC-P04 **Final Action: Accept in Principle**
(230.24)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.24 Clearances. Service-~~drop~~ entrance conductors shall not be readily accessible and shall comply with 230.24(A) through (D) for services not over 600 volts, nominal.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 4-78 for revised wording.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-78.

4-78 Log #3498 NEC-P04 **Final Action: Accept**
(230.24)

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Revise text to read as follows:
230.24 Clearances. Overheadservice ~~drop~~ conductors, etc.
Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to Code-Making Panel 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-79 Log #2747 NEC-P04 **Final Action: Reject**
(230.24(A) Exception No. 2)

Submitter: Allen L. Clapp, Power & Communication Utility Training Center
Recommendation: Revise text to read as follows:
Exception No. 2: Where the voltage between conductors does not exceed 300 ~~and the roof has a slope of 100 mm in 300 mm (4 in. in 12 in.) or greater~~, a reduction in clearance to 900 mm (3 ft) shall be permitted.
Substantiation: The requirement to have a roof slope exceeding a 4-inch drop in a 12-inch run is not necessary, not desirable, and not in the best overall interest of safety.

Section 230.24 already requires that service drop conductors shall not be readily accessible. As a result, service drops are only accessible to workers on the roof. By requiring a relatively steep slope, the chance that a worker on the roof may lose footing if startled by inadvertent contact with the service drop is increased.

A startle reaction may occur if the worker backs into the service drop, even though no electrical contact occurs. If the worker turns too quickly to see what he has touched, or if the worker realizes that it is a power service drop and tries to jump away too fast, the worker can lose footing and fall from the roof.

This issue was discussed in depth by NESC Subcommittee 4 on overhead clearances during the 1977 revision and again during the mid-1980s. Available accident data did not support requiring a steep roof. The consensus was reached that, should inadvertent contact with the service drop occur by a worker on the roof, it would be preferable that the worker not be on a steep roof. Thus, the NESC does not have the steep slope requirement in the comparable NESC rule.

The NEC requirement for a steep roof has caused confusion for some electrical inspectors when they observe service drops installed by utilities in accordance with NESC requirements over roofs with slopes less than 4 inches of drop in a 12-inch run.

I am a licensed Professional Engineer with over 400 electric and communication utilities and large industrial complexes as clients. I am a member of NFPA, IEEE, and IAEI. I have used both the National Electrical Code and the National Electrical Safety Code in my work since 1964. I have been a member of NESC subcommittees since 1971 and have served several times over the years on NESC/NEC coordination task forces. I have reviewed over 20 years of electrical accident data in that capacity. I have also been involved in over 600 accident investigation and litigation assignments over the years. The above proposal is made to (a) improve safety and (b) harmonize certain requirements of the NEC with those of the NESC to limit the opportunity for confusion.
Panel Meeting Action: Reject
Panel Statement: The NEC requirement is not a requirement as to how to build a roof it simply states that when these conductors are installed over a roof a reduction in the clearance distance to three feet is only allowed when the roof meets or exceeds the slope as defined. If these conductors are installed as part of the utility supply system then the NEC does not apply and the NESC distances would be utilized.

The slope of the roof referenced permits a lower clearance because pedestrian traffic is less likely on steep roofs.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-80 Log #3373 NEC-P04 **Final Action: Accept in Principle**
(230.24(A) Exception No. 3)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.24 Clearances.
(A) Above Roofs.
Exception No. 3: Where the voltage between conductors does not exceed 300, a reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.8 m (6 ft)of service-~~drop~~ entrance conductors, (The rest of the text to remain the same).
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept in Principle
Replace "service-entrance" with "overhead service".
Panel Statement: Change the term to be consistent with the panel action on Proposal 4-75. Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-75.

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-81 Log #3733 NEC-P04 **Final Action: Reject**
(230.24(A) Exception No. 3)

Submitter: Allen L. Clapp, Power & Communication Utility Training Center
Recommendation: Revise text as follows:

Exception No. 3: Where the voltage between conductors does not exceed 300, a reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.8 m (6 ft) of service-drop conductors, 1.2 m (4 ft) horizontally, pass above the roof ~~overhang~~, and (2) they are terminated at a through-the-roof raceway or approved support.

Substantiation: Delete the word *overhang*. As presently worded, the language prevents the through-the-roof mast from coming up inside the wall, since the wall itself is not overhang. This issue came up several years ago with the National Electrical Safety Code and the word *overhang* was removed. This change will match NECS language and limit confusion.

Panel Meeting Action: Reject

Panel Statement: The word overhang is needed to link and clarify the requirement since it is only applicable to the "overhanging portion of the roof".

This requirement does not address the installation of a service mast. It simply addresses the maximum distance that service drop conductors can cross the roof at a particular height to connect to the service mast. The requirement does not address whether or not the mast is in the wall. However, there are other code sections that address such an installation.

Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-82 Log #454 NEC-P04 **Final Action: Accept**
(230.24(A) Exception No. 5 (New))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Add New Exception 5 as follows:

Exception No. 5: Where the voltage between conductors does not exceed 300 and the roof area is guarded or isolated, a reduction in clearance to 900 mm (3 ft) shall be permitted.

Substantiation: This new exception is intended to correlate with allowances in the National Electrical Safety Code (NESC). Currently, there is a minor conflict with the Exceptions in the NEC and the NESC. Generally, the NESC allows the service entrance conductors to be a minimum of 3 foot above the roof if the area is guarded or inaccessible. This new exception will allow correlation between the two documents. Although the NESC allows this clearance for up to 750 volts, the proposed NEC exception is restricted to 300 volts. The requirement that the roof area be guarded or isolated will provide equivalent safety as currently allowed in Exceptions 2, 3 and 4.

Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-83 Log #2744 NEC-P04 **Final Action: Reject**
(230.24(B))

Submitter: Allen L. Clapp, Power & Communication Utility Training Center
Recommendation: Revise text to read as follows:

(B) Vertical Clearance for Service-Drop Conductors. Service-drop conductors, where not in excess of 600 volts, nominal, shall have the following minimum clearance from final grade when at maximum final sag resulting from ice loading or thermal line losses, whichever is greater:

FPN: New, unstretched wires are installed at initial sag conditions. Over time, the weight, wind, and ice loading received in service will cause inelastic (nonrecoverable) deformation (permanent stretching) in the wire. Final sag conditions occur when further inelastic deformation is reduced to a negligible amount. Maximum sag occurs when the combination of (a) elastic (recoverable) deformation due to thermal or ice loading and (b) inelastic deformation is the greatest. Rule 230A4, Rule 232A, and Appendix B of the National Electrical Safety Code ANSI C2-2007 contain information on (a) calculating the inelastic deformation due to conductor/cable weight, ice loading, and wind loading that is appropriate for various loading areas and useful in calculating maximum final sag and (b) appropriate conductor temperatures and ice loading useful in determining conditions that will produce maximum final sag, respectively.

(1) 3.0 m (10 ft) — at the electrical service entrance to buildings, also at the lowest point of the drip loop of the building electrical entrance, and above areas or sidewalks accessible only to pedestrians, measured from final grade or other accessible surface only for service-drop cables supported on and cabled together with a grounded bare messenger where the voltage does not exceed 150 volts to ground

(2) 3.7 m (12 ft) — over portions of residential property and residential driveways~~, and those commercial areas~~ where (a) such portions are not subject to truck traffic and ~~where~~ (b) the voltage does not exceed 300 volts to ground

(3) 4.5 m (15 ft) — for those areas listed in the 3.7-m (12-ft) classification where the voltage exceeds 300 volts to ground

(4) 5.5 m (18 ft) — over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, portions of driveways on residential property subject to truck traffic, and other land such as cultivated, grazing, forest, and orchard.

Substantiation: This proposal contains three types of changes. The first addresses the need to assure that the service drop cables or conductors will not sag enough after installation to produce vertical clearances less than those required by this NEC section. The second addresses the need to recognize that the front portions of most residential driveways are general-use driveways and subject to truck traffic. The third prohibits use of the reduced clearance of 12 ft for service drops to commercial buildings.

To assure that service drops are installed high enough to maintain the required clearance throughout their life, and not just at installation, consideration of sag changes due to their own weight, ice loading, and thermal loading is necessary. The National Electrical Safety Code contains appropriate information for use in calculating maximum final sags to assure that vertical clearances are met and is, therefore, a good reference.

Many portions of residential property are subject to truck traffic. In particular, the front portion of most residential driveways is subject to moving vans, delivery trucks, and ambulances. As a result of hundreds of service drops being torn down in the 1980s, the NESC raised the clearances required for service drops above driveways and limited the application of the reduced clearance of 12 ft to only those *residential* buildings where the height of the building did not allow achieving the full clearance value of 16.0 ft required by NESC Table 232-1. Some of the service-drop teardown accidents reviewed had serious safety consequences. In some cases, service drops torn down by moving vans and delivery trucks (which often exceed 12 ft in height) were touched in a damaged area by personnel trying to move them out of the way. In others, ambulances cut off the lights and power to houses to which they were making an emergency response call.

In essence, NESC Rule 234C and Table 234-1, Footnote 7 essentially limited application of the reduced clearances over driveways to those houses with so-called *hip* roofs that slope upward toward the peak on all sides; it was recognized that most owners that were spending the extra money to have a hip roof would were also spending the money to get underground service, thus reducing the number of houses with such low service drops. Although a flat-roofed house would qualify to use the footnote, few flat-roofed houses are constructed today. Most or all of the required table clearance of 16 ft can be achieved by attaching at the gable end of houses of that design. In essence, the NESC has prohibited using the reduced 12-ft clearance to through-the-roof service masts on the rear of most single-story houses, since most single story houses have a gable on each end and the peak of the gable is available to gain the extra height.

At the time of limiting the application of the reduced clearances over driveways, the members of NESC Subcommittee 4 on clearances came within one vote of prohibiting overhead service drops to houses if they could not meet the full 16-ft table clearance. The compromise was to limit application of the reduced clearances only to those buildings that were not tall enough to allow the full clearances. The subcommittee was unanimous at that time that, if this limitation did not solve the problems, we would reconsider requiring underground service for such short residences.

NESC SC4 also considered whether commercial buildings should be allowed to have reduced clearances and concluded that it would not be appropriate to allow reduced clearances for service drops to commercial buildings—the probability of access by a truck during the life of the installations was too great to allow the reduced clearances. Under the NESC, if the full table value of 16 ft cannot be met, the service drop must go underground. It is recommended that the NEC match the NESC in this regard to eliminate confusion and assure that appropriate consideration is given during building design to the need for either an underground service drop or appropriate locations for an overhead service drop and weatherhead.

The above proposal was worded in a manner to make the least changes to the existing language as practical. However, you may find that the following language may be preferable for subpart 4:

4) 5.5 m (18 ft) — over public streets, alleys, roads, parking areas, driveways (excluding portions of driveways on residential property not subject to truck traffic), and other lands (such as cultivated, grazing, forest, and orchard lands) subject to truck traffic, ~~driveways on other than residential property, and other land such as cultivated, grazing, forest, and orchard~~

I am a licensed Professional Engineer with over 400 electric and communication utilities and large industrial complexes as clients. I am a member of NFPA, IEEE, and IAEI. I have used both the National Electrical Code and the National Electrical Safety Code in my work since 1964. I have been a member of NESC subcommittees since 1971 and have served several times over the years on NESC/NEC coordination task forces. I have reviewed over 20 years of electrical accident data in that capacity. I have also been involved in over 600 accident investigation and litigation assignments over the years. The above proposal is made to (a) improve safety and (b) harmonize certain requirements of the NEC with those of the NESC to limit the opportunity for confusion.

Panel Meeting Action: Reject

Panel Statement: The submitter has submitted a proposal whereby the only calculation formula is defined in a different ANSI Standard, the National Electrical Safety Code. This additional standard is not uniformly adopted and it would be impossible for local AHJs to enforce this requirement and installers to comply with it. The submitter has not defined any documented problems with the existing requirements.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-84 Log #3499 NEC-P04 **Final Action: Accept**
(230.24(B))

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Revise text to read as follows:
230.24(B) Vertical Clearance for (Overhead) Service ~~drop~~ conductors, etc.
Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to Code-Making Panel 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term “Service Lateral”. The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-85 Log #2146 NEC-P04 **Final Action: Reject**
(230.25)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text as follows:
230.25 Abandoned services. The accessible portions of abandoned raceways, cables, conductors, and switchboards shall be removed. Where the existing service equipment is energized it shall remain.
Substantiation: Old abandoned service equipment remains with open meter sockets, panels, buses, etc., and is usually in rough shape.
Panel Meeting Action: Reject
Panel Statement: The submitter is correct that these items are sometimes left on a building and they are unsightly, however, they do not create an actual hazard and the general care and aesthetics of a building are really up to the property owner and not an enforceable code concern.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-86 Log #3369 NEC-P04 **Final Action: Accept in Principle**
(230.27)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.27 Means of Attachment. Multiconductor cables used for service-~~drops~~ entrance conductors shall be attached to buildings or other structures by fittings identified for the use with service-entrance conductors. Open conductors shall be attached to fittings identified for use with service-entrance conductors or to noncombustible, nonabsorbent insulators securely attached to the building or other structure.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
230.27 Means of Attachment. Multiconductor cables used for overhead service conductors shall be attached to buildings or other structures by fittings identified for the use with service conductors. Open conductors shall be attached to fittings identified for use with service conductors or to noncombustible, nonabsorbent insulators securely attached to the building or other structure.
Panel Statement: Change the term to be consistent with the panel action on Proposal 4-75. Not all service conductors are service entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-75.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-87 Log #2341 NEC-P04 **Final Action: Accept in Principle**
(230, Part III)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise Part III of Article 230 as follows: **III. ~~Underground~~ Service-Lateral Conductors.**
Substantiation: Article 100 defines “service lateral” as being “underground” so the inclusion of the word “underground” in the title of Part III of Article 230 is redundant and unnecessary. This change provides clarity through brevity.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 4-92.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-92.

4-88 Log #3366 NEC-P04 **Final Action: Accept in Principle**
(230.29)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.29 Supports over Buildings. Service-~~drop~~ entrance conductors passing over a roof shall be securely supported by substantial structures. Where practicable, such supports shall be independent of the building.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth is via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Accept in Principle

The panel accepts the deletion of the word "drop". The panel rejects the addition of the word "entrance".

Panel Statement: Not all service conductors are service entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-89 Log #3379 NEC-P04 **Final Action: Accept in Principle**
(230, Part III)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

Article 230 Part III Underground Service-~~Lateral~~ Entrance Conductors.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 4-92. Not all service conductors are service entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: See comment on 4-92.

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-90 Log #3350 NEC-P04 **Final Action: Reject**
(230.30)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

Service-lateral conductors shall be insulated and identified for the use.

Substantiation: Edit. Insulation type, voltage rating, ampacity, suitability for direct burial, etc., should also be required.

Panel Meeting Action: Reject

Panel Statement: The panel agrees that conductors such as THWN or THW are permitted for use in service laterals, while THHN conductors are not. Conductor uses are already specified in Article 310.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-91 Log #3367 NEC-P04 **Final Action: Accept in Principle**
(230.30)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.30 Insulation. Service-~~lateral~~ entrance conductors, underground, shall be insulated for the applied voltage. (The rest of the text to remain the same.)

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 4-93. Not all service conductors are service entrance-conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

YOUNG, J.: See comment on 4-92.

4-92 Log #3501 NEC-P04 **Final Action: Accept**
(230, Part III)

Submitter: James J. Rogers, Bay State Inspectional Agency

Recommendation: Revise text to read as follows:

III. Underground Service ~~Laterial~~ Conductors.

Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to Code-Making Panel 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term "Service Lateral". The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-93 Log #3506 NEC-P04 **Final Action: Accept in Principle**
(230.30)

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Revise text to read as follows:
230.30 ~~Insulation.~~ Installation
(A) Insulation. Underground service conductors shall be insulated for the applied voltage.
Exception: A grounded conductor shall be permitted to be uninsulated as follows:
(1) Bare copper used in a raceway.
(2) Bare copper for direct burial where bare copper is judged to be suitable for the soil conditions.
(3) Bare copper for direct burial without regard to soil conditions where part of a cable assembly identified for underground use.
(4) Aluminum or copper-clad aluminum without individual insulation or covering where part of a cable assembly identified for underground use in a raceway or for direct burial.
(B) Wiring Methods. Underground service conductors shall be installed in accordance with the applicable requirements of this code covering the type of wiring method used and shall be limited to the following methods:
(1) Type RMC conduit
(2) Type IMC conduit
(3) Type NUCC conduit
(4) Type HDPE conduit
(5) Type PVC conduit
(6) Type RTRC conduit
(7) Listed direct-burial conductors.
Substantiation: This proposal is intended to provide a definition of acceptable wiring methods to be utilized for the installation of underground service conductors. This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to CMP 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term “Service Lateral”. The member of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
230.30 ~~Insulation.~~ Installation
(A) Insulation. Underground service ~~service-lateral~~ conductors shall be insulated for the applied voltage.
Exception: A grounded conductor shall be permitted to be uninsulated as follows:
(1) Bare copper used in a raceway.
(2) Bare copper for direct burial where bare copper is judged to be suitable for the soil conditions.
(3) Bare copper for direct burial without regard to soil conditions where part of a cable assembly identified for underground use.
(4) Aluminum or copper-clad aluminum without individual insulation or covering where part of a cable assembly identified for underground use in a raceway or for direct burial.
(B) Wiring Methods. Underground service conductors shall be installed in accordance with the applicable requirements of this code covering the type of wiring method used and shall be limited to the following methods:
(1) Type RMC conduit
(2) Type IMC conduit
(3) Type NUCC conduit
(4) Type HDPE conduit
(5) Type PVC conduit
(6) Type RTRC conduit
(7) Listed direct-burial conductors.
Panel Statement: See panel action text for correct strike out and underline in Section 230.30 (A).
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-94 Log #3375 NEC-P04 **Final Action: Accept in Principle**
(230.31(A))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.31(A) Size and Rating. Service-~~lateral~~ entrance conductors shall have sufficient ampacity to carry the current for the load as calculated in accordance with Article 220 and shall have adequate mechanical strength.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept in Principle
See the panel action on Proposal 4-95.
Revise text to read as follows:
230.31 Size and Rating.
(A) General. ~~Service lateral~~ Underground service conductors shall have sufficient ampacity to carry the current for the load as calculated in accordance with Article 220 and shall have adequate mechanical strength.
Panel Statement: See the panel action on Proposal 4-95 for revised wording. Not all service conductors are service entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: See comment on 4-95.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-95 Log #3495 NEC-P04 **Final Action: Accept**
(230.31(A))

Submitter: James J. Rogers, Vineyard Haven, MA
Recommendation: Revise text to read as follows:
230.31 Size and Rating.
(A) General. ~~Service lateral~~ (Underground service) conductors shall have sufficient ampacity to carry the current for the load as calculated in accordance with Article 220 and shall have adequate mechanical strength.
Substantiation: This proposal is being submitted by a task group that has been formed by Panel Chair, Ronald Toomer, in response to instructions that were presented to CMP 4 by the Technical Correlating Committee as a result of some proposals that were submitted in the last cycle. These proposals spurred some discussion that resulted in differing opinions relative to the use of the term “Service Lateral”. The members of the task group are as follows: Larry D. Cogburn, Chair, Robert J. Deaton, James J. Rogers, John A. Sigmund, and John W. Young.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-96 Log #988 NEC-P04 **Final Action: Accept in Principle**
(230.32)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "or structures" after "building" in the second sentence.
Substantiation: Edit. Structures which are not "buildings" should be included as they are in 230.6.
Panel Meeting Action: Accept in Principle
Revise the wording as follows: Add "or other structure" after "building" in the second sentence.
Panel Statement: The panel revised the wording to be consistent with other sections of Article 230.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-97 Log #3389 NEC-P04 **Final Action: Accept in Principle**
(230.32)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.32 Protection Against Damage. Underground service-~~lateral~~ entrance conductors shall be protected against damage in accordance with 300.5. Service-~~lateral~~ entrance conductors entering a building shall be protected in accordance with 230.6 or protected by a raceway wiring method identified in 230.43.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept in Principle
The word "entrance" should not be added.
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-98 Log #3439 NEC-P04 **Final Action: Accept in Principle**
(230.33)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.33 Spliced Conductors. Service-~~lateral~~ entrance conductors shall be permitted to be spliced or tapped in accordance with 110.14, 300.5(E), 300.13, and 300.15.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept in Principle
Accept the deletion of "-lateral" and don't add the word "entrance".
Panel Statement: Not all underground service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-99 Log #2004 NEC-P04 **Final Action: Reject**
(230.34 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: SERVICE LATERAL CONDUCTORS. Service lateral conductors shall be installed in accordance with the applicable provisions of this Code and shall be limited to the following methods:
(1) Rigid metal conduit
(2) Intermediate metal conduit
(3) Electrical metallic tubing
(4) Type NUCC conduit
(5) Type HDPE conduit
(6) Rigid nonmetallic conduit
(7) Type MI cable
(8) Direct burial conductors.
Substantiation: Service lateral conductors may be installed on the load side of the service point by other than the utility. The wiring method is not specified. The panel statement for comment 4.47 in the 2007 ROP indicated the wiring method is the choice of the contractor which does not provide any guidance for the AHJ to determine the suitability of the installation.
Panel Meeting Action: Reject
Panel Statement: Service laterals are no longer addressed in Article 230. The

acceptable wiring methods for underground service conductors are listed in new Section 230.30(B) (see Proposal 4-93).
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-100 Log #2032 NEC-P04 **Final Action: Reject**
(230.35 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 230.XX SERVICE LATERAL CONDUCTORS.
Service lateral conductors shall be installed in accordance with the applicable provisions of this Code covering the type of wiring method used and shall be limited to the following methods:
(1) Rigid metal conduit
(2) Intermediate metal conduit
(3) Electrical metallic tubing
(4) Type NUCC conduit
(5) Type RTRC conduit
(6) Type HDPE conduit
(7) Rigid nonmetallic conduit
(8) Type MI cable
(9) Type IGS cable
(10) Direct-burial conductors
Substantiation: Wiring methods for service laterals are not specified. These conductors are not always installed by the serving utility, but they are covered by Part II of Article 230. Part III of Article 230 has other requirements for service laterals and wiring methods should be included.
Panel Meeting Action: Reject
Panel Statement: Service laterals are no longer addressed in Article 230. The acceptable wiring methods for underground service conductors are listed in new Section 230.30(B) (see Proposal 4-93).
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-100a Log #CP403 NEC-P04 **Final Action: Accept**
(230.40 Number of Service-Entrance Conductor Sets)

Submitter: Code-Making Panel 4,
Recommendation: Change the language in 230.40 to read as follows:
Each service drop, set of overhead service conductors, set of underground service conductors, or service lateral shall supply only one set of service-entrance conductors.
Substantiation: The panel is submitting this proposal to harmonize these definitions with the remainder of the changes made to the terms service drop and service lateral.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-101 Log #4592 NEC-P04 **Final Action: Reject**
(230.40 Exception No. 1)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following wording to the end of the existing exception: "If the number of service disconnect locations for any given classification of service does not exceed six, the requirements of 230.2(E) shall apply at each location. If the number of service disconnect locations exceeds six for any given supply classification, all service disconnect locations for all supply characteristics shall be clearly described using suitable graphics or text or both on one or more plaque(s) located in an approved, readily accessible location(s) on the building or structure served and as near as practicable to the point(s) of attachment or entry(ies) for each service drop or lateral.
Substantiation: On the literal text of the present NEC, it is permitted to group six of seven service disconnects for a seven family dwelling at one point. Then, one can run a set of service conductors around the outside of the building to a remote location and spot the seventh disconnect. In fact, the service conductors need not run outside the building; they could be run in a wall as long as there was two inches of concrete encasement.
Section 230-2 does not apply, since there is only one service. Therefore, it is not even necessary to provide a directory at either disconnect location to inform the fire service of the remote, still energized disconnect. If there is any justification for 230.2(E), and I believe there is, then surely this instance is equally compelling. This proposal addresses a critical safety concern. A ten-family apartment house might have 60 service disconnects. If there are two classes of service, there could be even more disconnects, with the total somewhat in doubt because the prior clarification has been removed.
In prior cycles there has been extensive discussion of the use of 90.4. The submitter happens to be the author of the present version of that section, and the panel should bear in mind that there are limits to the use of that section that apply in these cases. First, the authority to interpret the Code is not and never has been the authority to reinvent the Code or to remove clearly stated permissions in the Code, including 230.40 Exception No. 1. Second, the equivalent safety allowance provision is just that, an allowance. There is no way an inspector can reach the objectives of this proposal, which adds a restriction, by considering some alternate procedure to present Code wording that provides equivalent safety. On the other hand, if this proposal is accepted and proved burdensome in some particular case, then 90.4 could then be used to consider some alternative procedure.
For six code cycles, the Commonwealth of Massachusetts was unsuccessful in persuading CMP 4 that this exception should only apply by special permission. This is a compromise: Allow the exception by right, but address the most significant hazard.
Panel Meeting Action: Reject
Panel Statement: The submitter is correct in his concern for identifying placarding separate service disconnecting means. However, different language is needed to identify classification of services to harmonize with the requirements in Section 230.2(E).
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-101a Log #CP404 NEC-P04 **Final Action: Accept**
(230.40 Exception No. 2)

Submitter: Code-Making Panel 4,
Recommendation: Change the language in 230.40, Exception No. 2 to read as follows:
Where two to six service disconnecting means in separate enclosures are grouped at one location and supplying separate loads from one service drop, set of overhead service conductors, set of underground service conductors, or service lateral, one set of service-entrance conductors shall be permitted to supply each or several such service equipment enclosures.
Substantiation: The panel is submitting this proposal to harmonize these definitions with the remainder of the changes made to the terms service drop and service lateral.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-101b Log #CP405 NEC-P04 **Final Action: Accept**
(230.40 Exception No. 3)

Submitter: Code-Making Panel 4,
Recommendation: Change the language in 230.40, Exception No. 3 to read as follows:
A single-family dwelling unit and a separate structure shall be permitted to have one set of service-entrance conductors run to each from a single service drop, set of overhead service conductors, set of underground service conductors, or service lateral.
Substantiation: The panel is submitting this proposal to harmonize these definitions with the remainder of the changes made to the terms service drop and service lateral.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.

4-102 Log #1261 NEC-P04 **Final Action: Accept**
(230.40 Exception No. 3)

Submitter: Charles Eldridge, Indianapolis, IN
Recommendation: Revise text to read as follows:
A single-family dwelling unit and a separate structure(s) shall be permitted to have one set of service-entrance conductors run to each from a single service drop or lateral.
Substantiation: It has come to my attention that some inspectors are permitting only a single separate structure to be served in this manner. The intent is to permit more than one additional structure to be served. As an example, this revision will make it clear that a detached garage and a utility building could be served with separate sets of service entrance conductors.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: The proposal should be accepted in principle and the section changed to remove the word a before the word separate

4-103 Log #1693 NEC-P04 **Final Action: Reject**
(230.40 Exception No. 3)

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise 230.40 Exception No. 3 to allow up to two separate buildings or structures, in addition to the house, to be supplied by a single service drop or lateral.

230.40 Number of Service-Entrance Conductor Sets.

Exception No. 3: A single-family dwelling unit and ~~a~~ two separate buildings or structures shall be permitted to have one set of service-entrance conductors run to each from a single service drop or lateral.

Substantiation: Many single-family dwellings are located on lots that are large enough to permit two accessory buildings or structures to be located on the same property with the house. It would seem that one additional accessory building or structure [a total of two additional to the house] will not present any increased hazard for such an installation and will save the expense of a service disconnecting means being installed at the service pole or pedestal location in order to comply with the requirements of 230.40 when the third building or structure is added.

Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any technical data to support the limiting of the number of sets of additional service conductors to two. If more than one additional building is allowed to have a separate set of service conductors then there should be no limit of such installations on the same property. See the action on Proposal 4-102 for further clarification.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-104 Log #3213 NEC-P04 **Final Action: Reject**
(230.40 Exception No. 3)

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Delete all of 230.40 Exception No. 3.
Substantiation: NEC 230.40 Exception No. 3 has been misinterpreted to require that service equipment be installed at a common distribution point on a residential premises if more then two buildings are supplied, and that service equipment be installed at a common distribution point on a non-residential premises if more than one building is supplied. This is not correct and I don't believe it was the intent of NEC 230.40 Exception No. 3 when it was introduced into the NEC in 1996.

Example premises: A small parcel of land has a one-family dwelling, a detached accessory garage and a detached storage building. There is a center yard pole and pole-top utility transformer. The service point is the secondary terminals of the transformer. The service riser runs down the pole to a self-contained meter and a terminal box. From the terminal box three separate service laterals are extended to each of the three buildings. NEC 230.40 Exception No. 3 has been misinterpreted to require the service equipment be installed on the pole because "more than two" buildings are supplied. Dispite the lack of any supporting language in the NEC, it has been assumed that for a non-residential premises that service equipment would be required on the pole if "more than one" building is supplied.

Considerable research has been done relative to NEC 230.40 Exception No. 3 and the proposed language that was part of the 1996 National Electrical Code development process.

NEC 230.40 Exception No. 3 is completely unnecessary - the basic rules in the NEC have always allowed what the proposer was attempting to accomplish. There is nothing inherently wrong with the language - it is simply not necessary.

Unfortunately, the presence of the unnecessary language in 230.40 Exception No. 3 has caused much confusion for installers and inspectors. One or more states have amended 230.40 Exception 3 out of the NEC during their respective code adoption processes. There is no language in the NEC that correlates with 230.40 Exception No. 3. It should not be assumed that the presence of 230.40 Exception No. 3 in the NEC has some special meaning, or that other historical, fundamental code concepts somehow have a new or different meaning.

The following fundamentals will help to illustrate and substantiate the need to delete 230.40 Exception No. 3:

- Article 100 in the NEC has several definitions related to services (conductors, equipment, etc.)
- Every occurrence of the word "building" in the various service definitions is in the singular form, not the plural form
- The NEC does not regulate the number of buildings on a premises
- The NEC does not regulate the number of utility-supplied metered services on a multi-building premises. In other words, on a multi-building premises, a separate utility-metered service could be installed to each building - this may not be very practical or economically feasible if the buildings are in close proximity to one another, but it is not regulated by the NEC.
- In part, Article 225 contains rules for outside branch circuits and feeders run on or between buildings, structures, or poles (unlike service conductors, branch circuits and feeders are provided with short-circuit and ground-fault protection at their supply end)
- Article 230 in the NEC contains rules for service conductors and equipment for control and protection of services and their installation requirements
- Unlike branch circuits and feeders, service conductors do not have short-circuit and ground-fault protection at their supply end (service conductors are provided with "overload" protection at their load end)
- Various rules in the NEC are in place to ensure that service conductors that are subjected to a catastrophic overcurrent event do not, in theory, compromise the safety of the building to which they are connected or attached. Ideally, service conductors subjected to a catastrophic event would burn clear of the building.
- As an absolute minimum, the first occurrence of disconnection and overload protection for service conductors is inside the building nearest the point of entrance of the service conductors (the allowable length of service conductors inside a building will vary from job to job, but they shall always be kept to an absolute minimum). In some cases the disconnecting means and overload protection may be upstream from this inside location (e.g. installed on the exterior wall of the building).
- Where the service equipment is located outside on the exterior of the building, there may not be any service-entrance conductors, or they may be entirely outside the building.
- Notwithstanding other rules in the NEC (e.g. rules in Article 547 that establish a common distribution point on a multi-building agricultural premises), there is no limit to the quantity of "unfused" conductors that can be installed outside of a building on a premises, or outside of more than one building on a multi-building premises
- Notwithstanding any applicable exceptions, a building shall be supplied by only one service drop or service lateral (230.2) and the service drop or service lateral shall supply only one set of service-entrance conductors (230.40).
- Service conductors that supply a building or other structure shall not pass through the interior of another building or structure (230.3). In other words, if a service drop or service lateral supplies more than one building on a multi-building premises, the service drop or service lateral conductors are permitted to be installed on the exterior of Building A in order to supply a service in Building B, but they are not permitted to pass through the interior of Building A to get to Building B. There is no limitation in the NEC as to how many buildings could be supplied with one set of properly-sized service drop or service lateral conductors.
- Service drop conductors (e.g. at pole tops), service lateral conductors, and service-entrance conductors are permitted to be spliced in accordance with various rules in the NEC. The definition of a run of service conductors does not necessarily and automatically change simply because the run of conductor is interrupted by a terminal box, enclosure, pole, pedestal, or splice. Although not desirable, practical or workmanlike, one properly-sized service lateral could be subdivided (via underground splicing) into several properly-sized sets of service lateral conductors for distribution to multiple buildings on multi-building premises. Overhead service drops have been installed in this manner for decades on multi-building sites.
- On the contrary, a defined set of service lateral conductors automatically may become defined as a set of service-entrance conductors where the underground service lateral conductors penetrate the basement wall of a building (where there is no terminal box, meter, or other enclosure). The point of connection (or transition) from service lateral conductors to service-entrance conductors is the point of entrance of the conductors into the building essentially where the conductors pass through the basement wall.

In an effort to counteract the notion that NEC 230.40 Exception No. 3 has some special significance with regard to safety in the code, I offer the following code-compliant examples - some examples are real and very common; other examples are very extreme, but they help to illustrate the elementary concepts of the NEC.

- (NEC 230.2 and 230.40) Three structurally independent attached "townhouse" buildings (as defined in the International Residential Code) under a common roof line (there may or may not be real property lines between the units - that is not relevant for the purpose of the electrical code). Each townhouse is considered a separate building in the building code, the units are separated by fire-rated wall assemblies, and each townhouse is required to have a separate service lateral or service drop. The first occurrence of overload protection is inside each townhouse at the service panel. The service disconnecting means shall not consist of more than six switches or circuit breakers. (A maximum of six throws of the hand would be permitted to turn off power in each townhouse).
- (NEC 230.2 and 230.40 Exception No. 1) One six-unit apartment building or condominium building (a multifamily dwelling as defined in the NEC): The building is only permitted to have one service lateral or service drop. The service lateral or service drop is permitted to be subdivided into separate sets of service-entrance conductors, one set for each occupant (dwelling unit). The first occurrence of overload protection is inside each dwelling unit at the service panel. The service disconnecting means for each set of service-entrance conductors shall not consist of more than six switches or circuit breakers. (A maximum of 36 throws of the hand would be permitted to turn off power to the entire building).
- (NEC 230.2 and 230.40) An old resort with several cabins is turned into a Common Interest Community (the legal declaration that is used to establish a condominium, cooperative, or association type of property). From a pad-mounted transformer, each building on the multi-building premises would be permitted to be supplied with a separate set of service drop or service lateral conductors. The first occurrence of overload protection is inside each cabin at the service panel. The service disconnecting means at each cabin shall not consist of more than six switches or circuit breakers. (A maximum of six

throws of the hand would be permitted to turn off power in each cabin).

- (NEC 230.2 and 230.40) An old resort with several cabins. From a pad-mounted transformer, one service lateral or service drop could be daisy-chained to a terminal box on each building (remaining outside each building as per 230.3). From the exterior terminal box, a set of service-entrance conductors would supply the service equipment in each cabin. The first occurrence of overload protection is inside each cabin at the service panel. The service disconnecting means at each cabin shall not consist of more than six switches or circuit breakers. (A maximum of six throws of the hand would be permitted to turn off power in each cabin).

- (NEC 230.2 and 230.40 Exception No. 2) A large manufacturing building: The building is only permitted to have one service lateral or service drop. The service lateral or service drop is permitted to be subdivided into separate sets of service-entrance conductors to supply loads, in this case the Business Office, Heating and Cooling, and Manufacturing. The three service disconnects in separate enclosures shall be grouped at one location. The first occurrence of overload protection is inside the building at the three grouped service disconnects. (A maximum of 3 throws of the hand would be necessary to turn off power to the entire building).

- (NEC 230.2 and 230.40 Exception No. 1) A large strip mall building (10 stores/occupants): The building is only permitted to have one service lateral or service drop. The service lateral or service drop is permitted to be subdivided into separate sets of service-entrance conductors to supply each occupant. The service disconnect for each set of service-entrance conductors to supply each occupant. The service disconnect for each set of service-entrance conductors for each occupant shall consist of not more than six switches or circuit breakers. The first occurrence of overload protection is inside the building at the service disconnect. (A maximum of 6 throws of the hand would be necessary to turn off power at each occupant space, with a possible 60 throws of the hand to turn off power to the entire building).

- (NEC 230.2 and 230.40 Exception No. 1) A two-family dwelling building: The building is only permitted to have one service lateral or service drop. The service lateral or service drop is permitted to be subdivided into separate sets of service-entrance conductors to supply each dwelling unit. The service disconnect for each set of service-entrance conductors for each dwelling unit shall consist of not more than six switches or circuit breakers. The first occurrence of overload protection is inside the dwelling unit at the service disconnect. (A maximum of 6 throws of the hand would be necessary to turn off power at each dwelling unit, with 12 throws of the hand necessary to turn off power to the entire building).

- (NEC 230.2 and 230.40 Exception No. 1 and Exception No. 5) The same scenario as above with an additional set of service-entrance conductors to supply common area branch circuits as identified in 210.25. The first occurrence of overload protection is inside the building at each service disconnect. (A maximum of 6 throws of the hand would be necessary to turn off power at each dwelling unit and at the "common area" service, with 18 throws of the hand necessary to turn off power to the entire building).

If all of the above scenarios are permitted by the NEC and the first occurrence of overload protection in each case is inside the respective buildings, and the NEC does not limit the quantity of "unfused" electrical infrastructure on a premises, why does 230.40 Exception No. 3 need to be in the NEC?

Panel Meeting Action: Reject

Panel Statement: The submitter is incorrect in the statement that the existing requirement mandates that the service equipment be placed at a central location. In fact, just the opposite is accomplished. The main rule is that only one service be supplied from one drop or lateral. The exception allows one additional set to one additional structure for a single-family dwelling only. The submitter is incorrect in many of his assumptions relative to the number of buildings under single management that may be supplied by a single service lateral. The rule is very clear one lateral, one service other than multi-occupancy or up to six disconnects at one location.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-105 Log #3830 NEC-P04 **Final Action: Accept**
(230.40 Exception No. 4)

Submitter: James H. Maxfield, Dover, NH

Recommendation: Revise text to read as follows:

Exception No. 4: ~~A~~ Two-family dwellings, ~~or a~~ multifamily dwellings and multiple occupancy structures shall be permitted to have one set of service-entrance conductors installed to supply the circuits covered in 210.25.

Substantiation: The current exception only applies to two family and multifamily dwellings. It would appear that the intent of the exception is to permit an additional disconnecting means to comply with the minimum standards of 210.25 where common area branch circuits are installed on existing two family and multifamily structures.

The current language does not permit the addition of service conductors of the same voltage to an existing multiple occupancy structure.

For example, an existing multifamily dwelling consisting of six individual dwelling units which requires the installation of smoke alarms within the common areas or site illumination of any other common load could use the current exception to install a "house panel" to accommodate the new circuits without performing alterations to an existing code compliant electrical service. While a multiple occupancy structure which may need to add common area branch circuits as described in 210.25(B) of the 2008 edition would need to perform some service alterations to an existing code compliant service to accommodate the necessary new branch circuits. This could be very impracticable depending on the size and location of the existing compliant installation.

Acceptance of this revised language would avoid the need to perform service alterations to an existing code compliant service of a multiple occupancy structure.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-106 Log #1278 NEC-P04 **Final Action: Reject**
(230.41)

Submitter: Stephen Drayton, Eastern Idaho Electrical JATC / Rep. IBEW

Recommendation: Revise text to read as follows:

230.41 Insulation of Service-Entrance Conductors. Service-entrance conductors entering or on the exterior of buildings or other structures shall be insulated. A grounded conductor shall be permitted to be uninsulated if used in an auxiliary gutter, or it meets the insulation requirements of an under ground service-lateral conductor. See 230.30 and 230.30 exception.

Substantiation: To further the desire to use exceptions sparingly (see NEC Style Manual 3.1.4) and to make this section a positive rule. We believe this revision would simplify and clarify the intent of the section.

Panel Meeting Action: Reject

Panel Statement: The panel agrees that the revision would not add clarity. The present wording is correct. 230.41 is applicable to service-entrance conductors and the reference to 230.30 is to service laterals, which is not the same.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-107 Log #3043 NEC-P04 **Final Action: Accept**
(230.42(A))

Submitter: Mike Holt, Leesburg, FL

Recommendation: Add the following new text:

(A) General. The ampacity of the service-entrance conductors before the application of any adjustment or correction factors shall not be less than either (A)(1) or (A)(2). Loads shall be determined in accordance with Part III, IV, or V of Article 220, as applicable. Ampacity shall be determined from 310.15. The maximum allowable current of busways shall be that value for which the busway has been listed or labeled.

(1) The sum of the noncontinuous loads plus 125 percent of continuous loads

Exception: Grounded conductors that are not connected to an overcurrent device shall be permitted to be sized at 100 percent of the continuous and noncontinuous load.

(2) The sum of the noncontinuous load plus the continuous load if the service-entrance conductors terminate in an overcurrent device where both the overcurrent device and its assembly are listed for operation at 100 percent of their rating.

Substantiation: This proposal is intended to provide consistency with the rules for sizing branch circuits and feeders in 210.19(A)(1) and 215.2(A)(1).

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-108 Log #1718 NEC-P04 **Final Action: Reject**
(230.42(A), FPN No. 1 (New))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.

Recommendation: Add new text as follows:

FPN No. 1: See 110.14(C)(1)(a) and (b) for termination provisions of equipment.

Substantiation: Ignoring the temperature rating of equipment is the most common mistake being made in conductor sizing today. Entirely too many wiremen take no notice of the temperature limitations of 110.14(C) when sizing conductors. They disregard the temperature rating of equipment, and use the 90°C column of Table 310.16 when 90°C rated conductors, such as THHN, are being used. I've even had engineers stand up in seminars and yell "Larry, how are we supposed to know that!?"

At the very least, there should be a Fine Print Note directing the reader to the rules of 110.14(C)(1)(a) and (b).

Panel Meeting Action: Reject

Panel Statement: The NEC already adequately covers this requirement. The problems described by the submitter are best handled through education and enforcement.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-109 Log #4749 NEC-P04 **Final Action: Reject**
(230.42(B))

Submitter: Charles M. Trout, Maron Electric Company
Recommendation: Delete Section 230.42(B) Specific Installations
Substantiation: Section 230.42(B) requires ungrounded service conductors to have an ampacity not less than the minimum rating of the service disconnecting means required by 230.79(A) through (D). This conflicts with 230.90(A) Exception No. 3 which permits the sum of the ratings of the circuit breakers or fuses to exceed the ampacity of the service conductors, provided the calculated load does not exceed the ampacity of the service conductors.
Panel Meeting Action: Reject
Panel Statement: There is no conflict. 230.42(B) requires the conductors to have an ampacity not less than the service disconnecting means. Section 230.90 deals with overcurrent protection, not disconnecting means.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-109a Log #4739 NEC-P04 **Final Action: Accept**
(230.43(11))

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
230.43 Wiring Methods for 600 Volts, Nominal, or Less.
Service-entrance conductors shall be installed in accordance with the applicable requirements of this Code covering the type of wiring method used and shall be limited to the following methods:
(1) Open wiring on insulators
(2) Type IGS cable
(3) Rigid metal conduit
(4) Intermediate metal conduit
(5) Electrical metallic tubing
(6) Electrical nonmetallic tubing (ENT)
(7) Service-entrance cables
(8) Wireways
(9) Busways
(10) Auxiliary gutters
(11) Rigid ~~nonmetallic~~ <u>Polyvinyl Chloride Conduit</u> <u>(PVC)</u>
(12) Cablebus
(13) Type MC cable
(14) Mineral-insulated, metal-sheathed cable
(15) Flexible metal conduit not over 1.8 m (6 ft) long or liquidtight flexible metal conduit not over 1.8 m (6 ft) long between raceways, or between raceway and service equipment, with equipment bonding jumper routed with the flexible metal conduit or the liquidtight flexible metal conduit according to the provisions of 250.102(A), (B), (C), and (E)
(16) Liquidtight flexible nonmetallic conduit
<u>(17) High Density Polyethylene Conduit (HDPE)</u>
<u>(18) Non-metallic Underground Conduit with Conductors (NUCC)</u>
<u>(19) Reinforced Thermosetting Resin Conduit (RTRC)</u>
Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of "nonmetallic" in item 11 and add in each of the specific raceway types as acceptable for service entrance conductors as limited by the conditions of the articles.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-110 Log #2412 NEC-P04 **Final Action: Accept in Principle**
(230.43(11))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follow:
240.43(11) Rigid ~~nonmetallic~~ <u>PVC</u> conduit.
Substantiation: Conforming to style manual Article 352.
Panel Meeting Action: Accept in Principle
Panel Statement: See Proposal 4-109a for the revised wording.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-111 Log #4174 NEC-P04 **Final Action: Reject**
(230.43(15))

Submitter: David Mercier, Southwire Company
Recommendation: Revise text to read as follows:
(15) Flexible metal conduit not over 1.8 m (6 ft) long or liquidtight flexible metal conduit not over 1.8 m (6 ft) long between raceways, or between raceway and service equipment, with equipment bonding jumper routed with the flexible metal conduit or the liquidtight flexible metal conduit according to the provisions of 250.102(A), (B), (C), and (E). <u>Liquidtight flexible metal conduit shall be permitted to be installed in one continuous length between service equipment when listed for service entrance use.</u>
Substantiation: This change would allow the use of a single run of LFMC for service applications. The conduit would require listing to meet the performance of similar wiring methods allowed for service entrance.
Panel Meeting Action: Reject
Panel Statement: LFMC is already permitted to be used in one continuous length up to 6 ft.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-112 Log #1519 NEC-P04 **Final Action: Accept**
(230.44)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action on Proposal 4-113.
See the Technical Correlating Committee action on Proposal 4-113.
This action will be considered by the panel as a public comment.
Submitter: L. Keith Lofland, IAEI
Recommendation: Revise text to read as follows:
230.44 Cable Trays. Cable tray systems shall be permitted to support service-entrance conductors. Cable trays used to support service-entrance conductors shall contain only service-entrance conductors. <u>Such cable trays shall be identified with permanently affixed labels with the wording "Service-Entrance Conductors." The labels shall be located so as to be visible after installation and placed so that the service-entrance conductors may be readily traced through the entire length of the cable tray.</u>
Exception: Conductors other than service-entrance conductors shall be permitted to be installed in a cable tray with service-entrance conductors, provided a solid fixed barrier of a material compatible with the cable tray is installed to separate the service-entrance conductors from other conductors installed in the cable tray. ~~Cable trays shall be identified with permanently affixed labels with the wording "Service-Entrance Conductors." The labels shall be located so as to be visible after installation and placed so that the service-entrance conductors may be readily traced through the entire length of the cable tray.~~
Substantiation: Move last two sentences of the exception into the main body of 230.44. As 230.44 is now currently written, permanently affixed labels are <u>not required</u> for a cable tray containing service-entrance conductors <u>unless</u> the cable tray contains both service-entrance conductors and other conductors per the exception.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-113 Log #1740 NEC-P04 **Final Action: Accept**
(230.44)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with respect to both the placement of the added text and the accepted text of the second sentence.
This action will be considered by the panel as a public comment.
Submitter: Lowell Reith, Interstates Construction Services Inc.
Recommendation: Add new text to read as follows:
Cable tray systems shall be permitted to support service-entrance conductors. Cable trays used to support service-entrance conductors shall contain only service-entrance conductors and <u>shall be limited</u> to the following methods:
<u>1. Service-entrance cables</u>
<u>2. Type MC cable</u>
<u>3. Mineral-insulated, metal-sheathed cable</u>
<u>4. Type IGS cable</u>
<u>5. Single Thermoplastic-Insulated Conductors 1/0 and Larger with CT rating</u>
Substantiation: 230.44 lists service entrance cable as being allowed for use on a Cable tray. THHN conductors may be used for service entrance conductors in raceways, and for feeders and branch circuits in cable tray if listed and marked with a CT rating. If SE cable can be used as a single conductor in a cable tray as service entrance conductors, why not other Thermoplastic-Insulated conductors. I personally feel that is allowed, but have run into engineers and others who disagree. By putting a list of the types of cables allowed like what is found in 230.43 for Wiring methods for 600 volts or less, this would be made clear to all. THHN is typically installed in a raceway system for mechanical protection and because it has not undergone the same type of flammability testing as a building type cable such as SE cable. However, when it is marked "CT" as indicated in the ZLGR guide information, then it has undergone the proper flammability test for exposed cables in cable trays which is a more stringent flammability test than is done for SE cable.
Types TW, THW, THW-2, THHN, THHW, THWN, THWN-2, PFA, PFAH and Z in sizes 4 to 1 AWG for grounding conductors only and in sizes 1/0 AWG and larger for circuit and grounding conductors that are marked "Cable Tray Use" or "CT" comply with a vertical-tray cable flame test.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-113a Log #2687 NEC-P04 **Final Action: Reject**
(230.50)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
PROTECTION AGAINST PHYSICAL DAMAGE.
(A) UNDERGROUND SERVICE CONDUCTORS. Direct-buried service conductors and cables shall be protected in accordance with 300.5 D)(1)
(B) OTHER SERVICE CONDUCTORS. Above ground service conductors and cables, other than service drops, where likely to be subject to physical damage, shall be protected by any of the wiring methods specified in 230.43 that are identified for the use.
(C) INDIVIDUAL OPEN CONDUCTORS. Individual open conductors and aboveground cables, other than Type SE cable, shall not be installed less than 3.0 m (10 ft) above outside finished grade or where likely to be subject to physical damage unless protected in accordance with 250.50(B).
Exception: Type MC and Type MI cables shall be permitted less than 3.0 m (10 ft) above finished grade where not likely to be subject to physical damage or where protected in accordance with 230.50(B).
Substantiation: Underground conductors should be noted as direct buried and include service laterals. (B) should cover all above-ground service conductors except service drops. Protection means should be referenced to specific means of 230.43 which does not include "other approved means". Service cables in present (B) (2) should be service-entrance cables since they are not limited to height above grade. Service-entrance cables exposed to physical damage are covered by 338.12(A)(2).
Panel Meeting Action: Reject
Panel Statement: The panel agrees that the proposed revised wording does not add clarity to existing wording.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-114 Log #3438 NEC-P04 **Final Action: Accept**
(230.50(B)(1))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.50(B)(1) Service-Entrance Cables. Service-entrance cables, where subject to physical damage, shall be protected by any of the following: (The remainder of the text to remain the same.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-115 Log #3927a NEC-P04 **Final Action: Accept in Principle**
(230.50(B)(1))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Everywhere Schedule 80 PVC is mentioned, "Type RTRC marked with the suffix -XW" should also be included.
Substantiation: For the NEC 2008, Type RTRC marked with the suffix –XW and Schedule 80 PVC were added as sufficient for Class I Division 2 installations. The Type RTRC marked with the suffix –XW were "forgotten" at some places in the NEC, needs to be corrected.
Panel Meeting Action: Accept in Principle
Renumber the existing item (5) to (6) and add a new item (5) Reinforced Thermosetting Resin Conduit (RTRC).
Panel Statement: The panel added a new item to the submitters original proposal. The –XW designation is only required for Article 501, 505, and 515.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-116 Log #3435 NEC-P04 **Final Action: Accept**
(230.50(B)(2))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.50(B)(2) Other than Service-Entrance Cable. Individual open conductors and cables, other than service-entrance cables, shall not be installed within 3.0 m (10 ft) of grade level or where exposed to physical damage. (The remainder of the text to remain the same.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-117 Log #3372 NEC-P04 **Final Action: Accept**
(230.51)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.51 Mounting Supports. Service-entrance c~~C~~ables or individual open service-entrance conductors, shall be supported as specified in 230.51(A), (B), or (C). (The remainder of the text to remain the same.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-118 Log #3386 NEC-P04 **Final Action: Accept**
(230.51(A))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.51(A) Service-Entrance Cables. Service-entrance cables shall be supported by straps or other approved means within 300 mm (12 in.) of every service head, gooseneck, or connection to a raceway or enclosure and at intervals not exceeding 750 mm (30 in.).
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-119 Log #646 NEC-P04 **Final Action: Reject**
(Table 230.51(C))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
For approach boundaries to live parts for shock protection, see NFPA 70E, Standard for Electrical Safety in the Workplace.
Substantiation: The approach boundaries of NFPA 70E, Table 130.2(C), are related to the installation requirements of Table 230.51(C) and this information will be helpful in understanding this relationship.
Panel Meeting Action: Reject
Panel Statement: Table 230.51(C) is for supports and has nothing to do with approach boundaries. The NEC addresses clearance around electrical equipment with reference to NFPA 70E in Chapter 1; the submitter's concerns are adequately addressed there.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-120 Log #3299 NEC-P04 **Final Action: Reject**
(230.53)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and identify the specific lack of conformance with 4.3.3(b) of the NFPA Regulations Governing Committee Projects.
This appears to be an NEC Style Manual issue concerning "possibly unenforceable and vague" terms.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where exposed to the weather raceways, meter assemblies, conduit bodies, and other enclosures containing service conductors shall be ~~suitable~~ identified for use in wet locations and if practicable, raceways shall be arranged to drain.
Substantiation: "Suitable" is subjective and a term to be avoided per the Style Manual. The provision should apply to all exposed components. Weatherproof components should be covered by protocols for listing as to whether drain provisions are necessary. Conduit bodies for wet locations normally do not have drain holes and drilling holes may void listing. Draining for raceways is widely ignored, and while not justifying a violation does indicate a problem with the provision. In many areas raceway masts are installed through the roof and run inside a wall to service equipment inside the structure or inside a wall where it is not practical to provide drainage. This provision doesn't cover other enclosures or auxiliary gutters which are not listed as raceways in the Article 100 definition of raceway.
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-121 Log #3422 NEC-P04 **Final Action: Accept in Principle**
(230.54)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.54 Overhead Service Locations.
(A) Service Head. Service raceways shall be equipped with a service head at the point of connection to service-drop conductors. The service head shall comply with the requirement for fittings in 314.15.
(B) Service-Entrance Cable Equipped with Service Head or Gooseneck. Service-entrance cables shall be equipped with a service head. The service head shall comply with the requirement for fittings in 314.15. (The text of the Exception to remain the same.)
(C) Service Heads and Goosenecks Above Service-Drop Attachment. Service heads and goosenecks in service-entrance cables shall be located above the point of attachment of the service-drop conductors to the building or other structure. (The text of the Exception to remain the same.)
(D) Secured. Service-entrance cables shall be held securely in place.
(E) Separately Bushed Openings. Service heads shall have conductors of different potential brought out through separately bushed openings.
Exception: For jacketed multiconductor service-entrance cable without splice.
(F) Drip Loops. Drip loops shall be formed on individual conductors. To prevent the entrance of moisture, service-entrance conductors shall be connected to the service-drop conductors either (1) below the level of the service head or (20 below the level of the termination of the service-entrance cable sheath.
(G) Arranged That Water Will Not Enter Service Raceway or Equipment. S~~ervice-drop conductors and s~~ervice-entrance conductors shall be arranged so that water will not enter service raceway or equipment.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept in Principle
Add “or overhead service” immediately after service-drop in “A”.
Add “or overhead service” immediately after service-drop in two locations in “C”.
Add “or overhead service” after the word service-drop in “F”.
Add “and overhead service” immediately after “service-entrance” in “G”.
Panel Statement: Some installations may have overhead service conductors and no service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
YOUNG, J.: The revision does not add clarity to the Code. There is insufficient substantiation for the change.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-122 Log #562 NEC-P04 **Final Action: Accept**
(230.54(A) and (B))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
(A) Service Head. Service raceways shall be equipped with a service head at the point of connection to service-drop conductors. The service head shall ~~comply with the requirement for fittings in 314.15.~~ be listed for use in wet locations.
(B) Service Cable Equipped with Service Head or Gooseneck. Service cables shall be equipped with a service head. The service head shall ~~comply with the requirement for fittings in 314.15.~~ be listed for use in wet locations.
Substantiation: The proposal addresses usability. The requirement should appear clearly within these two rules for service weatherheads rather than needing to refer to another rule to find what is required. This proposal does not add technical revisions or requirements, just adds clarity for users and improves usability.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-123 Log #553 NEC-P04 **Final Action: Reject**
(230.54(F))

Submitter: Joe Riley, City of Arlington
Recommendation: Revise text as follows:
(F) Drip Loops. Drip loops shall be formed on individual services conductors~~.~~ and the conductors shall extend a minimum of 24 in. from the point where the conductors emerge from the service weather head. To prevent the entrance of moisture, service entrance conductors shall be connected to the service-drop conductors either (1) below the level of the service head or (2) below the level of termination of the service entrance cable sheath.
Substantiation: To form a drip loop on service conductors and provide adequate conductor length for service conductor terminations to an over head drop would require at least 24 in. of free conductor length. An NEC minimum required conductor length from the point where the conductors emerge from the service weather head would make it clear and consistent as to what would be considered adequate conductor length to form a drip loop and terminate service conductors to an overhead drop.
Panel Meeting Action: Reject
Panel Statement: This requirement has been in the NEC for many decades with no documented ongoing problems and the submitter has not presented any technical data supporting the necessity to attach a fixed minimum length to this requirement. The amount of cable required to make a drip loop will depend on the diameter of the cable and the allowable bending radius for that cable. A specific length of 24 inches may be too little for some cable and excessive for others.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-124 Log #3434 NEC-P04 **Final Action: Reject**
(230.56)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.56 Service-Entrance Conductor with the Higher Voltage to Ground. On a 4-wire, delta-connected service where the midpoint of one phase winding is grounded, the service-entrance conductor having the higher phase voltage to ground shall be durably and permanently marked by an outer finish that is orange in color, or by other effective means, at each termination or junction point.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply

service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Section 230.56 applies to all service conductors, not just service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-125 Log #4894 NEC-P04 **Final Action: Reject**
(230.56)

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services

Recommendation: Revise text as follows:

230.56 Service Conductor with the Higher Voltage to Ground. On a 4-wire, delta-connected service where the midpoint of one phase is grounded, the service conductor having the higher phase voltage to ground shall ~~be durably and permanently marked by an outer finish that is orange in color, or by other effective means at each termination or junction point~~ <u>be connected to the middle phase terminal in the service disconnect(s)</u>.

<u>FPN 1: See 110.15 for the requirements on marking the phase conductor having the higher voltage to ground where supplied from a 4-wire, delta-connected system.</u>

<u>FPN 2: See 408.3(E) for the phase arrangement of 3-phase buses in switchboards and panelboards.</u>

Substantiation: To make the requirement consistent with the requirement found in Article 408.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented any clearly defined reason for the removal of this basic safety requirement for this type of service installation and then inserting two fine print notes sending users to other code sections to find the information anyway. The existing wording is more user friendly. The user does not have to flip back to find the referenced section. Section 230.56 does not address where the "high leg" conductor terminates in the service-entrance switchboard.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-126 Log #828 NEC-P04 **Final Action: Reject**
(230.66)

Note: This proposal is reported as "Reject" as it did not receive the 2/3 affirmative vote.

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence:

Service equipment shall be <u>listed and</u> marked to identify it as being suitable for use as service equipment.

Substantiation: Many less critical components of wiring systems are required to be listed; it should be specifically required for service equipment.

Panel Meeting Action: Reject

Panel Statement: The change could introduce confusion. Service equipment may be listed as service equipment and if that is the case it will be marked as service equipment as opposed to being listed and marked suitable for use as service equipment. The present wording is not as specific and only covers that the equipment can be used as service equipment.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 6 Negative: 4

Explanation of Negative:

DORTA, T.: NEC already required Listed components throughout the code. Service equipment shall be no exception of critical equipment needed to be listed.

ROGERS, J.: This proposal should be accepted. Even though equipment that is marked as suitable for use as service equipment in essence is obtained through testing and listing a clear statement requiring listing for this equipment adds clarity.

STAFFORD, T.: Listed equipment is a proven method to ensure safety. Requiring listed equipment provides a verifiable level of safety above what is present when non-listed equipment is installed.

ZGONENA, T.: The panel action to reject this proposal was not appropriate. The proposal should be accepted. Although 230.2(E) does provide identification requirements when there is more than one service, it does NOT require the identification of the location of each service disconnecting means when only one service is provided. 230.2(E) only requires identification of other services, branch circuits, or feeders that supply the building or structure. If there is only one service, but multiple service disconnects for that service, it is not required to identify the location of each service disconnect. Presumably, this is because the disconnects are all grouped together in accordance with 230.72. However, the exception to 230.72 allows the water pump disconnecting means to be located remotely. Since this could be one of the six disconnects allowed, and is therefore associated with just one service, 230.2(E) is not applicable, and therefore the submitter's concerns are NOT addressed in 230.2(E).

4-127 Log #3563 NEC-P04 **Final Action: Reject**
(230.67)

Submitter: James T. Dollard, Jr., IBEW Local 98

Recommendation: Add new text to read as follows:

<u>**230.67 Dwelling Unit Surge Protection.**</u>

<u>**(A) Surge Protective Device**. All dwelling units shall be provided with a surge protective device (SPD) installed in accordance with Article 285.</u>

<u>**(B) Location**. The surge protective device shall be an integral part of the service disconnecting means or shall be located immediately adjacent thereto.</u>

<u>**(C) Type**. The surge protective device shall be a Type 1 or Type 2 SPD.</u>

<u>**(D) Replacement.** Where service equipment is upgraded, all of the requirements of this section shall apply.</u>

Substantiation: This proposed requirement is submitted for consideration by the Technical Committee for the sole purpose of personnel safety. The NEC requires GFCI and AFCI protective devices throughout dwelling units. Additionally, 120-smoke alarms are required by most local building codes in all new dwelling units. In essence we have mandated electronic based protection, designed to prevent shock, fire and to alarm residents in the event of a fire. These devices have all proven that when installed and maintained properly, they will and have saved lives. This proposal seeks a level of protection for these life saving devices as well as general surge protection throughout the home.

All GFCI's, AFCI's and smoke alarms may be damaged when a surge occurs due to lighting or other sources. In many cases these devices can be damaged and rendered inoperable by a surge.

It is practical to require a "whole house" SPD to provide a general level of protection. Home owners regularly buy and use Type 3 (point of utilization) SPD's which are cord and plug connected to protect computers, plasma TV's and other electronic equipment. However, in almost all new service installations as well as service upgrades, no consideration is given to providing a general level of protection to the "whole house."

Typical homeowners have no problem buying multiple Type 3 (point of utilization) SPD's to protect equipment for entertainment purposes, the additional cost of a Type 1 or Type 2 SPD for the purpose of personnel safety will not represent a financial burden.

First level subdivision (D) is included to require that when a service is upgraded, an SPD is to be installed. Residents of existing dwelling units deserve the same level of protection as those in new homes.

Note that a sister proposal has been submitted as a new 225.41.

Panel Meeting Action: Reject

Panel Statement: The submitter has not submitted any technical data that supports the statement relative to the installation of SPDs saving lives. These devices may protect some electronic equipment but there is no submitted documentation relative to smoke detector failures due to surges with or without SPDs. This is not an appropriate item for Article 230.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

STAFFORD, T.: This panel member determines that submitter's substantiation is correct as provided in original proposal

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4-128 Log #234 NEC-P04 **Final Action: Reject**
(230.70(A)(1))

Submitter: Sprague Owings, Nassau County, FL

Recommendation: 230.70(A)(1) Readily Accessible Location. The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or ~~inside nearest the point of entrance of the service conductors.~~

Change to:

Readily Accessible Location. The service disconnecting means shall be

installed at a readily accessible location either outside of a building or structure or if inside, nearest the point of entrance of the conductors when encased in rigid metal conduit or encased in 2 in. of concrete.
Substantiation: Since the service entrance conductors are only protected from overcurrents by the utility company's fusing or jacks, the fault current can far exceed the rating of the entrance conductors. It would seem prudent to attempt to minimize the potential area of contact of these lines to a minimum so that a fault could be confined outside the structure or encased in such a way to lessen the potential effect of a fault.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any technical data to support such an extreme limitation on the wiring methods utilized for service conductors to enter a building. For instance type SE cable has been utilized for installation such as this, and there is no track record of failures in this wiring method when properly installed.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-129 Log #534 NEC-P04 **Final Action: Reject**
(230.70(A)(1))

Submitter: Joseph Penachio, Northeast Metro Tech H.S.
Recommendation: Revise text to read as follows:
The service disconnecting means shall be installed in accordance with 230.70(A)(1), (A)(2), and (A)(3).
(1) Readily accessible location. The service disconnecting means shall be installed at a readily accessible location, either outside of a building or structure or inside nearest the point of entrance of the service raceway, cable, or conductors.
Substantiation: As stated, the nearest point of entrance of the service conductors is where the conductors exit the raceway or cable. A legal argument can be made that a disconnect could be installed 20, 30, or even 50 feet inside a building or structure because it would still be installed at the nearest point of entrance of the service conductors as stated.
Adding the wording raceway, cable, or between the words "raceway" and "conductors" clarifies the code's intent that the service disconnect be at the nearest point of entrance to the building or structure.
Panel Meeting Action: Reject
Panel Statement: The submitter's revised wording does not address the supposed problem the submitter is referencing. The disconnect should be nearest the point of entrance.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-130 Log #1485 NEC-P04 **Final Action: Reject**
(230.70(A)(1))

Submitter: Dennis J. Cox, Elkhart County Building Dept. / Rep. IAEI
Recommendation: Add new text as follows:
Readily Accessible Location. The service disconnecting means shall be installed at a readily accessible location (within 8 ft of the electric meter) either outside of a building or structure or inside nearest the point of entrance of the service conductors.
Substantiation: 230.70(A)(1) does not state how far the overcurrent device can be from the meter. It is an AHJ call. The basis for this change is the service conductors ahead of the main overcurrent device have no protection. How far is readily accessible? By adding (within 8 ft of the electric meter) this change would make this section standard, not a guess.
Panel Meeting Action: Reject
Panel Statement: There is no technical substantiation for the proposed distance of 8 ft.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: It should be further noted that although the submitter referenced IAEI, this proposal did not go through the IAEI process and therefor is not to be considered an official position of IAEI. If one were to research this issue as far back as at least the 1940s there have been proposals to define this length and the various code panels that dealt with subject have remained firm in the opinion that there is no one correct distance and the language as it exists allows the installer and the AHJ to review the physical characteristics of each installation on its own merit.

4-131 Log #3437 NEC-P04 **Final Action: Reject**
(230.70(A)(1))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.70(A)(1) Readily Accessible Location. The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the service-entrance conductor.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-132 Log #3578 NEC-P04 **Final Action: Reject**
(230.70(A)(1))

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Revise text to read as follows:
(1) **Readily Accessible Location.** The service disconnecting means shall be installed at a readily accessible location ~~either~~ outside of a building or structure ~~or inside nearest the point of entrance of the service conductors~~.
Substantiation: Allowing service equipment indoors poses an unnecessary risk to personnel and property, usually for asthetic reasons. Services supplied by raceway wiring methods provide pathways into a structure for both arc blast events contained in the laterals themselves as well as outdoor transformer explosions. If the NEC were to require service disconnects to be located entirely outdoors, then there would not be a direct conduit from an exploding or burning utility transformer to the vulnerable interior of the structure.
Attached are two events that occurred within a month of each other, within 20 miles of each other. In both events, there were personnel present who could have been seriously injured by the explosions and subsequent fires from service lateral and outdoor transformer faults.
There is no reason to allow deadly equipment to be installed inside a building for asthetic reasons.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The requirement presented by the submitter is far too restrictive and is not supported by technical data other than two incidents that could have happened on installations such as bottom fed switchboards or transformers. This allowance has been in the NEC for many decades without documented widespread problems.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-133 Log #4312 NEC-P04 **Final Action: Reject**
(230.70(A)(1))

Submitter: Roger D. McDaniel, Georgia Power Company
Recommendation: Add a new sentence at the end of 230.70(A)(1):
230.70(A)(1) Readily Accessible Location. The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure or inside nearest the point of entrance of the service conductors. The service disconnecting means for one and two family dwellings shall be in a readily accessible location outside of the building.
Substantiation: This proposal provides added safety for the occupants of one and two family dwellings by having overcurrent protection ahead of any feeder conductors routed inside the building. When the service disconnect is inside the building, there is no overcurrent protection for the service entrance conductors routed inside the building. The primary fuse for the utility transformer is sized only to protect the transformer and not the service entrance conductors.
An added benefit of the acceptance of this proposal would be to possibly reduce property damage and increase safety of fire fighters by having a location outside of a building to de-energize all conductors within a building during a fire. Many fire departments have to wait as much as 30 minutes or more to have a utility representative to disconnect power.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any evidence to support his conclusion that the recommended change would increase safety. There is no technical data presented that would support this change. A requirement such as this would be far too restrictive.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-134 Log #663 NEC-P04 **Final Action: Reject**
(230.70(A)(1) Exception (New))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
Exception: For installations under single management, where documented safe switching procedures are established and maintained for disconnection, and where the installation is monitored by qualified individuals, the disconnecting means shall be permitted to be located elsewhere on the premises.
Substantiation: This exception applies in 225.32, where buildings or structures are supplied by branch circuit(s) or a feeder(s), and it should apply to service supplied buildings or structures as well.
Panel Meeting Action: Reject
Panel Statement: The exception is correct in Article 225 where there are multiple buildings, but it is not correct in Article 230. The service disconnect is required to be readily accessible for emergency personnel.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-135 Log #829 NEC-P04 **Final Action: Reject**
(230.70(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Each service disconnecting means shall comply with 230.66 and be ~~suitable~~ identified for the prevailing conditions. See my proposal for 230.66.
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: It would be impossible to identify or mark all the prevailing conditions that a device would be suitable for. The service equipment is required to be marked in Section 230.66. The disconnect itself is not required to be marked.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-136 Log #348 NEC-P04 **Final Action: Accept**
(230.71(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-137 Log #4140 NEC-P04 **Final Action: Reject**
(230.71(A)(4))

Submitter: Larry LeVoir, City of Irvine
Recommendation: Add new text to read as follows:
Where the service disconnecting means is located outside the building and is within sight of the building, an additional disconnecting means shall not be required where conductors enter the building.
Substantiation: This addition would permit the disconnect to be located up to fifty feet away from the building. Under current wording, if the disconnect is located outside and not mounted on the building, then the rules in Article 225 would require an additional disconnecting means inside the building where the conductors enter. This would seem needlessly restrictive in my opinion. This proposal also parallels the existing requirements in 700.12(B)(6), 701.11(B)(5), and 702.11 which allow the disconnecting means for a feeder to be remote from the building.
Panel Meeting Action: Reject
Panel Statement: Over the past several code cycles CMP 4 has had to grapple with this issue of what distance from a building or structure is a safe distance for locating a disconnecting means, whether it be for service conductors or feeder conductors, and no agreeable distance has been found. The submitter has not presented and documented technical rationale for changing this opinion.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-138 Log #793 NEC-P04 **Final Action: Reject**
(230.72(A))

Submitter: Carol Pafford, City and County of Denver
Recommendation: Revise text to read as follows:
The two to six service disconnects as permitted in 230.71 shall be grouped together. Each disconnect shall be permanently marked to indicate the load served.
Substantiation: The existing language is revised to eliminate confusion between a service disconnect switch and feeder disconnect switches. Also, it has been assumed in practice that the disconnect switches are grouped together, but was not specifically called out as such. The term "grouped" has lead to ambiguity when deciding upon locations for service disconnect switches. Additionally, the labels of service disconnects are not currently required to have permanent labels, leading to missing or damaged non-permanent labels being installed. Requiring permanent labels will eliminate unidentified service disconnects resulting from non-permanently installed labels.
Panel Meeting Action: Reject
Panel Statement: The addition of "together" does not add clarity to "grouped". Permanent marking is subjective and would suggest it could not be changed but the installation could be modified, requiring a change in the marking.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-139 Log #2899 NEC-P04 **Final Action: Reject**
(230.72(A) and (B))

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Revise text to read as follows:
230.72 Grouping of Disconnects.
(A) General. The two to six disconnects as permitted in 230.71 shall be grouped. Each disconnect shall be marked to indicate the load served.
Exception: One of the two to six service disconnecting means permitted in 230.71, where used only for a water pump also intended to provide fire protection, shall be permitted to be located remote from the other disconnecting means.
(B) Additional Service Disconnecting Means. The one or more additional service disconnecting means for fire pumps, emergency systems, legally required standby, or optional standby services permitted by 230.2 shall be installed remote from the one to six service disconnecting means for normal service to minimize the possibility of simultaneous interruption of supply.
Substantiation: Provide clarification as to the term remote as used in 230.72(A) and (B). Need to define a distance as this term is very vague and leaves a lot to be interpreted by the contractor and AHJ.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any change indicated or defined.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-140 Log #227 NEC-P04 **Final Action: Reject**
(230.72(A) Exception (New))

Submitter: Don A. Hursey, Durham County Inspections Department
Recommendation: Add to the end of 230.72(A):
Exception: The location of water pump service disconnecting means shall be provided at the other disconnecting means.
Substantiation: It is important to know the location of the water pump service disconnecting means. Providing information at the service disconnecting means the location of the water pump service disconnect is beneficial.
Panel Meeting Action: Reject
Panel Statement: The submitter's concerns are already addressed in 230.2(E).
Number Eligible to Vote: 10
Ballot Results: Affirmative: 7 Negative: 3

Explanation of Negative:

ROGERS, J.: I originally voted in favor of rejecting this proposal. Upon further review it is my opinion that the submitter's concerns are not addressed in 230.2 when utilizing the allowance of providing power to a fire pump with taps ahead of the service main as this is not more than one service as described in 230.2E

STAFFORD, T.: This panel member determines that submitter's substantiation is correct as provided in original proposal

ZGONENA, T.: The panel action to reject this proposal was not appropriate. The proposal should be accepted. Although 230.2(E) does provide identification requirements when there is more than one service, it does NOT require the identification of the location of each service disconnecting means when only one service is provided. 230.2(E) only requires identification of other services, branch circuits, or feeders that supply the building or structure. If there is only one service, but multiple service disconnects for that service, it is not required to identify the location of each service disconnect. Presumably, this is because the disconnects are all grouped together in accordance with 230.72. However, the exception to 230.72 allows the water pump disconnecting means to be located remotely. Since this could be one of the six disconnects allowed, and is therefore associated with just one service, 230.2(E) is not applicable, and therefore the submitter's concerns are NOT addressed in 230.2(E).

4-141 Log #2529 NEC-P04 **Final Action: Reject**
(230.72(B))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise text to read as follows:

(B) Additional Disconnecting Means. The one or more additional disconnecting means for fire pumps, emergency systems, or legally required standby ~~or optional standby~~ services permitted by 230.2 shall be installed remote from the one to six service disconnecting means for normal service to minimize the possibility of simultaneous interruption of supply.

Substantiation: For the purpose of "locating" the disconnecting means for "optional standby systems" **remote from other disconnecting means**, the treatment of optional standby systems as though they were critical loads to be maintained in the ON condition in all possible cases is unnecessary. In fact, safety would be INCREASED if the disconnecting means for "optional loads" was grouped with the other "normal load" disconnecting means where fire incidences are concerned. Electrical services (or feeders) that do NOT supply life safety equipment or other legally required loads should be capable of being quickly de-energized during emergency events by locating all of the disconnecting means in close proximity. Added words are for grammatical accuracy.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented any technical rationale to support his assumption that locating the disconnects adjacent to one another enhances safety. Even though the systems he references are not legally required, these optional systems could provide assistance to building occupants or responding emergency personnel. There are requirements for proper labeling of these disconnects, as to where other disconnects are located this should provide the additional safety the submitter has mentioned.

Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-142 Log #3974 NEC-P04 **Final Action: Reject**
(230.72(B))

Submitter: Justin B. Biller, Roanoke County Office of Building Safety
Recommendation: Add new text as follows:

230.72 Grouping of Disconnects.

(A) General. The two to six disconnects as permitted in 230.71 shall be grouped. Each disconnect shall be marked to indicate the load served.

Exception: One of the two to six service disconnecting means permitted in 230.71, where used only for a water pump also intended to provide fire protection, shall be permitted to be located remote from the other disconnecting means.

(B) Additional Service Disconnecting means. The one or more additional service disconnecting means for fire pumps, emergency systems, legally required standby, or optional standby services permitted by 230.2 shall be installed a minimum remote distance of 1.8 m (6 ft) from the one to six service disconnecting means for normal service to minimize the possibility of simultaneous interruption of supply.

Substantiation: The current language in these sections is vague and permits a large variation of interpretations from AHJs on what would be considered remote. By codifying a specific distance, the code user and enforcers can apply specific language to determine remoteness of disconnects to ensure that fire pumps, emergency systems, legally required or optional standby power systems are not inadvertently operated simultaneously. The use of 1.8 m or 6 ft is somewhat arbitrary, but would be considered an acceptable distance for an individual that would be servicing equipment or an emergency responder to be unable to physically operate both sets of disconnects. This proposal is also intended to establish dialogue for the code-making panel to consider alternative minimum dimensions based on other quantifiable data.

See also similar proposal to 695.4(B)(2)(4).

Panel Meeting Action: Reject

Panel Statement: As noted in the substantiation the proposed distance is arbitrary. There is not technical substantiation to add a distance.

There is no specified distance for this requirement, nor could there be as adequate separation changes from one installation to another. This separation has to be determined onsite by designers, installers, and AHJs.

Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-143 Log #3378 NEC-P04 **Final Action: Reject**
(230.74)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

230.74 Simultaneous Opening of Poles. Each service disconnect shall simultaneously disconnect all ungrounded service-entrance conductors that it controls from the premises wiring system.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Not all service conductors are service-entrance conductors.

Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-144 Log #3374 NEC-P04 **Final Action: Reject**
(230.76)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

230.76 Manually or Power Operable. The service disconnecting means for ungrounded service-entrance conductors shall consist of one of the following:
(The rest of the text to remain the same.)

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the

service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-145 Log #328 NEC-P04 **Final Action: Reject**
(230.77)

Submitter: Richard R. Verrier, City of Biddeford
Recommendation: Revise as follows:
The service disconnecting means shall plainly indicate whether it is in the ~~open~~ off or ~~closed~~ on position.
Substantiation: The confusion describing the position indicator is contrary to other professions, i.e., you open a faucet to allow water flow and close it to shut it off. (open door; close door)!
Panel Meeting Action: Reject
Panel Statement: A disconnecting means is open when the contacts are open. Use of the word open implies an isolating gap. “Open” and “Closed” is well understood when describing an electrical connection.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
ZINNANTE, V.: I actually thought this proposal should have been “accept in principal” and I still stand by this position.
Art 230.71 states that the disconnecting means for a service shall consist of not more than six switches or sets of circuit breakers. Article 240.81 states: ‘Circuit breakers shall clearly indicate whether they are in the open “off” or closed “on” position.’ Why doesn’t this same logic apply when circuit breakers are used as service disconnecting means?

4-146 Log #3314 NEC-P04 **Final Action: Reject**
(230.79)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The service disconnecting means shall have ~~a~~ an ampere rating not less than the calculated load ~~to be carried~~ determined in accordance with Part I, II, III, IV, and V as applicable. (remainder unchanged).
(A) For installations to supply only ~~limited loads of~~ a single branch circuit the service disconnecting means shall have a rating of not less than 15-amperes.
(B) For installations consisting of ~~not more than~~ two 2-wire branch circuits supplied from a 2-wire service the service disconnecting means shall have a rating of not less than 30 amperes. For installations consisting of two multiwire branch circuits or two 3-phase branch circuits the disconnecting means shall have a rating not less than 30 amperes.
(D) No change.
Substantiation: Parts I and II also have applicable load provisions. The phrase “not more than two” includes a one circuit installation covered by (A) in which “limited load” is superfluous and not defined.
The provisions of (B) should only apply where the service is 2-wire; a 3-wire 15 ampere service can supply two 2-wire branch circuits.
Since (A) is not limited to a 2-wire circuit a single multiwire or 3-phase circuit could have a service disconnecting means rated 15 amperes.
Since (A) and (B)j don’t cover two multiwire or 3-phase circuits the provisions of (D) require a rating of 60 amperes for a 15 ampere circuit multiwire or 3-phase circuit.
Panel Meeting Action: Reject
Panel Statement: The reference to Article 220 Parts III, IV, or V is correct as written. The submitter has not presented any technical data to support the recommended changes he has presented. There is no reason to limit Part B to buildings with two wire services, and anything other than two 2 wire circuits is intended to require a minimum rating of 60 amperes for the disconnecting means.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-147 Log #3380 NEC-P04 **Final Action: Reject**
(230.81)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.81 Connection to Terminals. The service-entrance conductors shall be connected to the service disconnecting means by pressure connectors, clamps, or other approved means. Connections that depend on solder shall not be used.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-148 Log #2310 NEC-P04 **Final Action: Reject**
(230.82)

Submitter: Michael Wright, Alpha Technologies
Recommendation: Add new text as follows:
(9) Taps used to supply communications equipment at the network point of demarcation, where the connection of the communications equipment to the service provider side is optical or non-electrical, if provided with service equipment and installed in accordance with requirements for service-entrance conductors.
Exception No. 1: If a supply intended for installation in a meter base is listed for the purpose and the output is Class 2 or limited power circuits used by listed information technology equipment, a service disconnecting means for the supply is not required.

Substantiation: Problem: Currently the NEC does not allow meter base powering solutions for communications equipment applications such as fiber to the home (FTTx). There is confusion in the industry and with some AHJs on whether equipment installed at this location is under the jurisdiction of the NEC. In a survey by UL to the Electrical Council a significant number of the respondents felt these devices fall under the NEC, however no exception currently exists to accept this type of equipment. Most of the respondents also indicated that they did not object to a revision of Article 230-82 to accept this type of equipment.

Proposal: Allow for power in two basic cases where the communications equipment is isolated on the network side and energizing the network on the service provider side is not possible if a fault occurs in the communications equipment power supply. The first case would allow powering of these circuits the same as the following existing exception:

(5) Taps used only to supply load management devices, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors.

The second case (exception No. 1 in the proposed text) would allow supplies that have been specifically investigated for use in a meter base with a Class 2 or limited power output to directly power communications equipment at the network demarcation point without the need for a separate service entrance.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented to the panel sufficient technical data to make a decision on this proposal.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-149 Log #4593 NEC-P04 **Final Action: Reject**
(230.82)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee

Recommendation: Revise this section to read as follows:

<u>230.82. Equipment Connected to the Supply Side of Service Disconnect.</u> Only equipment included in this section shall be permitted to be connected to the supply side of the service disconnecting means.

<u>(A) Unswitched Equipment.</u>

<u>(1)</u> Cable limiters or other current limiting devices

<u>(2)</u> Meters or meter sockets nominally rated not in excess of 600 volts, provided all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250.

<u>(3)</u> Instrument transformers (current and voltage), high-impedance shunts, load management devices, and Type I surge protective devices

<u>(4)</u> Taps used only to supply load management devices, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors

<u>(5)</u> Solar photovoltaic systems, fuel cell systems, or interconnected electric power production sources

<u>(6)</u> Control circuits for power-operable service disconnecting means, if suitable overcurrent protection and disconnecting means are provided

<u>(7)</u> Ground-fault protection systems or Type 2 surge protective devices, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided

<u>(B) Meter Disconnect Switches.</u> A disconnecting means shall be permitted to be located ahead of the service equipment provided the installation complies with 230.82(B)(1) through 230.82(B)(3). A separate service disconnecting means that complies with Part V of Article 230 shall be installed, and shall be located as provided in 230.70(A)(1).

<u>(1) Rating.</u> A meter disconnect shall be capable of interrupting the load served. It shall have a short-circuit current rating not less than the available short-circuit current.

<u>(2) Marking.</u> A meter disconnect shall be legibly field marked on its exterior in a manner suitable for the environment substantially as follows:

METER DISCONNECT
NOT SERVICE EQUIPMENT

<u>(3) Grounding.</u> A meter disconnect shall be grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. The grounding connections shall be permitted to be in accordance with 250.142(A)(1).

Substantiation: This proposal should be read as fully supportive of the technical objectives of the 2002 NEC change in this section that added meter disconnects. The problem is to achieve those objectives in a way that does not create confusion and controversy around a fundamental principle of code application, namely, the determination of exactly which device located where constitutes the service disconnect.

Meter disconnects have been around for a very long time, normally consisting of a multipole circuit breaker mounted within a multifunction meter enclosure or in a self-contained metering pedestal. Theoretically a manufacturer could make any of them as convertible to either “hot sequence” (meter ahead of switch) or “cold sequence” (switch ahead of meter) in the field, to suit local utility requirements. At present, most of this market consists of hot sequence units that aren’t field-convertible. If these breakers are on the load side of the service point (the usual case), and if they provide overcurrent protection for the conductors they supply (also the usual case), then what they supply is a conventional feeder, and not a continuation of service conductors.

Although these switches can always be installed as service disconnects, the Advisory Committee understands the practical reluctance to do so in many cases. One major reason is that if they are so classified a grounding electrode would have to be provided at the metering point. If the meter is on the outside of the building that isn’t a big problem, but if the meter is hundreds of feet away, it would involve an additional electrode that would meet code but accomplish very little in terms of safety, since there would be no electrical loads at the remote metering point. It would be like requiring a grounding electrode conductor to be brought to every conventional meter socket.

The Committee also recognizes the increased, and justified, utility interest in cold sequence metering, especially on self-contained 480Y/277 volt metering systems, because of the greater safety it affords their service personnel. Pulling a meter under load at 277 volts to ground can result in a severe arc, which is why the NEC has required GFPE on 480Y/277 volt services for the last thirty-eight years. The remote switch makes sense, and clearly increases safety. Considering that the conductors run from the meter to the “service” disconnect are usually run as unprotected service conductors, requiring overload protection for these conductors has no observable safety justification. Remember also that bypass switches in meter sockets are to maintain load continuity, not load interruption, and opening a meter bypass switch under load may destroy the meter socket.

Some other utilities have also expressed interest in this concept where the metering is to be at a roadside, with the service running to the building served typically using an underground wiring method. This is true even on ordinary 120/240 volt single phase services to single family dwellings. Utility representatives point out, correctly, that here as well a remote disconnect adds an additional level of safety. Often electricians have been in the position of needing to pull a meter in order to deenergize service equipment in a flooded basement; a remote disconnect is much safer.

Unfortunately, countless NEC rules depend on a common understanding of exactly where the service is. Allowing two devices, often widely separated on the same property, that each potentially qualify as service disconnecting means is extremely troublesome. This proposal clearly covers this equipment in a way that precludes confusing meter disconnects with service disconnects.

It was only in the 1999 cycle that the following similar allowance was deleted from Section 230.82: “Fuses and disconnecting means or circuit breakers suitable for use as service equipment, in meter pedestals or otherwise provided and connected in series with the ungrounded service conductors and located away from the building supplied.” The reason this provision was deleted (Proposal 4-159 in the 1999 NEC cycle) was that such disconnecting means are in fact service disconnects and the normal requirements in Part B of Article 225 should generally apply because the conductors they supply are feeders. Further, the existence of this provision (which originated in the 1971 NEC, long before building disconnects moved from old Section 230-84 to Article 225) was leading to confusion and inconsistent application of the rules because of conflicts with Article 225. That action was essentially correct.

The meter disconnect supplies no electric equipment in its vicinity, and therefore requiring all the usual grounding provisions at a service disconnect appears to add little to safety, and discouraging its placement means reducing safety for the sake of editorial purity. On the other hand, a remote disconnect that waddles and quacks like a service disconnect will be treated accordingly by many inspectors, resulting in substantial argument and inconsistency in the application of a fundamental concept, the location of the service disconnect. This proposal provides the appropriate context for these switches, including a field-marking requirement that makes the function obvious.

This version of this previously submitted proposal responds to CMP 4’s objections during the comment stage of the 2005 cycle. The subsection (B) title now includes the word “switches” to provide a clearer contrast from (A) on unswitched equipment. The former (B)(1) (service disconnect provided) has been moved into the parent language of (B) so as to not create confusion in a section covering equipment ahead of service disconnects. In addition, for the same reason, former language covering service equipment has been dropped. A service disconnect placed ahead of a meter is not within the scope of this location.

At that time, CMP 4 also raised the issue of “it would not make any sense to locate a meter disconnecting means on the load side of the metering equipment …” The language in this proposal, however, deliberately allows for such switches on either side of the meter based on the fact that utilities differ as to which side of the meter should be disconnected. The wording has also been clarified to avoid the inference that the entire list must be installed. The second sentence for (B)(1) retains the safety ratings as presently required.

CMP 4 did not respond to the central issue addressed in the 2005 proposal, that being that the switch described here, and with the short-circuit current rating described in the current NEC, may and likely would otherwise qualify as a service disconnect as defined in Article 100, because it would be capable of constituting the main cutoff of supply. This confusion is exacerbated on systems with high available fault currents because the UL Guide Card information can be interpreted as a requirement for a fused switch at this location. The placement of a fused switch at this location will be interpreted by many as a service disconnect, however unintended. Remember that such a switch would fully comply with the overcurrent placement rule in 230.91.

This proposal is essential to avoid extensive field controversies around the location of the real service disconnect. It is highly significant that the submitter of related Proposal 4-106 is the same person as the submitter of the successful Proposal 4-159 in the 1999 cycle that deleted the prior allowance for such switches ahead of a service disconnect, precisely because of the confusion and conflicts such provisions create. We, yet again, respectfully invite CMP 4 to carefully reconsider this proposal.

CMP 4 essentially rejected the two comments supporting this proposal in the prior cycle, one from this Committee. The gravamen of the rejections was purely editorial in that the title of (A) would supposedly make the list inoperative if installed on the load side of a meter disconnect switch. Since the list includes such items as some control circuits with disconnects provided ahead of them and Type 2 surge protection provided with "suitable … disconnecting means" it is clear that the terminology "unswitched equipment" only applies to equipment that does not disconnect the entire load circuit, in contradistinction to a meter disconnect that does. However, an editorial modification could be made to retitle (A) as "Equipment Not Switched Other Than as Provided in (B)." This minor editorial quibble should not obstruct taking and does not justify the lack of effective action to address the technical merit of both the base proposal as well as the comments (4-35 and 4-36) supporting it.

Panel Meeting Action: Reject

Panel Statement: The current language adequately covers the submitter's concerns. The panel never intended that "meter disconnect switches" would serve as a service disconnecting means and that is why they are allowed "ahead of the service disconnecting means". The combination devices that the submitter references and their use as a service disconnecting means, whether they be at the building or remote from such, is a totally different requirement. A meter disconnecting switch is intended to be a separate device and in some jurisdictions is under the exclusive control of the utility company. In the last several code cycles the panel had a great deal of discussion as to why these devices had to be referenced in the NEC when they are under utility control. It was finally decided that it was best to reference these devices and to require some mandatory ratings.

The submitter offers no clarity but possibly some confusion. The group identified as "unswitched" does include devices (e.g., cable limiters and ground fault systems) that could be considered switching.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-150 Log #2005 NEC-P04 **Final Action: Reject**
(230.82(3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise last sentence: A meter disconnect shall be ~~capable of interrupting~~ identified as suitable to interrupt the maximum calculated load served.

Substantiation: Edit. A disconnect switch is an inanimate object and not capable in itself of interrupting the load. The load should be the maximum calculated load since (actual) load served could be less.

Panel Meeting Action: Reject

Panel Statement: The current wording in the referenced section is clear.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-151 Log #1729 NEC-P04 **Final Action: Reject**
(230.82(5))

Submitter: Joe Riley, City of Arlington

Recommendation: Revise text to read as follows:

230.82(5) Taps used only to supply load management devices, circuits for standby power systems, ~~fire pump equipment~~, and fire protection systems ~~and fire and sprinkler alarms~~, if provided with service equipment and installed in accordance with requirements for service entrance conductors.

Substantiation: The NEC does not have provisions for fire protection systems such as exhaust systems to be permitted for connection on the supply side of the disconnecting means as required in the 2006 International Building Code (IBC) Section [F] 910.4.4 Wiring and control. Wiring for operation and control of smoke exhaust fans shall be connected ahead of the main disconnect and protected against exposure to temperatures in excess of 1,000°F (538°C) for a period of not less than 15 minutes. Controls shall be located so as to be immediately accessible to the fire service from the exterior of the building and protected against interior fire exposure by fire barriers having a fire-resistance rating not less than 1 hour.

In IBC Section [F] 910.4.4, smoke exhaust fans installed under this section are not just permissible for connection ahead of the main disconnect, they are required to be connected ahead of the main disconnect. An NEC change allowing fire protective systems to be connected on the supply side of the disconnecting means will permit fire pumps, exhaust fans, and fire and sprinkler alarms for this type of connection and will be more consistent with the International Building Code and Fire Life Safety.

Panel Meeting Action: Reject

Panel Statement: The term "fire protection systems" is too general. Each item permitted to be installed on the line side of the service disconnect should be properly justified.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this item, however, the submitter has raised a legitimate issue and I encourage them to more clearly define his recommendation and resubmit it in the comment period.

4-152 Log #2881 NEC-P04 **Final Action: Accept**
(230.82(5))

Submitter: William Gross, Electric Service of Clinton

Recommendation: Revise text to read as follows:

(5) ~~Taps~~ Connections used only to supply load management devices, circuits for standby power systems, fire pump equipment and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service entrance conductors.

Substantiation: The word "Taps" as used in this section is similar to the definition used in Article 240 for "Tap Conductors." Since this is not an Article 240 application and the definition of the word "Tap" is not defined in Article 100 the wording should be changed.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

ZGONENA, T.: The panel action to accept this proposal was not appropriate. The proposal should be rejected. The word "Taps" is the correct word, in that it requires applying the requirements for tap conductors in this situation. Changing "taps" to connections would allow the connection of conductors which **may** ~~do~~ not meet the requirements of taps.

4-153 Log #2223 NEC-P04 **Final Action: Reject**
(230.82(9))

Submitter: Allen Forbes, L & A Electric, Inc.

Recommendation: Add new text to read as follows:

230.82(9) Terminal boxes.

Substantiation: It is common practice to install terminal boxes on the supply side of service equipment. This change will make Article 230 consistent with the definition of Service Lateral in Article 100.

Panel Meeting Action: Reject

Panel Statement: A terminal box is already permitted as it is an element of the wiring system and is considered an enclosure, not equipment. This is not needed. Conduit and raceways could also be installed.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-154 Log #2226 NEC-P04 **Final Action: Reject**
(230.90)

Submitter: Allen Forbes, L & A Electric, Inc.

Recommendation: Revise text to read as follows:

Each ungrounded service conductor terminated in a service disconnecting means shall have overload protection.

Substantiation: The existing wording implies that all service conductors shall have overload protection. This change will clarify that service conductors with taps do not require overload protection.

Panel Meeting Action: Reject

Panel Statement: The concern the submitter has raised is clearly described in the next paragraph – 230.90(A).

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-155 Log #3390 NEC-P04 **Final Action: Reject**
(230.90)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.90 Where Required. Each ungrounded service-entrance conductor shall have overload protection.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Not all service conductors are service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-156 Log #228 NEC-P04 **Final Action: Reject**
(230.90(A))

Submitter: Don A. Hursey, Durham County Inspections Department

Recommendation: Add to the end of 230.90(A):

The ampacity of the conductor shall be at least the ampere rating of the service entrance enclosure.

Substantiation: As an electrical inspector for 30 years, I have experienced where a MLO service entrance enclosure was rated much higher than the conductors that supply it. So many times engineers assume the conductors are already size for the service enclosure rating instead of the calculated load. This has caused problems when another service disconnect is added to the MLO service equipment enclosure.

Panel Meeting Action: Reject

Panel Statement: Service equipment can have a higher rating. As an example a 200A service panelboard could have a 100A main circuit breaker installed and in this instance the rating of the service equipment is 100A and it would be wired to that rating and not the possible rating of the service equipment. The conductors are not required to have a rating the same as the MLO service equipment. Clarification for that is located in 230.90 (A) Exception No.3. These conductors do have to be rated for the calculated load on all of the two to six disconnecting means located in the MLO equipment.

The problem the revision is attempting to resolve is an education and enforcement issue.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-157 Log #3426 NEC-P04 **Final Action: Reject**
(230.90(A))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.90(A) Ungrounded Conductor. Such protection shall be provided by an overcurrent device in series with each ungrounded service-entrance conductor that has a rating or setting not higher than the allowable ampacity of the conductor. (The rest of the text of this Section and Exceptions No. 1 and No. 2 to remain the same.)

Exception No. 3: Two to six breakers or sets of fuses shall be permitted as the overcurrent device to provide the overcurrent protection. The sum of the ratings of the circuit breakers or fuses shall be permitted to exceed the ampacity of the service-entrance conductors, provided the calculated load does not exceed the ampacity of the service-entrance conductors. (The rest of the text in Exceptions No. 4 and No. 5 to remain the same.)

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Not all service conductors are service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all "service-laterals" and "service drops" are always installed by utility companies.

4-158 Log #230 NEC-P04 **Final Action: Reject**
(230.90(A) Exception No. 2)

Submitter: Don A. Hursey, Durham City-County Inspections Department

Recommendation: Delete text as follows:

~~Exception No. 2: Fuses and circuit breakers with a rating or setting that complies with 240.4(B) or (C) and 240.b shall be permitted.~~

Substantiation: 240.21(B) and 240.21(C) does not allow the provisions of 240.4(B) or (C). This should also not be permitted for service conductors which have no overcurrent protection on the line side of the conductors.

Panel Meeting Action: Reject

Panel Statement: The submitter has not submitted any technical data to support the deletion of the allowance of utilizing the next standard size rules in accordance with the limitations expressed in Article 240 for service conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 9 Negative: 1

Explanation of Negative:

ZGONENA, T.: The panel action to reject this proposal was not appropriate. The proposal should be accepted. As the submitter noted, 240.21(B) specifically prohibits the application of 240.4(B) to protection for a feeder tap. If it is unacceptable for a feeder tap, certainly it should also be unacceptable to apply this rule to protection for an ungrounded service conductor.

4-159 Log #3395 NEC-P04 **Final Action: Reject**
(230.90(B))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.90(B) Not in Grounded Conductor. No overcurrent device shall be inserted in a grounded service-entrance conductor except a circuit breaker that simultaneously opens all conductors of the circuit.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Not all service conductors are service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-160 Log #2170 NEC-P04 **Final Action: Accept in Principle**
(230.92)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

230.92 Locked Service Overcurrent Devices.

Where the service overcurrent devices are locked or sealed or are not readily accessible to the occupant branch-circuit or feeder overcurrent devices shall be installed on the load side, shall be mounted in a readily accessible location, and shall be of lower ampere rating than the service overcurrent device.

Substantiation: It is quite common for such a panel to contain feeder circuits as well as branch circuits. Current language doesn’t address this situation.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 4-161.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-161 Log #2983 NEC-P04 **Final Action: Accept**
(230.92)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

230.92 Locked Service Overcurrent Devices.

Where the service overcurrent devices are locked or sealed or are not readily accessible to the occupant, branch-circuit or feeder overcurrent devices shall be installed on the load side, shall be mounted in a readily accessible location, and shall be of lower ampere rating than the service overcurrent device.

Substantiation: It is quite common for such a panel to contain feeder circuits as well as branch circuits. Current language doesn’t address this situation.

Panel Meeting Action: Accept

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-162 Log #3432 NEC-P04 **Final Action: Reject**
(230.93)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

230.93 Protection of Specific Circuits. Where necessary to prevent tampering, an automatic overcurrent device that protects service-entrance conductors supplying only a specific load, such as a water heater, shall be permitted to be locked or sealed where located so as to be accessible.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Not all service conductors are service-entrance conductors.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-163 Log #223 NEC-P04 **Final Action: Reject**
(230.95)

Submitter: Kim Hovey, Howard R. Green Company

Recommendation: Where 1000A (or more) service or feeder terminates in a factory listed device distribution device, ground fault protection is not required. Where any branch circuit of the listed device is 1000A or more, provide ground fault detection.

Substantiation: I think the intent of the 1000A or more ground fault requirement is not clear, especially, when the handbook explanatory notes make it clear that the ground fault protection is only for the line side, not the supply. Since most service (or feeders) utilize the tap rules, and terminate at a main breaker of a factory listed device, it should be clarified whether the ground fault rule is necessary. To me, there is a large difference between factory distribution devices and field installed conduit and wires.

I have submitted the same proposal to sections 215.10, 240.13, and 240.21(C).

Panel Meeting Action: Reject

Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-164 Log #4784 NEC-P04 **Final Action: Reject**
(230.95)

Submitter: Martin Camargo, Popov Engineers, Inc.

Recommendation: Revise the existing text in the second paragraph of 230.95 to read:

The rating of the service disconnect shall be considered to be the rating of the ~~largest~~ actual fuse installed or the ~~highest continuous current trip setting for which~~ rating of the actual ~~overcurrent device installed in a~~ circuit breaker installed in accordance with 240.6 ~~is rated or can be adjusted~~.

Substantiation: This proposal clarifies that the rating of a service disconnect is the rating of the actual fuse installed or the rating of the actual circuit breaker installed in accordance with 240.6.

For circuit breakers, 240.4(B) or (C) identifies considerations for adjustable trip circuit breakers. Per 240.6(B), the rating of an adjustable trip circuit breaker, not meeting 240.6(C), is the maximum setting possible. Per 240.6(C), the rating of an adjustable trip circuit breaker is considered the actual adjusted setting of the long-time trip if restricted access to the adjusted means is provided by either; removable and sealable covers, bolted equipment doors or locked doors are used. The construction of fused switches provides restricted access to the fuses similar to adjustable trip circuit breakers that meet the provisions of 240.6(C). As such, the actual fuse size installed should be considered to be the rating of the service disconnect.

If this proposal is not accepted, the NEC will continue to add undue cost to users who properly size the service equipment overcurrent protection below 1,000A. The fact that fuses sized less than 1,000A and installed in a 1,200A fused service disconnect, properly sized to comply with the Code, require Ground Fault Protection of Equipment places an unnecessary cost on the user. This is no different than the existing provisions for adjustable trip circuit breakers with restricted access provisions in accordance with 240.4(C) to not require ground fault protection of equipment if the actual setting is less than 1,000A. The ability to increase this rating is achievable for both fused switches and adjustable trip circuit breakers and as such, they should be treated the same. In fact, it is much easier and less costly to change the setting on an adjustable trip circuit breaker, complying with 240.4(C), after the fact with the simple adjustment of a dial than it is to replace lower fuses rated less than 1,000A with fuses rated 1,000A or higher which can cost in excess of $1,500. What happens after the system is installed and inspected, for both fuses and adjustable trip circuit breakers, is out of control of the NEC.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented any technical data to support the reduction in this requirement other than a potential cost savings. The installation of GFPE equipment can save end users substantial expenses by preventing unwanted catastrophic failures and the resultant loss of use of the facility. This requirement is intended to be treated separately from the requirements found in Article 240.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-165 Log #3932 NEC-P04 **Final Action: Reject**

(230.95 Exception No. 2 (New))

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)

Recommendation: Add a second exception after the second paragraph, designating the existing exception as Exception No. 1.

Exception No 2: Ground fault relays on the normal source side (line side of the transfer switch) that supply emergency svstems, legally required standby systems, or healthcare essential electrical svstems, are permitted to be restrained from operating for ground faults on the loadside of the transfer switch if the system complies with both of the following:

(a) Ground fault protection relays on the normal source side (line side of the transfer switch) are not restrained from operation for ground faults on the normal source side (line side of the transfer switch)

(b) Audible and visual signal devices indicate whenever a sround fault relay has been restrained. Instructions on the course of action to be taken in the event of an indicated ground fault shall be located at or near the sensor location.

Substantiation: For life-safety purposes and system reliability for the prevention of blackouts, it is desirable that a ground-fault on the load side of a transfer switch in an emergency system, legally required standby system, or healthcare essential electrical system, not take out the ground fault protection on the normal source. This proposal allows the ground fault protection on the normal source to be restrained from operating and taking down all or major portions of the normal system because of a ground fault on the load side of the transfer switch. For these critical life-safety-related applications, it requires both audible and visual signaling that a ground fault has occurred and that it is being restrained.

Restraining the normal system ground fault protection relays for faults on the load side of the transfer switch is consistent with the concept of continuity of service for emergency systems (700.26 & 700.7(D)), legally required standby systems (701.17), and healthcare essential electrical svstems (5I7.17(B)).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: This is a coordination issue and can be handled without revising the NEC. The requirement should be dealt with in Articles 517, 700, 701, and 708.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-166 Log #3959 NEC-P04 **Final Action: Reject**

(230.95(C))

Submitter: Roderic Hageman, PRIT Service, Inc.

Recommendation: Revise text to read as follows:

(C) Performance Testing. The ground-fault protection system shall be performance tested when first installed on site. The test shall be conducted in accordance with instructions that shall be provided with the equipment and shall be conducted by primary current injection to functionally test current pickup, time delay, and, if applicable, zone interlocking. A written record of this test shall be made and shall be available to the authority having jurisdiction.

Substantiation: PRIT Service, Inc. is a third-party, independent electrical testing firm accredited by the International Electrical Testing Association. In the over forty years of performing testing of ground fault systems, we have found a significant percentage of them that do not function as intended. We have found everything from faulty equipment to improper placement of primary conductors that defeat the actual ground fault protection while still allowing the push-to-test feature to function.

Time delay tests are important to ensure that the designed delays allow proper coordination with downstream protective equipment. Otherwise, unnecessary total power outages result when only a single feeder should trip. The use of zone interlocking can provide instantaneous tripping and reduce arc-flash incident energy and equipment damage. However, if this feature is not wired correctly, loss of coordination will result.

Panel Meeting Action: Reject

Panel Statement: It is not always possible to do primary current injection on an installation. The additional words could be in conflict with the words in the beginning of the same sentence that instruct to follow the instructions with the equipment. Mandating a particular method to conduct performance tests is not within the scope of the NEC.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-167 Log #4085 NEC-P04 **Final Action: Reject**

(230.95(C))

Submitter: Ron Widup, Shermco Inustries, Inc. / Rep. InterNational Electrical Testing Association

Recommendation: Revise text to read as follows:

(C) Performance Testing. The ground-fault protection system shall be performance tested when first installed on site. The test shall be conducted in accordance with instructions that shall be provided with the equipment and shall be conducted by primary current injection. A written record of this test shall be made and shall be available to the authority having jurisdiction.

Substantiation: As an Accredited Member of the InterNational Electrical Testing Association, we perform third-party performance testing on thousands of newly-installed ground fault protection systems. In the process of executing the performance testing, there is a large quantity of performance-related failures uncovered during the performance testing activities. The problems range from relatively minor modes of failure, such as an indicating lamp not functioning; to major modes of failure, such as no trip under primary fault current conditions.

Ground fault *systems* are not limited to components, but rather, they are a complete system that must be validated and performance tested as a system if the owner and Authority Having Jurisdiction are to be assured of a properly functioning ground fault protective system. Many of the instructions provided with ground fault protection systems only address the protective relay, and only require a "push to test" simulation that does not verify that the other essential components are operational and interconnected properly. The "push to test function", because it is not done by primary current injection, does not completely verify nor validate the performance of the primary sensor, the current transformer windings, the control wiring, and the control power. Because of this, it puts the owner at risk of a non-functioning ground fault protection system, increasing the possibility of extensive equipment damage and fires under ground fault conditions.

The procedures for performance testing of both newly-installed and service-aged ground fault protection systems is recognized by industry under the national consensus testing standards ANSI/NETA MTS-2007, Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems, and NETA ATS-2007, Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

As an easily-executed field test procedure for the performance testing of ground fault protection systems, industry standard procedures (from NETA) dictate the following electrical tests, and of note is item No. 4. And while it is not the author's intent to add all of the industry consensus standard procedures listed below as NEC requirements, item No. 4 is highlighted as a normal and recognized practice for the performance testing of ground fault protection systems, and would not introduce undo burden to the installing contractor nor the industry:

1. Perform resistance measurements through bolted connections with a low-resistance ohmmeter, if applicable, in accordance with Section 7.14.1.
2. Measure the system neutral-to-ground insulation resistance with the neutral disconnect link temporarily removed. Replace the neutral disconnect link after testing.
3. Perform insulation resistance test on all control wiring with respect to ground. Applied potential shall be 500 volts dc for 300-volt rated cable and 1000 volts dc for 600-volt rated cable. Test duration shall be one minute. For units with solid-state components or control devices that cannot tolerate the applied voltage, follow manufacturer's recommendation.
4. **Perform ground fault protective device pickup tests using primary injection.**
5. For summation type systems utilizing phase and neutral current transformers, verify correct polarities by applying current to each phase-neutral current transformer pair. This test also applies to molded-case breakers utilizing an external neutral current transformer.
6. Measure time delay of the ground fault protective device at a value equal to or greater than 150 percent of the pickup value.
7. Verify reduced control voltage tripping capability is 55 percent for ac systems and 80 percent for dc systems.
8. Verify blocking capability of zone interlock systems.

Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 4-166.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-168 Log #3391 NEC-P04 **Final Action: Reject**
(230.200)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.200 General. Service-entrance conductors and equipment used on circuits exceeding 600 volts, nominal, shall comply with all the applicable provisions of the preceding sections of this article and with the following sections that supplement or modify the preceding sections. (The rest of the text to remain the same.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-169 Log #4594 NEC-P04 **Final Action: Accept**
(230.205(A))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following wording at the end: “provided the disconnecting means can be operated by mechanical linkage from a readily accessible point, or electronically in accordance with 230.205(C) where applicable.”
Substantiation: The literal text of the 2008 NEC amendment, however unconscionable, now considers it to be acceptable to install a pole-top switch with no linkage to the pole base, thereby relying on personnel working with a hot stick out of a bucket truck to open the switch. This was very unlikely to have been the intent. This equipment is commonly used, and routinely provided with such linkage which can be padlocked to prevent inadvertent operation. The requirement should be appropriately stated.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 10
Ballot Results: Affirmative: 9 Negative: 1
Explanation of Negative:
SIGMUND, J.: I am voting against the panel action to accept. Use of fuse cutouts are common in industrial occupancies, with sufficient expertise and supervision to maintain this type of installation. I would propose adding an exception that mechanical linkage or electrical operation is not required in industrial occupancies where conditions of maintenance and supervision ensure that only qualified personnel will be operating and maintaining these disconnect switches.

4-170 Log #3401 NEC-P04 **Final Action: Reject**
(230.205(B))

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.205(B) Type. Each service disconnect shall simultaneously disconnect all ungrounded service-entrance conductors that it controls and shall have a fault-closing rating that is not less than the maximum short-circuit current available at its supply terminals. (The rest of the text to remain the same.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-171 Log #1631 NEC-P04 **Final Action: Accept**
(230.208, FPN)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the “Accept in Principle” action taken on Proposal 6-123.
This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the FPN, change “Table 310.67 through Table 310.86” to “Table 310.60(C)(1) through Table 310.60(C)(20)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.67 through 310.86 as Tables 310.60(C)(1) through 310.60(C)(20) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

4-172 Log #3370 NEC-P04 **Final Action: Reject**
(230.209)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
230.209 Surge Arresters (Lightning Arresters). Surge arresters installed in accordance with the requirements of Article 280 shall be permitted on each ungrounded overhead service-entrance conductor.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Not all service conductors are service-entrance conductors.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, in addition the submitter is incorrect in the statement that under current code requirements that all “service-laterals” and “service drops” are always installed by utility companies.

4-173 Log #3609 NEC-P04 **Final Action: Reject**
(230.213)

Submitter: G. Scott Peele, Progress Energy
Recommendation: Add new text to read as follows:
Current -Voltage Diversion Trip (CVDT) shall be provided as an integral part of the service disconnect to protect from unwanted current paths or voltage shifts on the service conductors. The circuit should provide trip protection on residential of no more than 10 amps diversion for 30 seconds continuous and/or + - 10% voltage diversion (deviation) on the service conductors. Current sensing will be prior to supply-side equipment bonding jumper.
Substantiation: Background information and pictures, data, and diagrams are supporting material.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented sufficient data to require this equipment on every service. In addition, the submitter references single family dwelling services in his substantiation and the proposed requirement is for services over 600 volts.
Number Eligible to Vote: 10
Ballot Results: Affirmative: 10

ARTICLE 240 — OVERCURRENT PROTECTION

10-9 Log #1549 NEC-P10 **Final Action: Reject**
(240.2.Current-Limiting Overcurrent Protective Device)

Submitter: John Warren, I.B.E.W. Electrician/Apprentice Instructor / Rep. I.B.E.W. Local #176
Recommendation: Add new text as follows:
240.2 Definitions.
Current-Limiting Overcurrent Protective Device. A device that, when interrupting currents in its current-limiting range, reduces the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance.
A current-limiting protective device is one that cuts off a fault current in less than one-half cycle. It thus prevents available short-circuit currents from building up to their full magnitude.
Substantiation: This statement is an important characteristic of all current limiting devices and should be added to improve the understanding of how the magnitude is reduced.
Panel Meeting Action: Reject
Panel Statement: The proposal is not in agreement with the definition of a current-limiting circuit breaker in the UL Standard for circuit breakers (UL 489). The proposed language is too restrictive. The NEC is not a design specification or an instruction manual for untrained persons per section 90.1(C).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-10 Log #2560 NEC-P10 **Final Action: Reject**
(240.2.Tap Conducors)

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Delete the definition of “Tap Conductors” in 240.2.
Substantiation: This proposal and a sister proposal to include the definition of “Tap Conductors” in Article 100 would more accurately adhere to the Scope of Article 100, since the phrase “tap conductors”, as defined in 240.2, is used in more than one Article. Specifically, 430.28 and 210.19(A)(3) Ex 1. In addition, there would be less uncertainty by code users about whether the use of the term “tap conductors” used in articles other than 240 has a different meaning than as defined in 240.2.
Panel Meeting Action: Reject
Panel Statement: The definition of the term “tap conductor” must remain in Article 240. The term “tap conductor” is used in the NEC for applications other than those in Article 240. See panel action and statement on proposal 10-8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-11 Log #3440 NEC-P10 **Final Action: Reject**
(240.2.Tap Conductors)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
240.2 Definitions.
Tap Conductors. As used in this article, a tap conductor is defined as a conductor, other than a service-entrance conductor, that has overcurrent protection ahead of its point of supply that exceeds the value permitted for similar conductors that are protected as described in 240.4. (The remainder of the text in 240.2 to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles.

That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: The recommendation is contingent on the acceptance of proposals to CMP-4 which intend to modify service related definitions. The global implications of such a change would require task group action to correlate the use of these terms throughout the document. CMP-10 requests that the TCC direct CMP-4 to comment on this proposal and a task group be formed if necessary.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-12 Log #539 NEC-P10 **Final Action: Reject**

(240.4, FPN (New))

Submitter: James W. Moore, Samaritan's Purse World Medical Mission, Gregory P. Bierals

Recommendation: Add new text to read as follows:

FPN: For overcurrent protection requirements for transformers, see 450.3, 450.4, 450.5, and 450.6.

Substantiation: A fine print note is included in 450.3 which references four sections of Article 240 for overcurrent protection of conductors. This new FPN will serve as an aid to users of the Code where transformers are to be installed or are already installed.

Panel Meeting Action: Reject

Panel Statement: The intent of the submitter is met in the present text of the NEC and the overcurrent protection requirement reference for transformers is addressed in NEC 240.3.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-13 Log #618 NEC-P10 **Final Action: Reject**

(240.4, FPN)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add new text to read as follows:

FPN: See ICEA P32-382 for information on allowable short-circuit currents for insulated copper and aluminum conductors.

Substantiation: Overcurrent protection of conductors is based on protection against overload, as well as short-circuit and ground-fault conditions. Simply providing this protection based upon the listed ampacities from the tables in Article 310 will not always provide this protection, possibly causing damage or total failure of the insulation.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided substantiation that the tables of Section 310 are inadequate.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

FREDERICKS, C.: I'm voting against the panel action, the panel action should have been to accept. It is broadly known that especially for higher short circuit currents, additional considerations may be needed beyond existing NEC rules to ensure that conductors are protected against all possible short circuit conditions. One reference that is widely considered in these determinations is ICEA P32-382, as referenced in the proposal. The proposed addition of the FPN would help alert NEC users to this design issue.

OCKULY, G.: I vote negative on Panel action.

The proposed FPN would absolutely improve safety by alerting the Code user that conductors must be protected for their full range of overcurrents. This includes both overload and short-circuit currents. The NEC does a sufficient job providing requirements for overload protection; however, protection against short-circuit is somewhat vague. Proper, full range conductor protection is necessary to comply with NEC Section 110.10. For example: an AWG 10 copper conductor with THW insulation has a nominal 35 ampere allowable ampacity (Table 310.16). It is important to note that this same conductor has a short-circuit rating of 4,300 amperes for one cycle. Proper conductor protection mandates providing protection over the full range of overcurrents. The proposed FPN is a valuable addition to this Section.

10-14 Log #3110 NEC-P10 **Final Action: Accept**

(240.4(B))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing title of 240.4(B) of the 2008 NEC as follows:

(B) Overcurrent Devices Rated 800 Amperes or Less.

Substantiation: The definition of "device" in Article 100 was changed in the 2008 NEC. Even without the change, it is clear fuses and circuit breakers meet the definition of "device" including conductors. So, it seems the addition of the word "Overcurrent" will make it clear the type of "device" contemplated in this section.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-15 Log #4813 NEC-P10 **Final Action: Reject**

(240.4(B)(4) (New))

Submitter: Charles M. Williams, Stealth Electric

Recommendation: New Subsection (4) If the conductors being protected supply a service, or distribution sub-panel, have lesser ampacity than the overcurrent protection device or equipment they terminate on, an identification plate shall be placed on the equipment.

Substantiation: Anyone installing electrical circuits subsequent to the installation of these kinds of equipment may assume conductors meet the same level of ampacity. The hazard is decreased in the case of branch circuits, as these are less likely to be increased in load demand.

Panel Meeting Action: Reject

Panel Statement: The submitter has provided no substantiation that a safety issue exists when the conductor's overcurrent protection is sized according to 240.4(B).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-16 Log #2944 NEC-P10 **Final Action: Accept**

(240.4(C))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing title of 240.4(C) of the 2008 NEC as follows:

(C) Overcurrent Devices Rated Over 800 Amperes.

Substantiation: The definition of "device" in Article 100 was changed in the 2008 NEC. Even without the change, it is clear fuses and circuit breakers meet the definition of "device." But, many other components used in electrical systems also meet the definition of "device" including conductors. So, it seems the addition of the word "Overcurrent" will make it clear the type of "device" contemplated in this section.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-17 Log #2984 NEC-P10 **Final Action: Reject**

(240.4(C))

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Delete the following text:

~~(C) Devices Rated over 800 Amperes. Where the overcurrent device is rated over 800 amperes, the ampacity of the conductors it protects shall be equal to or greater than the rating of the overcurrent device defined in 240.6.~~

Substantiation: 240.4(C) provides no relief to the general requirement of 240.4.

Items (A), (B), (D), (E), (F) and (G) are exceptions to the rule of 240.4, but 240.4(C) simply makes you comply with the general rule of 240.4. 240.4(C) is simply an unneeded redundancy.

Panel Meeting Action: Reject

Panel Statement: 240.4(C) is not intended to supply relief to the general requirement of 240.4. Section 240.4(C) specifically addresses devices rated over 800 amperes. Since 240.4(B) is for devices rated 800 amperes or less, it is logical to have an additional first level subdivision for devices rated over 800 amperes for the purpose of increased clarity and usability.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

COOK, D.: Submitter's substantiation is correct. The required action to comply with current NEC 240.4 and 240.4(C) is exactly the same. I also agree with Panel statement that maintaining 240.4(C) is logical and useful to users. I would suggest an Accept in Principal action, maintain existing 240.4(C), and revise the main paragraph in 240.4 to read:

Protection of Conductors. Conductors, other than flexible cords, flexible cables, and fixture wires, shall be protected against overcurrent in accordance with their ampacities specified in 310.15, ~~unless otherwise~~ as permitted or required in 240.4(A) through (G).

10-18 Log #1271 NEC-P10 **Final Action: Reject**
(240.4(F))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:

240.4(F) Transformer Secondary Conductors. Single-phase (other than 2-wire) and multiphase (other than delta-delta, 3-wire) transformer secondary conductors shall not be considered to be protected by the primary overcurrent protective device. ~~Conductors supplied by the secondary side of a single-phase transformer having a 2-wire (single-voltage)secondary, or a three-phase,delta-delta connected transformer having a 3-wire (single-voltage) secondary, shall be permitted to be protected by overcurrent protection provided on the primary (supply) side of the transformer, provided this protection is in accordance with 450.3 and does not exceed the value determined by multiplying the secondary conductor ampacity by the secondary-to-primary transformer voltage ratio.~~

FPN: See 240.21(C)(1) Protection by Primary Overcurrent Device

Substantiation: In the interest of not repeating NEC rules in multiple sections, we believe this is a good way to keep the intent of both sections intact. We will propose the opposite change to 240.21(C)(1).
Panel Meeting Action: Reject
Panel Statement: The requirements in 240.4 are general in nature and the inclusion of 240.4(F) is necessary to clarify where conductors on the secondary of a transformer are considered to be protected by the primary overcurrent protective device. The proposed deletion of the qualifiers for the protection of the secondary conductors would cause confusion and misapplication of the NEC. The inclusion of an informational fine print note is not as user friendly as including the requirement. The duplication in 240.21(C)(1) is necessary to differentiate conductors meeting the general requirements of 240.4(F) from those considered as not being protected at their point of supply in 240.21(C)(2) through (6).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

COOK, D.: The existing text in 240.4 (F) and 240.21 (C) (1) is difficult to read and understand.

The rating of the overcurrent protective device and the location of that device are two separate requirements. The submitter's statement that both sections include requirements for the rating and location of the overcurrent protective device seem true.

The general requirement in 240.4 requires the rating of the device to match the ampacity of the conductor unless alternate permission is provided in items (A) through (G).

The general requirement in 240.21 requires the overcurrent device that is sized in 240.4 to be located at the supply end of the conductor that it protects unless an alternate location is provided in items (A) through (H).

Item 240.21(C) (1) allows an alternate location for protection for secondary conductors of single phase, 2-wire transformer and three phase, delta-delta, 3-wire transformers. It also includes the conditions for this alternate location (including the overcurrent protection sizing requirement). This item includes the complete set of requirements. It seems the text in 240.4 (F) could simply provide permission to use the complete set of requirements in 240.21 (C) (1) to determine the rating of the overcurrent device.

It seems the proposal could be accepted in principal and the text in 240.4(F) revised to read: Transformer Secondary Conductors. Where transformer secondary conductors are protected by primary overcurrent device in accordance with 240.21(C) (1).

10-19 Log #1329 NEC-P10 **Final Action: Reject**
(240.5(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence:

Fixture wire shall be protected against overcurrent in accordance with its ampacity as specified in Table 402.5 <u>unless otherwise permitted or required elsewhere in this Code</u>:

Substantiation: Present wording appears to conflict with 240.5(B)(2) and Table 430.72(B) where fixture wire is used for motor control circuits per 725.49(B) and Table 240.4(G) reference to article 430 motor control circuits. Without the proposed wording, the requirement of 402.12 may confuse code users as to whether Table 240.4(G) reference to Article 430 or the reference to tables applies.
Panel Meeting Action: Reject
Panel Statement: The main paragraph clearly states that protection shall be provided in accordance with either 240.5(A) or 240.5(B) so no conflict resides between 240.5(A) and 240.5(B)(2). There is no conflict with 725.49(B) since Chapters 5 through 7 supplement or modify Chapters 1 through 4 in accordance with NEC 90.3. NEC 240.3 clearly provides permission for the protection of fixture conductors in accordance with specific equipment articles found in Table 240.3.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-20 Log #1197 NEC-P10 **Final Action: Reject**
(240.5(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

(1) 20-ampere <u>and less</u> circuits, -18 AWG up to 15m (50 ft) of run length
(2) 20-ampere <u>and less</u> circuits, 16 AWG up to 30m (100ft) of run length
(3) 20-ampere <u>or less circuits</u> -14 AWG and larger
(4) <u>over 20 to</u> 30-ampere circuits -14 AWG and larger
(5) <u>over 30 to</u> 40-ampere circuits 12 AWG and larger
(6) <u>over 40 to</u> 50-ampere circuits -12 AWG and larger

Substantiation: Edit. Intermediate ampere rated circuits and nonstandard ratings should be incorporated.
Panel Meeting Action: Reject
Panel Statement: The lower rated overcurrent devices are permitted to be used in the NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-21 Log #4280 NEC-P10 **Final Action: Reject**
(240.7)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 240.7.

<u>240.7 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>

<u>(1) Equipment listing or labeling</u>

<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>

<u>(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment</u>

Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: Listing and third party evaluation are methods to support approval of equipment and should be considered in NEC 110.2; however, they may not be the only methods. The concept of providing fundamental guidance for making the approval decision has merit. Since the approval issue spans several articles, the panel requests that this be taken up by the TCC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

COOK, D.: The discussion of Proposals 10-21 through 10-25 did not include an expectation from CMP-10 that AHJ's should be able to evaluate overcurrent devices in the field and use that evaluation as a basis for the required approval of that equipment. Without that self evaluation in the field, it is obvious some other basis will be required. The panel statement indicates "listing" and "third party evaluation" (otherwise known as "field evaluations") are methods to support approval, but not the only methods. While indicating other methods should be included, the panel offers no suggestion for other acceptable methods (basis) for approval. As a representative of code enforcement, I believe the easiest, most consistent and predictable basis for equipment (overcurrent device) approval is listing. As an AHJ working to approve overcurrent devices that protect equipment and circuits operating at very low voltage and current levels to equipment and circuits operating as high as 115 KV, my desire is to see `listing" for all overcurrent devices. Note that product standards for this equipment include testing (some that could be destructive) and verification of prescriptive construction requirements that cannot be performed in the field. I realize a revision to immediately require listing of all overcurrent devices is not financially feasible and from a timing standpoint, may not be possible by 2011. Therefore item 3 was included to allow AHJ's to use methods they have been utilizing as the basis for their equipment approval. The basis of the 2017 date was to allow time for industry to achieve certification of uncertified products.

That time may not be reasonable. Establishing a direction for certification and a reasonable time frame to achieve that goal was the purpose of the proposal. The dated selected was a random guess at what might be reasonable and the exact time frame is less important than achieving the objective. While it is obvious the examples included in item 3 are not popular, but no other examples were offered as a basis for approval. Some organizations represented have taken public positions to oppose manufacturers self declaration of conformity, but choose not to support requirements for independent third party certification of equipment. Without some action for this issue, Article 240 leaves the +-40,000 local enforcement jurisdictions in the US and any other enforcement jurisdictions around the world no direction to establish a reasonable basis for approval of overcurrent protection equipment. Not providing that direction leaves owners, designers, installers, manufacturers, and enforcement to politically and economically negotiate the direction and level of safety afforded by the overcurrent protective devices at the local level. That local political and economic negotiation will result in inconsistent enforcement of the overcurrent protection requirements. I fail to understand how that approach is a benefit to designers, installers, manufacturers, enforcement, and owners that will be left uncertain about what is required to get their investment approved. While I would be perfectly satisfied to see criteria for equipment approval included in NEC 110.2, CMP-10 has no responsibility for the requirements in NEC 110.2.

10-22 Log #4281 NEC-P10 **Final Action: Reject**
(240.7)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 240.7.
<u>240.7 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>
<u>(1) Equipment listing or labeling</u>
<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: Listing and third party evaluation are methods to support approval of equipment and should be considered in NEC 110.2; however, they should not be the only methods. The concept of providing fundamental guidance for making the approval decision has merit. Since the approval issue spans several articles, the panel requests that this be taken up by the TCC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
COOK, D.: See my Explanation of Negative on Proposal 10-21 (Log #4280).

10-23 Log #4282 NEC-P10 **Final Action: Reject**
(240.7)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 240.7.
<u>240.7 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>
<u>(1) Equipment listing or labeling</u>
<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>
<u>(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: Listing and third party evaluation are methods to support approval of equipment and should be considered in NEC 110.2; however, they may not be the only methods. The concept of providing fundamental guidance for making the approval decision has merit. Since the approval issue spans several articles, the panel requests that this be taken up by the TCC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
COOK, D.: See my Explanation of Negative on Proposal 10-21 (Log #4280).

10-24 Log #4283 NEC-P10 **Final Action: Reject**
(240.7)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 240.7.
<u>240.7 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: Listing and third party evaluation are methods to support approval of equipment and should be considered in NEC 110.2; however, they may not be the only methods. The concept of providing fundamental guidance for making the approval decision has merit. Since the approval issue spans several Articles, the panel requests that this be taken up by the TCC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
COOK, D.: See my Explanation of Negative on Proposal 10-21 (Log #4280).

10-25 Log #4284 NEC-P10 **Final Action: Reject**
(240.7)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 240.7.
<u>240.7 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.</u>

Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: Listing and third party evaluation are methods to support approval of equipment and should be considered in NEC 110.2; however, they may not be the only methods. The concept of providing fundamental guidance for making the approval decision has merit. Since the approval issue spans several articles, the panel requests that this be taken up by the TCC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
COOK, D.: See my Explanation of Negative on Proposal 10-21 (Log #4280).

10-26 Log #4375 NEC-P10 **Final Action: Reject**
(240.12(1))

Submitter: Alan Manche, Square D Company/Schneider Electric
Recommendation: Add a new sentence to the end of bullet item 1 in paragraph of 240.12:
(1) Coordinated short-circuit protection. <u>A means to intentionally defeat the coordinated short-circuit protection shall not be permitted.</u>
Substantiation: Establishing selectively coordinated systems can increase the arc-flash hazard when maintenance is performed on the system depending upon the design of the system. The arc-flash hazard can be increased in a selectively coordinated system and the panel has accepted those risks in favor of the benefit of selectivity on these systems for the purpose of the hazard that could be created due to a non-orderly shut down. Some system designers are now including a means to defeat selectivity by installing systems that can turn the selectivity off by temporarily changing breaker settings via a switch or sensor in order to protect the electrical worker. There is no prohibition established in the NEC to restrict defeating selectivity, or the life safety aspect for which it was installed, in order to protect the electrical worker.
Unfortunately the enhanced protection for the electrical worker can be a trade-off by defeating the life safety function of the selectively coordinated system and place a greater hazard on numerous other personnel or populations. The most likely time for an incident to happen that would require the system to be selective is when a working is doing maintenance on the system. If the selectivity is defeated, an arc event small or large could initiate a fire hazard or take down lighting, ventilation, or a critical process leaving a system inoperable which places the life safety of others in a dangerous position.
There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety.
Panel Meeting Action: Reject
Panel Statement: A system that is selectively coordinated can be designed to additionally limit the amount of energy produced in an arc flash event. When a system is selectively coordinated using circuit breakers without instantaneous trips the inclusion of an energy reducing maintenance switch for the protection of persons maintaining the system may be required.
Selectively coordinated systems as required in Articles 620, 700, 701, and 708 represent electrical systems in venues that are likely to meet the justification requirements of NFPA 70E for energized work. It is not desirable to prohibit a means to reduce the amount of let-through energy in these systems while energized work is being performed.
Also see panel action and statement on Proposal 10-82.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-27 Log #223b NEC-P10 **Final Action: Reject**
(240.13 & 240.21(C))

Submitter: Kim Hovey, Howard R. Green Company
Recommendation: Where 1000A (or more) service or feeder terminates in a factory listed device distribution device, ground fault protection is not required. Where any branch circuit of the listed device is 1000A or more, provide ground fault detection.
Substantiation: I think the intent of the 1000A or more ground fault requirement is not clear, especially, when the handbook explanatory notes make it clear that the ground fault protection is only for the line side, not the supply. Since most service (or feeders) utilize the tap rules, and terminate at a main breaker of a factory listed device, it should be clarified whether the ground fault rule is necessary. To me, there is a large difference between factory distribution devices and field installed conduit and wires.
I have submitted the same proposal to sections 230.95 and 215.10.
Panel Meeting Action: Reject
Panel Statement: The purpose of the referenced paragraphs is to limit the possibility of arcing burn down of equipment. Ground fault detection in these installations would not achieve the same intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-28 Log #3931 NEC-P10 **Final Action: Reject**
(240.13 Exception (New))

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Add an exception after the first paragraph.
<u>*Exception: Ground fault relays on the normal source side (line side of the transfer switch) that supply emergency systems, legally required standby systems, or healthcare essential electrical systems, are permitted to be restrained from operating for ground faults on the loadside of the transfer switch if the system complies with both of the following:*</u>
<u>*(a) Ground fault protection relays on the normal source side (line side of the transfer switch) are not restrained from operation for eround faults on the normal source side (line side of the transfer switch)*</u>
<u>*(b) Audible and visual signal devices indicate whenever a ground fault relay has been restrained. Instructions on the course of action to be taken in the event of an indicated eround fault shall be located at or near the sensor location.*</u>
Substantiation: For life-safety purposes and system reliability for the prevention of blackouts, it is desirable that a ground-fault on the load side of a transfer switch in an emergency system, legally required standby system, or healthcare essential electrical system, not take out the ground fault protection on the normal source. This proposal allows the ground fault protection on the normal source to be restrained from operating and taking down all or a large portion of the normal system because of a ground fault on the load side of the transfer switch. For these critical life-safety-related applications, it requires both audible and visual signaling that a ground fault has occurred and that it is being restrained.
Restraining the normal system ground fault protection relays for faults on the load side of the transfer switch is consistent with the concept of continuity of service for emergency systems (700.26 & 700.7(D)). legally required standby systems (701.17), and healthcare essential electrical systems (517.17(B)).
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The requirements for ground-fault protection of equipment reside within the panels that have protection requirements for those specific applications outside the general protection requirements established by Panel 10 and therefore should remain under the purview of those specific committees unless otherwise directed by the TCC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-29 Log #190 NEC-P10 **Final Action: Accept in Principle**
(240.15(B)(1))

Submitter: Bryan P. Holland, City of North Port
Recommendation: Revise as follows:
(1) Multiwire Branch Circuit. ~~Except where limited by 210.4(B)~~ Individual single-pole circuit breakers ~~with or without handle ties~~ <u>with a means to simultaneously disconnect all ungrounded conductors per 210.4(B)</u>, shall be permitted as the protection for each...
Substantiation: Section 210.4(B) negates the proposed deleted text of this proposal. This revision better correlates the two sections and helps to clarify the intent of 240.15(B)(1).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 10-30 which meets the intent of the submitter to provide correlation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-30 Log #330 NEC-P10 **Final Action: Accept**
(240.15(B)(1))

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
(1) Multiwire branch circuit. ~~Except where limited by 210.4(B),~~ Individual single-pole circuit breakers, with ~~or without~~ identified handle ties, shall be permitted as the protection for each ungrounded conductor of multiwire branch circuits that serve only single-phase line-to-neutral loads.
Substantiation: There is no longer a limitation given in 210.4(B), and handle ties will be necessary on single-pole breakers used in multiwire circuits to comply with 210.4(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-31 Log #531 NEC-P10 **Final Action: Accept**
(240.15(B)(1))

Submitter: Kenneth R. Ryan, Columbia, TN
Recommendation: Delete text to read as follows:
~~Except where limited by 210.4(B)~~, Individual single-pole circuit breakers, with ~~or without~~ identified handle ties, shall be permitted as the protection for each ungrounded conductor of multi-wire branch circuits that serve only single-phase line-to-neutral loads.
Substantiation: 210.4(B) was changed to state that "…each multi-wire branch circuit shall be provided with a means to **simultaneously** disconnect all ungrounded conductors at the point where the branch circuit originates." Article 240.15 (B)(1) should be changed to agree with Art. 210.4 (B). The above language would accomplish this bit of housekeeping.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-32 Log #2355 NEC-P10 **Final Action: Accept**
(240.15(B)(1))

Submitter: Gary P. Mullis, Mecklenburg County, LUESA
Recommendation: Revise text to read as follows:
(1) **Multiwire Branch Circuit.** ~~Except where limited by 210.4 (B), i~~ Individual single-pole circuit breakers, with or without identified handle ties shall be permitted as the protection for each ungrounded conductor of multiwire branch circuits that serve only single phase line to neutral loads.
Substantiation: 210.4(B) was revised in the 2008 NEC by deleting the limitation to only apply to multiwire circuit conductors serving more than one device or equipment on the same yoke. 210.4(B) now requires each multwire circuit to be provided with a simultaneous disconnect means. The result is that 240.15(B)(1) refers to a non existent limitation. The proposal will align the two sections and eliminate the confusion on limitations in 240.15(B)(1).
Panel Meeting Action: Accept
Panel Statement: See panel action on Proposal 10-30 which also deletes "or without" as handle ties are now required.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-33 Log #2552 NEC-P10 **Final Action: Accept in Principle**
(240.15(B)(1))

Submitter: John Stuckwisch, Barth Electric / Rep. IEJATC Local 481 IBEW
Recommendation: Delete text as follows:
~~240.15(B)(1) Multiwire Branch Circuit except where...~~
Substantiation: 240.15(B)(1) contradicts new code 210.4(B) Disconnecting Means for Multiwire Branch Circuit.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel has revised the language in order to address the submitter's concern. See panel action on Proposal 10-30.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-34 Log #2887 NEC-P10 **Final Action: Accept**
(240.15(B)(1))

Submitter: Joseph Bellantoni, Rivers Electrical
Recommendation: Revise text to read as follows:
~~Except where limited by 210.4(B),~~ individual single-pole circuit breakers, with ~~or without~~ identified handle ties, shall be permitted as the protection of each ungrounded conductor of multiwire branch circuits that serve only single phase line-to-neutral loads.
Substantiation: 210.4(B) requires the disconnecting means of a multiwire branch circuit to "simultaneously disconnect all ungrounded conductors." The wording of 240.15(B)(1) is misleading and seems to allow the use of single pole circuit breakers with or without handle ties. By removing the word "without" this bring 240.15(B)(1) in line with the requirement called for in 210.4(B) for multiwire branch circuits.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-35 Log #3044 NEC-P10 **Final Action: Accept**
(240.15(B)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal since the existing title was changed from "Multiwire Branch Circuit" to "Multiwire Branch Circuits" within the proposed text.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(A) Text remains unchanged.
FPN: Text remains unchanged.
(B) Text remains unchanged.
(1) Multiwire Branch Circuits. ~~Except where limited by 210.4(B), I~~ Individual single-pole circuit breakers~~,~~ with ~~or without~~ identified handle ties~~,~~ shall be permitted as the protection for each ungrounded conductor of multiwire branch circuits that serve only single-phase line-to-neutral loads.
Substantiation: This proposal is intended to create uniformity with 210.4(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-36 Log #3849 NEC-P10 **Final Action: Accept in Part**
(240.15(B)(1))

Submitter: Bill McGovern, City of Plano
Recommendation: Revise text as follows:
(1) Multiwire Branch Circuit. Multiwire branch circuits with ~~Except where limited by 210.4(B), individual single pole circuit breakers, with or without~~ identified handle ties, shall be permitted as the protection for each ungrounded conductor of multiwire branch circuits that serve only single-phase line-to-neutral loads.
Substantiation: 210.4(B) requires multiwire branch circuits to simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates. There seems to be confusion with the wording in 240.15(B)(1) which allows multiwire branch circuits without identified handle ties to be used for multiwire branch circuits that serve single-phase line-to-neutral loads. By eliminating without handle ties it makes it clear that all multiwire branch circuits require simultaneous disconnecting means.
Panel Meeting Action: Accept in Part
The panel accepts the deletion of "Except where limited by 210.4(B)" and "or without." The panel rejects the deletion of "with" handle ties.
Panel Statement: The panel rejects the deletion of "with" handle ties as they are now always required per 210.4(B).
See panel action and statement on Proposal 10-30.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HIDAKA, J.: The 2nd sentence of the Panel action should read: "The panel rejects the deletion of "individual single pole circuit breakers with" handle ties."
This will then correlate to the "Accept" of Proposal 10-30.

10-37 Log #4152 NEC-P10 **Final Action: Reject**
(240.15(B)(1))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Delete text as follows:
~~Except where limited by 210.4(B), i Individual single-pole circuit breakers, with or without identified handle ties shall be permitted as the protection for each ungrounded conductor of multiwire branch circuits that serve only single phase line to neutral loads.~~
Renumber (2) to (1) and (3) to (2).
Substantiation: 210.4(B) was revised in the 2008 by deleting the restriction to multiwire circuit conductors serving more than one device or equipment on the same yoke ending on the same yoke. 210.4(B) now requires each multiwire circuit to be provided with a simultaneous disconnect means. The result is that 240.15(B)(1) refers to a nonexistent limitation. The proposal will align the two sections and delete the confusion on limitations in 240.15(B)(1).
Panel Meeting Action: Reject
Panel Statement: The panel understands the submitter's concern of the present language relative to NEC 210.4(B). The panel has revised the language in order to address the submitter's concern instead of deleting the entire paragraph. See panel action on Proposal 10-30.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-38 Log #4595 NEC-P10 **Final Action: Reject**
(240.15(B)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this paragraph.
Substantiation: This topic is now completely covered in 210.4(B), which imposes identical requirements. In terms of code administration, it is poor practice to have the same rule in two different places supervised by different panels. This topic is more closely related to the application of branch-circuit configurations than it is to the functioning of overcurrent devices, and so the rules should be in Article 210.
Panel Meeting Action: Reject
Panel Statement: The panel understands the submitter's concern of the present language relative to NEC 210.4(B). The panel has revised the language in order to address the submitter's concern instead of deleting the entire paragraph. See panel action on Proposal 10-30.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-39 Log #4466 NEC-P10 **Final Action: Accept**
(240.15(B)(2), (3), and (4))

Submitter: Ed Larsen, Square D Company/Schneider Electric
Recommendation: Revise the text to read as follows:
(2) Grounded Single-Phase ~~and 3-Wire dc~~ ac Circuits. In grounded systems, individual single-pole circuit breakers rated 120/240 volts ac with identified handle ties shall be permitted as the protection for each ungrounded conductor for line-to-line connected loads for single-phase circuits ~~or 3-wire, direct-current circuits~~.
(3) 3-Phase and 2-Phase Systems. For line-to-line loads in 4-wire, 3-phase systems or 5-wire, 2-phase systems ~~having a grounded neutral point and no conductor operating at a voltage greater than permitted in 210.6~~, individual single-pole circuit breakers rated 120/240 volts ac with identified handle ties shall be permitted as the protection for each ungrounded conductor provided the systems have a grounded neutral point and the voltage to ground does not exceed 120 volts.
(4) 3-Wire dc Circuits. Individual single-pole circuit breakers rated 125/250 volts dc with identified handle ties shall be permitted as the protection for each ungrounded conductor for line-to-line connected loads for 3-wire, direct-current circuits supplied from a system with a grounded neutral where the voltage to ground does not exceed 125 V.
Substantiation: Section 240.15(2) and (3) allows the creation of multi-pole circuit breakers in the field with a handle tie for L-L applications. This provision should be limited to those applications covered by tests in UL 489, in other words, 2 single pole breakers connected with a handle tie for 120/240 Vac and 125/250 Vdc applications.

This proposal will bring the NEC into agreement with the UL White Book DIVQ guide information, which reads as follows:

Single-pole or multi-pole independent trip circuit breakers, with handle ties, rated 120/240 V ac, are suitable for use on multi-wire circuits with line-to-line or line-to-ground connected loads.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 120/240 V ac, are suitable for use in line-to-line single-phase circuits or line-to-line lighting and appliance branch circuits connected to 3-phase, 4-wire systems, provided the systems have a grounded neutral and the voltage to ground does not exceed 120 V.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 125/250 V dc, are suitable for use in line-to-line connected 3-wire dc circuits supplied from a system with a grounded neutral where the voltage to ground does not exceed 125 V.

2-pole independent trip breakers and single-pole breakers with handle ties, rated 125/250 V (both ac and dc), are suitable for use in accordance with either of the above two paragraphs, as applicable.

The proposal will prevent the misapplication of circuit breakers, particularly in light of the availability of three pole handle ties which have come on the market in response to the addition of 210.4(B) in the 2008 NEC. The UL 489 standard supports the applications allowed by the revised text, but no more.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-40 Log #246 NEC-P10 **Final Action: Accept**
(240.15(C))

Submitter: John W. Young, Siemens Energy & Automation
Recommendation: Delete text as follows:
~~(C) Closed-Loop Power Distribution Systems. Listed devices that provide equivalent overcurrent protection in closed-loop power distribution systems shall be permitted as a substitute for fuses or circuit breakers.~~
Substantiation: Article 780 – Closed Loop and Programmed Power Distribution was deleted from the 2008 NEC. Closed Loop is no longer addressed in the NEC therefore this Section should be deleted.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-41 Log #4596 NEC-P10 **Final Action: Accept**
(240.15(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this paragraph.
Substantiation: Article 780 was deleted in the 2008 cycle for lack of interest. The application addressed by this rule no longer exists. Refer to the submitter's substantiation for Proposal 10-59 in the ROP for the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-42 Log #1185 NEC-P10 **Final Action: Reject**
(240.16 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:

240.x Listing. Overcurrent protective devices shall be listed.
Substantiation: Items critical to safety of electrical installations should provide indication that testing protocols have determined a level of safety.
Panel Meeting Action: Reject
Panel Statement: Listing is a method to support approval of equipment and should be considered in NEC 110.2; but, it may not be the only method. The submitter has not provided technical substantiation that the listing of these devices should always be required.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

COOK, D.: See my Explanation of Negative on Proposal 10-21 (Log #4280).

10-43 Log #1551 NEC-P10 **Final Action: Reject**
(240.21)

Submitter: Kristin Quinn, JATC Local 176/Office Assistant / Rep. I.B.E.W. Local #176
Recommendation: Add new text as follows:

240.21 Location in Circuit. General. Overcurrent protection shall be provided in each ungrounded circuit conductor and shall be located at the point where the conductors receive their supply except as specified in 240.21(A) through (H). Conductors supplied under the provisions of 240.21(A) through (H) shall not supply another conductor except through an overcurrent protective device meeting the requirements of 240.4.
Substantiation: This would emphasize that the **general rule** is that overcurrent protection shall be provided in each ungrounded circuit conductor and shall be located at the point where the conductors receive their supply, except where permitted elsewhere in the code.
Panel Meeting Action: Reject
Panel Statement: The existing text meets the intent of the submitter. The parent text of 240.21 represents the general rule, and the eight first-level subdivisions address other permitted means of protection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-44 Log #2273 NEC-P10 **Final Action: Reject**
(240.21)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise the first sentence of the first paragraph of section 240.21 as shown here.
240.21 Location in Circuit. For other than service conductors, overcurrent protection shall be provided in each ungrounded circuit conductor and shall be located at the point where the conductors receive their supply except as specified in 240.21(A) through (H).
Substantiation: The proposed inclusion of additional words makes it clear that required OVERCURRENT protection for service conductors is NOT required at their supply point. Section 240.21(D) attempts to address this issue by referencing section 230.91, which addresses the "location" of an "overcurrent device" with respect to a service disconnecting means. Section 230.90, "where required," begins by saying that "each ungrounded service conductor shall have 'overload' protection." The seeming redundant discussion of "where" (location) to provide the "overload" protection using an "overcurrent" device (separately defined) provides an opportunity for misunderstanding about what is intended or required by these sections.
Panel Meeting Action: Reject
Panel Statement: The proposed revision is redundant and not necessary as pointed out by the submitter's substantiation that service conductor protection is already addressed in NEC 240.21(D).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-45 Log #4825 NEC-P10 **Final Action: Reject**
(240.21(B))

Submitter: Don Ganiere, Ottawa, IL
Recommendation: Add text to read as follows:

(B) Feeder Taps. Conductors shall be permitted to be tapped, without overcurrent protection at the tap, to a feeder as specified in 240.21(B)(1) through (B)(5). Feeder taps shall be permitted to originate at the load terminal of an overcurrent protective device. The provisions of 240.4(B) shall not be permitted for tap conductors.
Substantiation: This type of installation is permitted in many areas, but the code does not specifically permit it. The additional wording will make it clear that this is a code compliant installation. As long as all of the conditions of this section are complied with the point of origination of the tap conductor does not create any additional hazard.
Panel Meeting Action: Reject
Panel Statement: The proposed language is not necessary as the present language permits such installation where appropriate.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-46 Log #2945 NEC-P10 **Final Action: Accept in Part**
(240.21(B)(1))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:

(1) Taps Not over 3 m (10 ft) Long. If ~~Where~~ the length of the tap conductors does not exceed 3 m (10 ft) and the tap conductors comply with all of the following:

(1) The ampacity of the tap conductors is

a. Not less than the combined calculated loads on the circuits supplied by the tap conductors, and

b. Not less than the rating of the switchboard or other distribution equipment ~~device~~ supplied by the tap conductors or not less than the rating of the overcurrent protective device at the termination of the tap conductors.

(2) The tap conductors do not extend beyond the switchboard, panelboard, disconnecting means, or control devices they supply.

(3) Except at the point of connection to the feeder, the tap conductors are enclosed in a raceway, which shall extend from the tap to the enclosure of an enclosed switchboard, panelboard, or control devices, or to the back of an open switchboard.

(4) For field installations if ~~where~~ the tap conductors leave the enclosure or vault in which the tap is made, the rating of the overcurrent device on the line side of the tap conductors shall not exceed 10 times the ampacity of the tap conductor.

FPN: For overcurrent protection requirements for panelboards, see 408.36.

Substantiation: As defined in Article 100, the word “device” applies very broadly and can include conductors as well as panelboards. Section 408.36 requires overcurrent protection within or on the supply side of the panelboard so “panelboard” is not included in 240.21(B)(1)b. No such requirement for switchboards is found in Article 408.

Section 3.3.4 of the NEC Style Manual states that “where” should not be used to mean “when” or “if.” This proposal intends to use the word “if” where appropriate.

Panel Meeting Action: Accept in Part
Revise text to read as follows:

(1) Taps Not over 3 m (10 ft) Long. If ~~Where~~ the length of the tap conductors does not exceed 3 m (10 ft) and the tap conductors comply with all of the following:

(1) The ampacity of the tap conductors is

a. Not less than the combined calculated loads on the circuits supplied by the tap conductors, and

b. Not less than the rating of the ~~switchboard or other distribution equipment~~ device supplied by the tap conductors or not less than the rating of the overcurrent protective device at the termination of the tap conductors.

(2) The tap conductors do not extend beyond the switchboard, panelboard, disconnecting means, or control devices they supply.

(3) Except at the point of connection to the feeder, the tap conductors are enclosed in a raceway, which shall extend from the tap to the enclosure of an enclosed switchboard, panelboard, or control devices, or to the back of an open switchboard.

(4) For field installations if ~~where~~ the tap conductors leave the enclosure or vault in which the tap is made, the rating of the overcurrent device on the line side of the tap conductors shall not exceed 10 times the ampacity of the tap conductor.

FPN: For overcurrent protection requirements for panelboards, see 408.36.

Panel Statement: The panel accepts the revision of changing “Where” to “If” in order to comply with the style manual. The panel does not accept the change from “device” to switchboard or power distribution equipment” since the language narrows the use of this section well beyond the present permission without necessary substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:

COOK, D.: Submitter’s substantiation raises a valid question related to use of the Article 100 defined term “device”. However, the proposed use of the undefined term “distribution equipment” does not provide clear intent of the requirement for typical NEC users. For uniform application and enforcement of the requirement, text must clearly define equipment where 10 foot taps are permitted to terminate. Panel statement indicates proposed text narrows the use well beyond present permission. Based on the current Article 100 definition of device, narrowing the permission seems to be a positive step.

DOLLARD, JR., J.: We are voting negative on the panel action to accept in part proposal 10-46. Our comments are as follows:
The submitter is correct, the use of the word “device” in 240.21(B)(1)(1)(b) is incorrect. The word “device” is defined in Article 100 as follows:
“**Device.** A unit of an electrical system that carries or controls electric energy as its principal function.”
During the discussion on this proposal, it was clear that the panel intends for these “tap conductors” to be provided with overload protection. As presently written, the text permits termination in a device as defined above. The intent of the panel is not met in the present text of this section. The submitter is correct the existing text is confusing and should be clarified.
The present text of 240.21(B)(1)(2) includes more prescriptive text and limits termination of these “tap conductors” to “switchboard, panelboard, disconnecting means, or control devices.” The same level of clarity is necessary in 240.21(B)(1)(1)(b).
The panel statement refers to the present permission of this section. The submitter seeks only to clarify what is permitted. Clarification is needed. 240.21(B)(1)(1)(b) should be revised as follows:
“b. Not less than the rating of the switchboard, disconnecting means, or control device supplied by the tap conductors or not less than the rating of the overcurrent-protective device at the termination of the tap conductors.”
OCKULY, G.: I agree with the comment submitted by Mr. Dollard.
Comment on Affirmative:

FREDERICKS, C.: I agree with the panel action to Accept in Part, but the action should have included acceptance of the submitter’s proposed text “switchboard or other distribution equipment”. Ten foot taps may terminate on bussing or terminals other than the terminals of an overcurrent device. As long as all the requirements for a ten foot tap are satisfied, this should be acceptable.

10-47 Log #3636 NEC-P10 **Final Action: Accept in Principle**
(240.21(B)(1)(4))

Submitter: James T. Smith, Londonderry, NH
Recommendation: Revise text to read as follows:

For field installations where the tap conductors leave the enclosure or vault in which the tap is made, ~~the rating of the overcurrent device on the line side of the tap conductors shall not exceed 10 times~~ the ampacity of the tap conductor shall not be less than 1/10 the rating of the overcurrent device protecting the feeder conductors.

Substantiation: The obtuse wording of 240.21(B)(1)(4) is difficult to interpret when compared to 240.21(B)(2)(1). The wording of 240.21(B)(2)(1) is in a more understandable format and using the same wording would make it easier to interpret both sections.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 10-48.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-48 Log #4193 NEC-P10 **Final Action: Accept**
(240.21(B)(1)(4))

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:

(4) For field installations where the tap conductors leave the enclosure or vault in which the tap is made, the ampacity of the tap conductors is not less than one-tenth of the rating of the overcurrent device protecting the feeder conductors ~~the rating of the overcurrent device on the line side of the tap conductors shall not exceed 10 times the ampacity of the tap conductor~~.

Substantiation: The method of describing the ration of the tap conductor to the feeder conductor should be consistent in this section. No technical change is intended. The language is similar to that used in 240.21(B)(2)(1).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-49 Log #609 NEC-P10 **Final Action: Reject**
(240.21(B)(2)(2))

Submitter: Gregory P. Bierals, Samaritan’s Purse World Medical Mission
Recommendation: Revise text to read as follows:

The tap conductors terminate in a single circuit breaker or a single set of fuses that limit the load to the ampacity of the tap conductors. Where the tap conductors have an ampacity that does not correspond to the standard ampere ratings for fuses and inverse time circuit breakers in 240.6(A), the next standard rating that does not exceed 800 amperes may be used.

Substantiation: The short time insulation withstand rating should be sufficient for this application, even though the overcurrent protection for the tap conductor may be up to three times the tap conductor ampacity.
Panel Meeting Action: Reject
Panel Statement: The present protection rule for tap conductors is a long standing rule and there has been no substantiation presented to reduce the protection requirements of the tap conductors. The submitters substantiation even points to the conductors being protected “up to … the conductor ampacity.”
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-50 Log #3045 NEC-P10 **Final Action: Reject**
(240.21(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Transformer Secondary Conductors. A set of conductors feeding a single load, or each set of conductors feeding separate loads, shall be permitted to be connected to a transformer secondary, without overcurrent protection at the secondary, as specified in 240.21(C)(1) through (C)(6). The provisions of 240.4(B) shall ~~not~~ be permitted for transformer secondary conductors.
FPN: Text remains unchanged.
Subsections 1 through 6 remain unchanged.
Substantiation: 230.90(A) Ex No 2 allows compliance with 240.4(B), therefore there should therefore be no reason to prohibit using the next standard size for transformer secondary conductors. 240.4(B) has an excellent track record, and should be allowed all transformers, not just those that provide service conductors.
Panel Meeting Action: Reject
Panel Statement: There has been no substantiation presented that reducing the protection of secondary conductors on all transformers in feeders and branch circuits is applicable simply based on permission for a service application. The use and loading of such conductors differ and cannot be equated with feeders and branch circuits without additional information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-51 Log #1270 NEC-P10 **Final Action: Reject**
(240.21(C)(1))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
240.21(C)(1)Protection by Primary Overcurrent Device. Conductors supplied by the secondary side of a single-phase transformer having a 2-wire (single-voltage) secondary, or a three-phase, delta-delta connected transformer having a 3-wire (single-voltage) secondary, shall be permitted to be protected by overcurrent protection provided on the primary (supply) side of the transformer, provided this protection is in accordance with 450.3 and does not exceed the value determined by multiplying the secondary conductor ampacity by the secondary-to-primary transformer voltage ratio.
~~Single-phase (other than 2-wire) and multiphase (other than delta-delta, 3-wire) transformer secondary conductors are not considered to be protected by the primary overcurrent protective device.~~
FPN:See 240.4(F) Transformer Secondary Conductors
Substantiation: In the interest of not repeating NEC rules in multiple sections, we believe this is a good way to keep the intent at both locations intact. We will propose the opposite change to 240.4(F).
Panel Meeting Action: Reject
Panel Statement: The proposed deletion would cause confusion and misapplication of the NEC. The inclusion of an informational fine print note is not as user friendly as including the requirement.
The duplication in 240.21(C)(1) is necessary to differentiate conductors meeting the general requirements of 240.4(F) from those considered as not being protected at their point of supply in 240.21(C)(2) through (6).
See panel action and statement on Proposal 10-18.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
COOK, D.: Current text in the first paragraph of 240.21 requires conductors to generally be protected at the point they receive their supply except as permitted in (A) through (H). Deleting the text as proposed simply requires the transformer secondary conductors considered in the second paragraph of 240.21(C) (1) to comply with one of the other conditions in 240.21 (C). The proposed FPN is unnecessary. I support an Action to accept in principal based on revisions included above.

10-52 Log #2947 NEC-P10 **Final Action: Accept in Part**
(240.21(C)(2))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
(2) Transformer Secondary Conductors Not over 3 m (10 ft) Long. If ~~Where~~ the length of secondary conductor does not exceed 3 m (10 ft) and complies with all of the following:
(1) The ampacity of the secondary conductors is
a. Not less than the combined calculated loads on the circuits supplied by the secondary conductors, and
b. Not less than the rating of the switchboard or other distribution equipment ~~device~~ supplied by the secondary conductors or not less than the rating of the overcurrent-protective device at the termination of the secondary conductors
(2) The secondary conductors do not extend beyond the switchboard, panelboard, disconnecting means, or control devices they supply.
(3) The secondary conductors are enclosed in a raceway, which shall extend from the transformer to the enclosure of an enclosed switchboard, panelboard, or control devices or to the back of an open switchboard.
(4) For field installations where the secondary conductors leave the enclosure or vault in which the supply connection is made, the rating of the overcurrent device protecting the primary of the transformer, multiplied by the primary to secondary transformer voltage ratio, shall not exceed 10 times the ampacity of the secondary conductor.
FPN: For overcurrent protection requirements for panelboards, see 408.36.
Substantiation: As defined in Article 100, the word “device” applies very broadly and can include conductors as well as panelboards. Section 408.36 requires overcurrent protection within or on the supply side of the panelboard so “panelboard” is not included in 240.21(B)(1)b. No such requirement for switchboards is found in Article 408.
Section 3.3.4 of the NEC Style Manual states that “where” should not be used to mean “when” or “if.” This proposal intends to use the word “if” where appropriate.
Panel Meeting Action: Accept in Part
Revise text to read as follows:
(2) Transformer Secondary Conductors Not over 3 m (10 ft) Long. If ~~Where~~ the length of secondary conductor does not exceed 3 m (10 ft) and complies with all of the following:
(1) The ampacity of the secondary conductors is
a. Not less than the combined calculated loads on the circuits supplied by the secondary conductors, and
b. Not less than the rating of the ~~switchboard or other distribution equipment~~ device supplied by the secondary conductors or not less than the rating of the overcurrent-protective device at the termination of the secondary conductors
(2) The secondary conductors do not extend beyond the switchboard, panelboard, disconnecting means, or control devices they supply.
(3) The secondary conductors are enclosed in a raceway, which shall extend from the transformer to the enclosure of an enclosed switchboard, panelboard, or control device or to the back of an open switchboard.
(4) For field installations where the secondary conductors leave the enclosure or vault in which the supply connection is made, the rating of the overcurrent device protecting the primary of the transformer, multiplied by the primary to secondary transformer voltage ratio, shall not exceed 10 times the ampacity of the secondary conductor.
FPN: For overcurrent protection requirements for panelboards, see 408.36.
Panel Statement: The panel accepts the revision of changing “Where” to “If” in order to comply with the style manual. The panel does not accept the change from “device” to switchboard or power distribution equipment” since the language narrows the use of this section well beyond the present permission without necessary substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:
COOK, D.: Submitter’s substantiation raises a valid question related to use of the Article 100 defined term “device”. However, the proposed use of the undefined term “distribution equipment” does not provide clear intent of the requirement for typical NEC users. For uniform application and enforcement of the requirement, text must clearly define equipment where 10 foot secondary conductors are permitted to terminate. Panel statement indicates proposed text narrows the use well beyond present permission. Based on the current Article 100 definition of device, narrowing the permission seems to be a positive step.
DOLLARD, JR., J.: We are voting negative on the panel action to accept in part proposal 10-52. Our comments are as follows:
The submitter is correct, the use of the word “device” in 240.21(C)(2)(1)(b) is incorrect. The word “device” is defined in Article 100 as follows:
“**Device.** A unit of an electrical system that carries or controls electric energy as its principal function.”
During the discussion on this proposal, it was clear that the panel intends for these “tap conductors” to be provided with overload protection. As presently written, the text permits termination in a device as defined above. The intent of the panel is not met in the present text of this section. The submitter is correct the existing text is confusing and should be clarified.
The present text of 240.21(C)(2)(2) includes more prescriptive text and limits termination of these “tap conductors” to “switchboard, panelboard, disconnecting means, or control devices.” The same level of clarity is necessary in 240.21(C)(2)(1)(b).
The panel statement refers to the present permission of this section. The submitter seeks only to clarify what is permitted. Clarification is needed. 240.21(C)(2)(1)(b) should be revised as follows:
“b. Not less than the rating of the switchboard, disconnecting means, or control device supplied by the secondary conductors or not less than the rating of the overcurrent-protective device at the termination of the secondary conductors.”
OCKULY, G.: I agree with the comment submitted by Mr. Dollard.
Comment on Affirmative:
FREDERICKS, C.: I agree with the panel action to Accept in Part, but the action should have included acceptance of the submitter’s proposed text “switchboard or other distribution equipment”. Ten foot taps may terminate on bussing or terminals other than the terminals of an overcurrent device. As long as all the requirements for a ten foot tap are satisfied, this should be acceptable.

10-53 Log #4597 NEC-P10 **Final Action: Reject**
(240.21(C)(3))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Begin the rule as follows: "For the supply of switchboards in industrial occupancies only, where the length of secondary conductors...".
Substantiation: This is essentially an editorial proposal aimed at clarifying the limited conditions under which this rule can be used because of developments elsewhere in the Code. As a practical matter this provision is limited to tap conductors arriving at the main lugs of a switchboard. A motor control center could not qualify, because overcurrent protection in the form of a singular device is required in accordance with the rating of the common power bus, as covered in 430.94. Power panels no longer comply because all panelboards now require individual overcurrent protection, with exceptions that would not apply here (see 408.36). If the tap arrived at a wireway or auxiliary gutter over the collection of loads intended to be supplied, the individual taps to each of the loads would violate the prohibition against tapping taps, certainly so if they were reduced in size to meet the likely termination limitations of the smaller equipment.
Panel Meeting Action: Reject
Panel Statement: The proposed language limits the rule to specific equipment. The language could easily be construed as permitting switchboards and prohibiting other equipment such as switchgear.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-54 Log #3436 NEC-P10 **Final Action: Reject**
(240.21(D))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
240.21(D). Service-Entrance Conductors. Service-entrance conductors shall be permitted to be protected by overcurrent devices in accordance with 230.91.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: The recommendation is contingent on the acceptance by CMP-4 of proposals that intend to modify service related definitions. The global implications of such a change would require task group action to correlate the use of these terms throughout the document. CMP-10 requests that the TCC direct CMP-4 to comment on this proposal and a task group be formed if necessary. Also see panel action and statement on Proposal 10-11.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-55 Log #1872 NEC-P10 **Final Action: Reject**
(240.21(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (E) or substitute text: Service conductors shall ~~be permitted to be~~ protected in accordance with 230.91.
Delete (E) or substitute text: Busways and busway taps shall be ~~permitted to be~~ protected against overcurrent in accordance with 368.17.
Substantiation: Edit. "Permitted" does not impose a requirement per 90.5(B). The referenced sections already apply.
Panel Meeting Action: Reject
Panel Statement: The language "shall be permitted" is used in 240.21(D) through (H) as a means to permit overcurrent protection of a specific installation in accordance with another article within Chapters 1 to 4 but outside the scope of Panel 10. CMP-10 permits such protection but does not establish the requirements for such installation requirements. There is no data to support the change from an allowance to a mandatory requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-56 Log #2703 NEC-P10 **Final Action: Reject**
(240.21(D), (E), and (F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "permitted to be".
Substantiation: Edit. "Permitted" does not impose a requirement, per 90.5 (B).
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on 10-55.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-57 Log #1143 NEC-P10 **Final Action: Reject**
(240.21(G))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 13 for action in Article 445.
This action will be considered by the Code-Making Panel 13 as a public comment.
Submitter: Lawrence W. Forshner, Town of Natick
Recommendation: Add subsection (1) at the end of the existing paragraph:
(1) **Multiple feeders without individual overcurrent protection at the source. Conductors not over 15 m (50 ft).** Multiple feeder conductors connected to a common generator bus, on the supply end, and individual enclosures on the load end, as specified in 700.9(B)(5), shall not be required to be sized per 445.13 if the length of the conductors does not exceed 15 m (50 ft) and complies with all of the following:
(1) The conductors are protected from physical damage by being enclosed in an approved raceway or by other approved means.
(2) The conductors terminate in a single circuit breaker or single set of fuses that limit the load to the ampacity of the conductors. This devise shall be permitted to supply any number of additional overcurrent devices on its load side.
(3) The generator must be equipped with overcurrent protection meeting the requirements of 445.12.
Substantiation: I am in agreement with the new section 700.9(5) in the 2008 code. However, if a design engineer, installing a gen-set and related feeders chooses to install multiple feeders that terminate in individual enclosures, present code would require the ampacity of each feeder to comply with 445.13. A new subsection to 240.21(G) would address this situation and allow the ampacity of the individual feeders to be sized to the overcurrent protective device that they terminated in. It is appropriate for this new text to be in Article 240, and it is also appropriate for this new text to be in the "tap rule" section, with listed conditions similar to all other subsections of 240.21. It is also appropriate for it to be a subsection to the section commonly referred to in the industry as the "generator tap rule."
If a generator with a full load ampere rating of 1000 amps had three sets of feeders each terminating in 400 amp breakers, the lugs on the 400 amp breaker would have to accept cabling rated at 1000 amps. The generator entrance box would also have to accept three sets of fully rated cables. Three times what they are designed for.
Modern generators are equipped with UL listed protective relays that provide inherent protection for the generator windings, and a single set of tap conductors rated at 100 percent of the generator full load rating. This proposal addresses the overcurrent protection of multiple feeder taps that have an ampacity lower than the full load of the generator.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation to establish relaxing the protection of feeder conductors from a generator. The proposal would in effect establish a 50 ft tap rule without restriction as compared to the numerous other tap rule restrictions.
This proposal includes requirements for the sizing of conductors (445.13), which is outside the scope of Article 240. This proposal may be better suited for Articles 445 or 700.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-58 Log #2171 NEC-P10 **Final Action: Accept**
(240.21(H))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(H) Battery Conductors. Overcurrent protection shall be permitted to be installed as close as practicable to the storage battery terminals in an unclassified ~~non hazardous~~ location. Installation of the overcurrent protection within a hazardous location shall also be permitted.
Substantiation: The phrase "non-hazardous'" implies that there is no hazard whatsoever. The more accurate term, and the term used throughout the code, is "unclassified".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HIDAKA, J.: Should be "Accept in Principle" as we are not accepting the proposal verbatim. See Proposal 10-59.

10-59 Log #2985 NEC-P10 **Final Action: Accept**
(240.21(H))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(H) Battery Conductors. Overcurrent protection shall be permitted to be installed as close as practicable to the storage battery terminals in an unclassified ~~non-hazardous~~ location. Installation of the overcurrent protection within a hazardous location shall also be permitted.
Substantiation: The phrase "non-hazardous" implies that there is no hazard whatsoever. The more accurate term, and the term used throughout the code, is "unclassified".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-60 Log #4721 NEC-P10 **Final Action: Accept**
(240.21(H))

Submitter: William Svensson, National Fuel Gas
Recommendation: Revise text as follows:
Overcurrent protection shall be permitted to be installed as close as practicable to the storage battery terminals in a ~~non hazardous~~ unclassified location. Installation of the overcurrent protection within a hazardous (classified) location shall also be permitted.
Substantiation: In the first sentence, the phrase "non-hazardous location" is not defined in the NEC, whereas the term "unclassified location" is defined in 500.2 Definitions.
In the second sentence, the single term "hazardous" is not defined as to the type of hazard (voltage, amperage, or classification). Clearly the previous authors of the text in 240.21(H) were referring to a hazardous (classified) location due to the presence of hydrogen gas, or not. The phrase "hazardous (classified) location" is used hundreds of times in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HIDAKA, J.: Should be "Accept in Principle" as we are not accepting the proposal verbatim. See Proposal 10-59.

10-61 Log #4895 NEC-P10 **Final Action: Reject**
(240.21(H))

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Add a fine print note as follows:
FPN: See 480.4 for information on overcurrent protection for battery conductors.
Substantiation: To reference other code section containing information on battery conductor overcurrent protection.
Panel Meeting Action: Reject
Panel Statement: The proposed FPN does not add any further information and only serves as a pointer. It is not the intent of the panel to point to every article that could be relevant.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-62 Log #2882 NEC-P10 **Final Action: Reject**
(240.23)

Submitter: William Gross, Electric Service of Clinton
Recommendation: Revise text to read as follows:
Where a change occurs in the size of the ungrounded conductor, a similar change shall be ~~permitted~~ to be made in the size of the grounded conductor.
Substantiation: Increasing the size of the grounded conductor where there is a change in size of the ungrounded conductors will decrease the impedance of the ground fault current path. This will help to facilitate the operation of the overcurrent devices.
Panel Meeting Action: Reject
Panel Statement: If the ungrounded conductor size is increased, NEC 250.122(B) already requires the equipment grounding conductors to be increased in size. Ground fault current will not flow on the grounded conductor.
If the size of the ungrounded conductor decreases, there is no safety reason to require the size of the grounded conductor to also decrease in size.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-62a Log #1881 NEC-P10 **Final Action: Reject**
(240.24(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (B)(1) add:
(3) Dormitories
(4) Penal institutions
Revise latter part of (B)(2)...supplying, penal institution areas, dormitories, or any guest room(s) or suite(s) without permanent provisions for cooking, shall be permitted to be accessible only to authorized management personnel.
Substantiation: Dormitories in colleges, vacation camps, military schools and academies, and the penal institution areas should be included.
Panel Meeting Action: Reject
Panel Statement: The submitter has not submitted any substantiation to expand the list of occupancies.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
COOK, D.: I support the panel action to reject the expansion of the list of occupancies in 240.24(B)(1). A more appropriate action would seem to be a deletion of the existing two building or occupancy types. The key condition limiting access to the service and feeder overcurrent devices seems to be included in the main paragraph of 240.21 (B) (1) and does not seem to be related to the persons excluded from access, but rather based on the continuous building management and maintenance which limit the need for all occupants to be provided access.

10-63 Log #555 NEC-P10 **Final Action: Reject**
(240.24(E))

Submitter: Joe Riley, City of Arlington
Recommendation: Revise text as follows:
(E) Not Located in Bathrooms or Restrooms. ~~In dwelling units and quest rooms or quest suites of hotels and motels,~~ Overcurrent devices, other than supplementary overcurrent protection, shall not be located in any bathroom or restroom.
Substantiation: Many restrooms are constructed with ceramic walls and floors to provide a convenient method of cleansing with hose spray any waste matter and residue to floor drains. The regular wash down and sanitization of restroom walls and floors permits individuals' exposure to electrical shock hazards since the walls and floors are grounded tile surfaces with overcurrent devices installed in restroom areas that may be damp, wet, or where moisture may be present.
Panel Meeting Action: Reject
Panel Statement: The use of a dwelling unit or guest suite bathroom is much different than other bathrooms. The submitter's substantiation shares concern for there being a hose-down application hazard. The environmental protection of overcurrent protective devices is addressed in 240.32.
The submitter has not provided adequate substantiation to expand this requirement to bathrooms/restrooms in other than guest rooms, guest suites, or dwelling units.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
COOK, D.: While I agree with the Panel action to reject the proposal to expand the requirement to additional restroom types, the last sentence of the first paragraph in the Panel statement indicates the environmental protection of overcurrent devices is addressed in 240.32. That statement would seem to apply to the exiting restrooms where overcurrent devices are prohibited. Providing the undesired conditions that need to be avoided for overcurrent devices rather than a building or occupancy type would result in more uniform enforcement.

10-64 Log #2969 NEC-P10 **Final Action: Reject**
(240.24(E))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text as follows:
240.24 Location in or on Premises.
[240.24(A) through 240.24(D) unchanged by this Proposal]
(E) Not Located in Bathrooms <u>and Bedrooms</u>. In dwelling units and guest rooms or guest suites of hotels and motels, overcurrent devices, other than supplementary overcurrent protection, shall not be located in bathrooms. <u>In dwelling units having three or more bedrooms, overcurrent devices, other than supplementary overcurrent protection, shall not be located in bedrooms or in rooms or spaces solely accessible through a bedroom.</u>
[remainder of 240.24 unchanged by this Proposal]
Substantiation: The issue is operational accessibility of overcurrent devices.
“Occupant” in 240.24(B) is undefined and is ambiguous, depending on one’s role, as to whether it is collectively singular or individually singular. To a landlord or building management, each dwelling unit <u>is</u> in the control of a single <u>legal</u> occupant, regardless of how many individuals may reside in that dwelling unit.
In dwelling units located near colleges, universities, schools, organizations having residency and internship programs, etc., it is common for unrelated individuals to pool together to rent and share dwelling units. Where there are three or more unrelated individuals residing together, responsibility for unauthorized use of personal possession unintended for shared usage becomes unclear (the “blame game”) and individuals residing there are frequently motivated to retrofit bedroom doors with keyed deadbolts to secure those personal possessions during absences from the dwelling unit. This deadbolt retrofit may be without the knowledge or concern of the landlord or building management. While the collective occupant or the legal occupant may have ready access to overcurrent devices, some of the (other) individuals residing in that dwelling unit may not.
Panel Meeting Action: Reject
Panel Statement: The submitter’s intent is met in the present text of 240.24(B)(2).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-65 Log #3360 NEC-P10 **Final Action: Accept in Principle in Part**
(240.24(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
In dwelling units, <u>dormitories,</u> and guest rooms or guest suites of <u>inns,</u> hotels and motels overcurrent devices other than supplementary overcurrent protection shall not be located in bathrooms <u>or toilet compartments</u>.
Substantiation: Article 100 Scope indicates commonly defined terms do not require a code definition. A dormitory definition indicates it is a large area containing numerous beds, rooms for individuals or groups. Where a dormitory is provided with a bathroom(s) or toilet compartment(s) this provision should apply.
Panel Meeting Action: Accept in Principle in Part
(E) Not Located in Bathrooms. In dwelling units, <u>dormitories,</u> and guest rooms or guest suites ~~of hotels and motels~~, overcurrent devices, other than supplementary overcurrent protection, shall not be located in bathrooms.
Panel Statement: The inclusion of the term “inns” does not provide additional clarity; the terms guest room and guest suite presently meet the submitter’s intent. The deletion of the reference to hotels and motels meets the intent of the submitter.
The inclusion of the term “toilet compartment” would cause confusion as the term “bathroom” is well defined in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
COOK, D.: See my affirmative comment on Proposal 10-63.

10-66 Log #1483 NEC-P10 **Final Action: Reject**
(240.24(F))

Submitter: Steve Likes, Likes Electric
Recommendation: Add new text as follows:
Not Located over Steps. Overcurrent devices shall not be located over steps <u>in new construction. Existing panels may be changed out to new panels of same amperage</u>.
Substantiation: There are many old fuse panels that were installed over steps. This rule makes it illegal to replace these panels with safer ones with breakers. Many of these homes could not have the panels moved without major remodeling and would not be cost effective. This would leave the options of not replacing the panel and have overloaded fuses (in many cases) or bigger fuse amperages used than the wire is rated for (30 amp fuses for 20 amp fuses) or if it is done to not have the work inspected. Both of these options, in my opinion, are not right and not what the NEC should promote.
I think that panels should not be placed over stairs in new construction, but that we can replace old panels with newer, safer ones.
Panel Meeting Action: Reject
Panel Statement: Panels with overcurrent devices should not be installed over steps. The submitter has not provided adequate substantiation to show that a problem exists.
The panel takes exception to the premise in the substantiation that old fuse panels are unsafe. In Chapter 5 of the July 1, 2008 report by the Fire Protection Research Foundation, titled Residential Electrical System Aging, it is reported that all of the recovered fuses calibrated properly within the allowable time at the test current requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-67 Log #4598 NEC-P10 **Final Action: Reject**
(240.24(F))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows: Overcurrent devices shall not be located over steps of a stairway unless the step or landing below the overcurrent devices has a width in accordance with 110.26(A)(2).
Substantiation: Steps and intermediate landings come in many sizes; not all are unsuitable for this application. It would seem that if there is a flat workspace that meets Article 110 constraints, the equipment should be permitted.
Panel Meeting Action: Reject
Panel Statement: The panel discussed this application during the addition of the present language in the 2008 NEC and concluded that a landing was not a step. The panel also concluded that if a landing had the working space as required in 110.26(A)(2), it is would be acceptable to have overcurrent protection located in such a space based on the present language of the NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-68 Log #4141 NEC-P10 **Final Action: Reject**
(240.24(F), FPN (New))

Submitter: Larry LeVoir, City of Irvine
Recommendation: Add new text to read as follows:
<u>FPN: Local building codes contain restrictions on items located in or penetrating stairwells.</u>
Substantiation: This addition is necessary in view of today’s world of overlapping Code requirement. No long can an electrician consult only the NEC for an installation. The 2006 IBC does not permit penetrations into stairwells also known as exit enclosures. Just by looking at 240.24(F) in the NEC, the electrician could be led to believe that as long as they did not place a cabinet containing overcurrent devices over a stairwell that they are good to go.
Panel Meeting Action: Reject
Panel Statement: The submitter’s concern applies generally across the entire NEC; therefore, an FPN for this specific area is not warranted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
COOK, D.: Panel statement could be expanded to: The submitters concern is related to maintaining the fire rating of specific areas of a building which is already addressed in 300.21. It should also be noted that all stairways covered by 240.24(F) are not part of rated assemblies.

10-69 Log #3476 NEC-P10 **Final Action: Reject**
(240.24(G))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Revise text to read as follows:
<u>Mounting Height. No enclosure containing branch circuit overcurrent devices shall be located so that an overcurrent device is located less than two (2) ft above the earth, floor, or working platform.</u>
<u>Exception: Open bottom equipment, such as switchboards or equipment that by its physical size would require the center of the grip of the operating handle, for any service overcurrent device, feeder overcurrent device, or branch circuit overcurrent device installed in it to exceed 2.0 m (6 ft 7 in.) above the floor or working platform.</u>
Substantiation: If an installer decides to place an enclosure with the overcurrent device(s) as close to the earth, floor, or working platform as they choose, there is nothing in the code to prohibit it. To work on it or inspect it would require one to lie down on their side to be able to access it, more than likely with their face in it, possibly being exposed to energized parts.
Article 550 has had a minimum mounting height for the disconnecting means for many years.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any documentation that a problem exists.
The substantiation for requiring a minimum height of 24 inches is NEC 550, but it must be understood that is for a specific application of mobile/manufactured homes. Requiring a general minimum height requirement for locating all overcurrent protection would have a significant impact on the electrical installations including electrical machinery.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-70 Log #3795 NEC-P10 **Final Action: Reject**
(240.24(G) (New))

Submitter: John A. Schultz, St. Paul, MN
Recommendation: Add text to read as follows:
(G) Access to Structure. Where overcurrent devices are located within a structure, access tot he interior of the structure shall be provided by a personnel door.
Substantiation: In many instances, dwelling garages and similar structures are constructed without personnel doors and rely on a vehicle door for interior access. In these instances and where vehicle doors are provided with power openers supplied by overcurrent devices located within the structure and the device interrupts power, there is no way to access the device to restore power to the circuit without damaging the structure or vehicle door. A similar proposal is submitted for Section 210.8.
Panel Meeting Action: Reject
Panel Statement: 240.24(B) requires access to overcurrent devices. A garage door would allow access.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-71 Log #4911 NEC-P10 **Final Action: Reject**
(240, Part III (New))

Submitter: James Brozek, Acton, MA
Recommendation: Develop a new Part III, as shown below, and renumber existing Parts III through IX as IV through X. New Part III is to include a new 240.27 and a new 240.28. If accepted, this proposal would then require the deletion of 240.13, 230.95, 700.26, 215.10, 517.17, and 708.52. See sister proposals that accomplish this action.
III Ground Fault Protection
240.27 Ground-Fault Protection of Equipment. Ground-fault of equipment shall be provided for solidly grounded wye electrical systems of more than 150 volts to ground but not exceeding 600 volts phase-to-phase for each disconnecting means rated 1000 amperes or more. The grounded conductor for the solidly grounded wye system shall be connected directly to ground through a grounding electrical system as specified in 250.50, without inserting any resistor or impedance device.
The rating of the disconnecting means shall be considered to be the rating of the largest fuse that can be installed or the highest continuous-current trip setting for which the actual overcurrent device installed in a circuit breaker is rated or can be adjusted.
The provisions of this section shall not apply to a disconnecting means for the following:
(1) Continuous industrial processes where a nonorderly shutdown will introduce additional or increased hazards
(2) Installations where ground-fault protection of equipment is provided on an upstream disconnecting means
Exception: Where an additional level of ground-fault protection is required for health care and critical operations power systems
(3) Fire pumps
(4) The alternate source circuit for emergency systems
(5) The normal source circuit for emergency systems where the disconnecting means supplies only loads as shown in 230.2(A)(1), (2), (3), and (4)
FPN: 700.76(O) provides the requirements for signaling the presence of a ground fault in an emergency system
(A) Setting. The ground fault protection system shall operate to cause the disconnecting means to open all ungrounded conductors of the faulted circuit. the maximum setting of the ground-fault protection shall be 1200 amperes and the maximum time delay shall be one second for ground-fault currents equal to or greater than 3000 amperes.
(B) Fuse. If a switch and fuse combination is used, the fuses employed shall be capable of interrupting any current higher than the interrupting capacity of the switch during a time that the ground-fault protective system will not cause the switch to open.
(C) Performance Testing. The ground-fault protection system shall be performance tested when first installed on site. The test shall be conducted in accordance with instructions that shall be provided with the equipment. A written record of this test shall be made and shall be available to the authority having jurisdiction.
FNP No. 1: Ground-fault protection that functions to open a disconnecting means affords no protection from fault on the line side of the protective element. It serves only to limit damage to conductors and equipment on the load side in the event of an arcing ground fault on the load side of the protective element.
FPN. No. 2: This added protective equipment may make it necessary to review the overall wiring system for proper selective overcurrent protection coordination. Additional installations of ground-fault protective equipment may be needed on feeders and branch circuits where maximum continuity of electric service is necessary.
FPN No. 3: Where ground-fault protection is provided for a disconnecting means and interconnection is made with another supply system for a transfer device, means or devices may be needed to ensure proper ground-fault sensing by the ground-fault protection equipment.
240.28 Ground-Fault Protection of Equipment for Life-Safety Related Loads.
(A) Applicability. The requirement of 240.28 shall apply to
(1) Hospitals and other buildings (including multiple occupancy buildings) with critical care areas or utilizing electrical life support equipment, and buildings that provide the required essential utilities or services for the operation of critical care areas or electrical life support equipment as described in Article 517, and
(2) Critical operation (including multiple occupancy buildings) with critical operations areas as described in Article 708.
(B) Feeders. Where ground-fault protection is provided for operation of a disconnecting means as specified in 240.27, an additional step of ground fault protection shall be provided in all next level disconnecting means downstream toward the load. Such protection shall consist of overcurrent devices and current transformers or other equivalent protective equipment that shall cause the downstream disconnecting means to open and to selectively coordinate with the upstream disconnecting means for all values of available ground fault currents.
The additional levels of ground fault protection shall not be installed as follows:
(1) On the load side of an essential electrical system transfer switch
(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)
(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase
(C) Selectivity. Ground fault protection for operation of the upstream and downstream disconnecting means shall be fully selective such that the downstream disconnecting device, but not the upstream device, shall open on ground faults on the load side of the downstream device. A six cycle minimum separation between the upstream and downstream ground-fault tripping bends shall be provided. Operating one of the disconnecting devices shall be considered in selecting the time spread between these two hands to achieve 100 percent selectivity.
(D) Testing. When equipment ground-fault protection is first installed, each level shall be tested to ensure that ground-fault protection is operational.
FPN: Testing is intended to verify the ground fault function is operational. The performance test is not intended to verify selectivity as this is often coordinated similarly to fuses and circuit breakers by reviewing time current curves and properly choosing and setting the equipment. (Selectivity of fuses and circuit breakers is not performance tested for overload and short-circuit.).
Substantiation: There are currently requirements for equipment ground fault protection spread throughtout the NEC, with much duplication, making for difficult understanding and enforcement. The expertise for overcurrent protection, which includes ground-fault protection, lies with Panel 10 and therefore, the requirements for ground fault protection should reside in Article 240. This proposal consolidates requirements for ground fault protection from Articles 215, 230, 240, 517, 700, and 708. As such, it will allow for the deletion of 215.10, 230.95, 240.13, 517.17, 700.26, and 708.52.
The following text shows where each of the pieces of the proposal originates, in legislative text.
From 230.95:
Ground Fault Protection of Equipment. Ground-fault of equipment shall be provided for solidly grounded wye ~~electric services~~ electrical system of more than 150 volts to ground but not exceeding 600 volts phase-to-phase for each ~~service disconnected~~ disconnecting means rated 1000 ampere or more. The grounded conductor for the solidly grounded wye system shall be connected directly to ground through a grounding electrode system, is specified in 220.50 without inserting any resistor or impedance device.
The rating of the ~~service disconnect~~ disconnecting means shall be considered to be the rating of the largest fuse that can be installed or the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated or can be adjusted. (This now covers ground fault protection for services (230.95), feeders (215.10), and equipment (240.13), all in one requirement. Reference can be made simply to the disconnecting means, as it will cover all three applications.)
From 240.14:
The provisions of this section shall not apply to ~~the~~ a disconnecting means for the following:
(1) Continuous processes where a nonorderly shutdown will introduce additional or increased hazards
(2) Installations where ground fault protection of equipment is provided ~~by other requirements for services or feeders~~ on an upstream disconnecting means.
Exception: Where an additional level of ground fault protection is required for health care and critical operations power systems.
(3) Fire pumps (the exception covers requirements for two levels of ground fault protection for health care and COPS)
From 700.26:
(4) The alternate source circuit for emergency systems (700.26 does not require ground fault protection for the alternate source circuit of an emergency system.)
New material:
(5) The normal source circuit for emergency systems where disconnecting means supplies only loads as shown in 230.2(A)(1), (2), (3), and (4). (Ground fault protection should not be required for a disconnecting means on the normal

source of an emergency circuit if the disconnecting means serves only (1) fire pumps, (2) emergency system, or (3) legally required standby systems.)

From 700.26:

FPN 700.7(D) provides the requirements for signaling the presence of a ground fault in an emergency system.

From 230.95:

(A) Setting. The ground fault protection system shall operate to cause the ~~service disconnected~~ disconnecting means to open all ungrounded conductors of the faulted circuit. The maximum setting of the ground-fault protection shall be 1200 amperes, and the maximum time delay shall be one second for ground-fault currents equal to or greater than 3000 amperes.

(B) Fuse. If a switch and fuse combination is used, the fuses employed shall be capable of interrupting any current higher than the interrupting capacity of the switch during a time that the ground fault protective system will not cause the switch to open.

(C) Performance Testing. The ground-fault protection system shall be performance tested when first installed on site. The test shall be conducted in accordance with instructions that shall be provided with the equipment. A written record of this test shall be made and shall be available to the authority having jurisdiction.

FPN No. 1: Ground-fault protection that functions to open ~~the service disconnect~~ a disconnecting means affords no protection from faults on the one side of the protective element. It serves only to limit damage to conductors and equipment on the load side in the event of an arcing ground fault on the load side of the protective element.

FPN No. 2: This added protective equipment ~~of the service equipment~~ may make it necessary to review the overall wiring system for proper selective overcurrent protection coordination. Additional installation of ground fault protective equipment may be needed on feeders and branch circuits where maximum continuity of electric service is necessary.

FPN No. 3: Where ground fault protection is provided for ~~the service disconnect~~ a disconnecting means and interconnection is made with another supply system by a transfer device means or devices may be needed to ensure proper ground-fault sensing by the ground-fault protection equipment.

From 517.17:

240.28 ~~**517.17**~~ Ground-Fault Protection of Equipment for Life-Safety Related Loads:

(A) Applicability. The requirements of 517.17 240.28 shall apply to

(1) Hospitals and other Buildings (including multiple occupancy buildings) with critical care areas or utilizing electrical life support equipment, and buildings that provide the required essential utilities or services for the operation of critical care areas or electrical life support as described in Article 517 and

(2) Critical operations (including multiple occupancy buildings) with critical operations areas, as described in Article 708.

(B) Feeders. Where ground-fault protection is provided for operation of ~~the service~~ a disconnecting means or feeder disconnecting means as specified in 240.95 or 215.10 240.27, an additional step of ground fault protection shall be provided in all next level disconnecting means downstream toward the load. Such protection shall consist of overcurrent devices and current transformers or other equivalent protective equipment that shall cause the ~~feeder~~ downstream disconnecting means to open and to selectively coordinate with the upstream disconnecting means for all values of available ground fault currents.

The additional levels of ground-fault protection shall not be installed as follows:

(1) On the load side of an essential electrical system transfer switch

(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)

(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase

(B) Selectively. Ground -fault protection for operation of the ~~service~~ upstream and ~~feeder~~ downstream disconnecting means shall be fully selective such that the ~~feeder~~ downstream disconnecting device, but not the ~~service~~ upstream device shall open on ground faults on the load side of the ~~feeder~~ downstream device. A six-cycle minimum separation between the ~~service~~ upstream and feeder downstream ground-fault tripping bands shall be provided. Operating time of the disconnecting devices shall be considered in selecting the time spread between these two bands to achieve 100 percent selectivity. (This combines the requirements from 517.17 and 708.52.)

From 708.52(c):

(D) Testing. When equipment ground-fault protection is first installed, each level shall be tested to ensure that ground fault protection is operational.

FPN: Testing is intended to verify the ground fault function is operational. The performance test is not intended to verity selectively ~~in 708.52(D)~~, as this is often coordinated similarly to fuses and circuit breakers by reviewing ~~tie and~~ time-current curves and properly choosing and setting the equipment. (Selectivity of fuses and circuit breakers is not performance tested for overload and short-circuit). (This covers the testing requirements for both 517.17 and 708.52)

Panel Meeting Action: Reject

Panel Statement: The requirements for ground-fault protection of equipment reside within the panels that have protection requirements for those specific applications outside the general protection requirements established by panel 10 and therefore should remain under the purview of those specific committees unless otherwise directed by the TCC.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

10-72 Log #3877 NEC-P10 **Final Action: Accept in Principle in Part**
(240.35 (New))

TCC Action: The Technical Correlating Committee directs that the Chairs of Code-Making Panels 1 and 10 form a Task Group to correlate the actions taken on Proposals 10-72 and 1-183.

Submitter: Michael J. Farrell, III, Lucas County Building Regulations

Recommendation: Add a new 240.35 as follows:

240.35 Marking with Available Short-Circuit Current. Enclosures, in other than dwelling occupancies, containing service or feeder circuit overcurrent protective devices, shall be field marked with a label containing all of the following:

(1) The available short-circuit current

(2) The date on which the short-circuit calculation was performed

(3) A warning that the available short-circuit current may change over time, requiring a new calculation whenever significant changes are made to the electrical system.

Substantiation: This proposal will significantly increase the enforceability of numerous NEC® requirements. Engineers, contractors, electricians, manufactures, and distributors, must have knowledge of the available short-circuit current before equipment can be designed-in, purchased, and installed. There is simply no way for NEC® Sections 110.9, 110.10, 240.86, 250.4(A)(5), 250.4(B)(4), 409.110, 440.4(B), and 670.3(A) to be met without knowing the available short-circuit current. all the time-consuming work to determine the available short-circuit current must already be completed in order to meet the above-referenced Code sections. This proposal simply requires that this "already-determined" value be posted on the enclosure so that the electrical inspector can easily inspect the installation. It will be of great help to the inspector to understand the values upon which decisions about the equipment were made.

While the available short-circuit current normally may change over time, with changes to the serving distribution system, it is understood that the future user of this information will need to perform additional calculations in the future. The date of the previous calculation will certainly help the user to determine if and when a new calculation is necessary. The warning helps to ensure the user understands that the values can and do change over time.

In summary, this proposal increases enforceability and provides additional data that future users can utilize to make more intelligent decisions.

Panel Meeting Action: Accept in Principle in Part

Add a new section as follows:

240.35 Marking with Available Short-Circuit Current. Equipment enclosures, in other than dwelling occupancies, containing service or feeder circuit overcurrent protective devices, shall be field marked with a label containing the following:

(1) The available short-circuit current as calculated for equipment rating purposes

(2) The date on which the short-circuit calculation was performed or obtained.

Exception: In installations with written safety procedures, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, marking on the enclosure is not required if documentation of 240.35 (1) and (2) is available upon request to the authority having jurisdiction.

Panel Statement: Changes were made to emphasize that this is marking only with the available short-circuit current as calculated for equipment rating purposes. The available short-circuit current shall only be utilized for equipment selection purposes (NEC), not for arc-flash calculation purposes (NFPA 70E). These changes meet the submitter's intent to help with NEC enforcement, but better coordinate with requirements in NFPA 70E.

Also (3) was not accepted, as it is expected to be understood that short circuit currents may change with significant system or utility changes.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 8 Negative: 4

Explanation of Negative:

ELDRIDGE, C.: This proposal should be rejected since the requirement covering the need for most occupancies other than dwellings is already covered by OSHA as stated by the submitter. In addition, the need for restricting the requirements to "other than dwelling units" as proposed, has not been established. Some dwelling occupancies could have higher available fault current than the assumed 10 kA and, in fact exceed 22 kA for some installations.

FREDERICKS, C.: I am voting against the panel action to accept. A label on the equipment could give a false sense of knowledge or security, even if a warning was added as originally proposed. An effective means beyond a warning would need to be provided to ensure that the data can be verified to be applicable, and also up to date. If this proposal is finally accepted, the industrial exception as accepted by the panel should be the general rule, and there should also be a requirement that the data be verified by a responsible party before being used for equipment selection.

HIDAKA, J.: This proposal should be rejected as the available short circuit current (ASCC) information is only of value at the time of installation of the equipment. In addition, the permit process should already require this information to be known to those concerned and would be used at that time so it is redundant to require the marking on the equipment. The hazard is this information may be used in the future for arc flash calculations or future modifications when in fact the utility may have at some point after the initial installation upgraded the source such that a higher available current exists. In all cases (initial or future installations) the utility should be contacted to determine the ASCC. Since this information may only be valid the day it is applied and it needs to be determined by both the AHJ and the designer/installer of the installation at the time modification or maintenance work is being conducted, there is no value added this marking.

MANCHE, A.: The acceptance of this proposal and the panel statement establishes a number of questions and safety concerns. The accepted language requires the "Available Short Circuit Current as calculated for equipment rating purposes" to be marked on equipment that contains service or feeder overcurrent devices. The panel statement, not visible to the user of the NEC, then explains that this calculated available short circuit current is not intended to be used for making arc flash calculations for NFPA 70E purposes. Once a label is placed on the equipment with an "Available Short Circuit Current XXkA," how does the next person know if that
is for "equipment ratings only" or can be used for the arc flash analysis as may be found on markings now required by NFPA 70E? Is the maximum utility value marked on the service or was a calculation performed? Is the value that is marked on the feeder enclosure calculated from the maximum service value or from a study performed based on the actual fault current levels calculated from the actual transformer parameters? The most accurate information can be obtained from a current document based on the status of the system, not based on a marking on the equipment.

Marking the equipment with an Available Short Circuit Current value can create a significant safety hazard as pointed out by the panel statement attempting to describe how the marking is to be used, and not used. NEMA also opposes this marking requirement due to concerns about its validity and accuracy as stated in the panel statement. The marking as conveyed in the accepted text places workers at risk and makes uniform enforcement questionable.

Comment on Affirmative:

COOK, D.: I agree with the concept submitted and the actions taken by CMP-10, but the action should be expanded to include all equipment enclosures containing overcurrent devices where the available short-circuit current is greater than 10,000 amperes. While older overcurrent devices can be located with short circuit ratings as low as 5,000 amperes, I'm not aware of new overcurrent devices rated less than 10,000 amperes. Many utility transformer sizes for many single family dwelling units will limit the available current to less than 10,000, but it is not uncommon on larger custom type homes to see values greater than 10,000 amperes. Large condominium installations (dwelling occupancies) are also likely to exceed the 10,000 ampere value. Apartment complexes (dwelling occupancies) commonly are exposed to values greater than 10,000 amperes. Mixed use developments often include dwelling occupancies in locations where higher short circuit values exit. Numerous examples of "dwelling occupancies" could be provided where short circuit current values greater than 10,000 amperes are possible. The proposed text is also limited to services and feeders when available short circuit values could easily exceed 10,000 amperes at branch circuit overcurrent devices based on the specific electrical design. It also does not seen necessary to mark a value where a service equipment enclosure for a non-dwelling occupancy is supplied from a single phase utility transformer that is 10 or 15 KVA. The key to determining whether the value should be marked is the available short-circuit current value, not the occupancy type or whether the overcurrent devices protect services, feeders, or branch circuits.

OCKULY, G.: Since this proposal is similar to 1-183, the TCC may wish to correlate the actions on both these proposals. This very important proposal in necessary to ensure compliance with NEC 110.9

(Note: Sequence 10-73 was not used)

10-74 Log #2208 NEC-P10 **Final Action: Reject**
(240.50(D))

Submitter: Charles Eldridge, Indianapolis, IN
Recommendation: Revise text as follows:

(D) Renewable Fuses. Class H cartridge fuses of the renewable type shall <u>not</u> be permitted ~~to be used only for replacement in existing installations where there is no evidence of overfusing or tampering~~.

Substantiation: Most commercial and industrial locations where this type of fuse is (was?) used would have enough available fault current to make this type of fuse obsolete.
Panel Meeting Action: Reject
Panel Statement: No evidence of a field problem with Class H renewable fuses applied under the present NEC restrictions has been provided. These fuses are integral to certain older equipment such as oil-filled motor starters, where they could not be substituted. Misapplication of these fuses vs. the available short circuit level has not been substantiated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-75 Log #238 NEC-P10 **Final Action: Reject**
(240.60(C))

Submitter: Roger Downs, Nebraska State Electrical Division
Recommendation: Add new text to read:

Marking shall be visible with the fuse installed.

Substantiation: Presently, to check fuse amperage rating it is sometimes necessary to remove the fuse and turn it around.
Panel Meeting Action: Reject
Panel Statement: Per listing agency requirements, the amount of information that must be provided on the label prohibits it all from being visible on only one side of the fuse.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-76 Log #645 NEC-P10 **Final Action: Reject**
(240.80, FPN (New))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add a new Fine Print Note to read as follows:

FPN: See NFPA 70B, Electrical Equipment Maintenance, for information on circuit breaker maintenance procedures.

Substantiation: NFPA 70B has been available since 1979 and this publication has valuable information on circuit breaker maintenance.
Panel Meeting Action: Reject
Panel Statement: The scope of the NEC covers the installation of electrical system not the maintenance of the electrical system. A reference to NFPA 70B is not appropriate in the general requirements of the NEC: however, it is found in Annex F as an informational reference.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-77 Log #602 NEC-P10 **Final Action: Reject**
(240.83(E), FPN)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add a new Fine Print Note as follows:

FPN: Circuit breakers marked with a slash voltage rating. For example, 120/240 volts or 480 Y/277 volts, are not intended for use on corner grounded delta, ungrounded or impedance grounded systems.

Substantiation: Where it is possible for full phase-to-phase voltage to be present across only one pole, such as may occur if phase "A" develops a fault-to-ground on a 480 volt, B-phase, corner grounded delta system, the ground-fault current may exceed the interrupting rating of the circuit breaker.
Panel Meeting Action: Reject
Panel Statement: The specific application of the circuit breaker ratings are already addressed in 240.85. The proposed language is redundant and unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-78 Log #3645 NEC-P10 **Final Action: Reject**
(240.85)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:

240.85 Applications.

A circuit breaker with a straight voltage rating, such as 240V or 480V, shall be permitted to be applied in a circuit in which the nominal voltage between any two conductors does not exceed the circuit breaker's voltage rating. A two-pole circuit breaker shall not be used for protecting a 3-phase, corner-grounded delta circuit unless the circuit breaker is marked 1–3 to indicate such suitability.

A circuit breaker with a slash rating, such as 120/240V or 480Y/277V, shall ~~be permitted to~~ <u>only</u> be applied in a solidly grounded circuit where the nominal voltage of any conductor to ground does not exceed the lower of the two values of the circuit breaker's voltage rating and the nominal voltage between any two conductors does not exceed the higher value of the circuit breaker's voltage rating.

Substantiation: These breakers can only be used on grounded systems where the voltage to ground does not exceed the lower of the two values, however the existing wording does not actually prohibit the used of these breakers at other voltages. There is no reasonable reading of the words "shall be permitted" that can lead the reader to conclude that these words are intended to prohibit other uses. The used of the words "shall be permitted" in this section is not in compliance with 3.1.2 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: The present language provides permission for the overcurrent device to be used in a particular application. This language is used throughout Article 240 for fuse and breaker applications. A 480Y/277 breaker could be used in a 240 volt grounded delta system, so the proposed language would inappropriately restrict the application with appropriate product ratings.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-79 Log #2901 NEC-P10 **Final Action: Reject**
(240.86)

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Revise text to read as follows:
Provide clarification for use of terms available fault current used at least four times in the NEC and short circuit current rating.
Substantiation: Provide clarification as to the difference between available Fault Current as used in 240.86, 285.6, 700.5 and 701.6 and Short circuit current rating as used in 410.143, 430.8 exceptions 1, 2 & 3, 440.4(B) and 670.3(A)(4).
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided suggested text to define the terms in question. This proposal does not meet the requirements of 4.3.3(c) of the Regulations Governing Committee Projects as follows:
4.3.3 Content of Proposals. Each Proposal shall be submitted to the Council Secretary and shall include the following:
(c) Proposed text of the Proposal, including the wording to be added, revised (and how revised), or deleted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-80 Log #259 NEC-P10 **Final Action: Reject**
(240.87)

Submitter: Albert Oster, Lynn, MA
Recommendation: Revise text to read as follows:
Circuit Breaker handles larger than 14.29 mm (9/16 in.) by 7.93 mm (5/16 in.) shall have provision for locking or adding a lock that makes the circuit breaker capable of being locked in the open position. The provision for locking or adding a lock shall remain in place with or without the lock installed.
Substantiation: I have a fairly good collection of lock out tag out devices, yet I still encounter breakers that my devices will not fit, or do not fit well, and the device either can be knocked off or damages the breaker handle. I believe safety would be improved if lockout was easier. I have included the size with the intent to exclude the most common size breakers in an attempt to make the proposal more practical, however I wouldn’t be adverse to see this as code without any size limitations.
Panel Meeting Action: Reject
Panel Statement: The substantiation points to a number of lock-out devices being available but not capable of serving the purpose to lock-out the handle. Placing a requirement on nearly all circuit breakers to have a lock-out means does not address that issue.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-81 Log #467 NEC-P10 **Final Action: Reject**
(240.87 (New))

Submitter: James P. Benson, Jim Benson Electrical Contractor
Recommendation: Add new text to read as follows:
Interchangeability. It shall be permissible to interchange circuit breakers of different manufacturer names provided the manufacturer makes a circuit breaker suitable for installation within the panel board and is acceptable to the authority having jurisdiction. Such OCPD devices shall provide an equal connection to the bus.
Substantiation: Currently, the NEC has interchange rules for fuses only. As manufacturers close and are repurchased by other companies, some inspectors are requiring the circuit breaker to be the same name as the panel where it is to be installed, and this can be a hardship on the installer.
Panel Meeting Action: Reject
Panel Statement: The panelboard standard has specific marking requirements to address the specific overcurrent devices that can be used within it to perform appropriately under short-circuit and thermal conditions. The means to ensure an equal connection to the bus is to review the markings on the panelboard for the appropriate overcurrent device that can be installed. This and other important concerns (i.e., short circuit venting, thermal, etc.) are appropriately addressed by the product’s standard.
110.3(B) requires listed material to be installed and used in accordance with any instructions included in the listing or labeling.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

10-82 Log #3562 NEC-P10 **Final Action: Accept in Principle**
(240.87 (New))

Submitter: James T. Dollard, Jr., IBEW Local 98
Recommendation: Add new text to read as follows:
240.87 Short-time Delay. Where short-time delay is utilized on a circuit breaker, one of the following shall be provided:
(A) Zone-selective interlocking
(B) Differential relaying
(C) Energy-reducing maintenance switching
FPN: An energy-reducing maintenance switch allows a worker to set a circuit breaker trip unit to instantaneous while the worker is working within an arc-flash boundary as defined in NFPA 70E, and then to set the trip unit back to a short-time delay setting after the potentially hazardous work is complete
Substantiation: Short-time delay is an industry-proven method to achieve selective coordination of circuit breakers. It delays the opening of an upstream circuit breaker while the downstream overcurrent device clears a short-circuit. If however, a short occurs between the two devices, the upstream circuit breaker will still delay its tripping operation, allowing for more let-through energy than would have been allowed if the upstream circuit breaker had utilized an instantaneous trip. This type of installation is typical for electrical power distribution systems. This extra amount of let-through energy may injure workers or damage equipment. There are at least three methods to prevent the increased let-through energy.
Zone-selective interlocking allows the upstream circuit breaker and downstream circuit breaker to communicate with each other and determine whether the upstream circuit breaker should open as quickly as possible or after a pre-set amount of time delay. For shorts on the load side of the downstream circuit breaker, the downstream circuit breaker signals the upstream circuit breaker, telling it to “hold off”, not to trip, since the downstream circuit breaker will trip and take the short off-line. For shorts between the circuit breakers, the downstream circuit breaker does not “see” the short, and therefore does not send a signal to the upstream circuit breaker. Without a signal from the downstream circuit breaker, the upstream circuit breaker will trip as quickly as possible. This reduces the amount of energy that is released into the system for shorts between the devices, and allows for selective coordination at the same time. It offers a higher degree of arc-flash protection for employees and also greater equipment protection.
With differential relaying, the amount of current coming in to the upstream circuit breaker is compared to the amount of current leaving the downstream circuit breakers. Under normal conditions, the difference is zero. If, during a short circuit condition on the load side of the downstream circuit breaker, the difference is zero, the upstream circuit breaker waits for the affected downstream circuit breaker to open. If the difference in current reaches the setting, due to a short circuit between the circuit breakers, the upstream circuit breaker opens as quickly as possible. For short circuits between the devices, as might occur when an employee is working in energized switchgear, the upstream circuit breaker limits the amount of let-through energy to which the worker could be exposed.
With an energy reducing maintenance switch, the worker is able to set the trip unit to instantaneous whenever working within the flash protection boundary as defined by NFPA 70E, and then turn back to the short-time delay mode when finished. This system provides let-through energies while energized work is being performed.
Panel Meeting Action: Accept in Principle
Add new text to read as follows:
240.87 Non-instantaneous Trip. Where a circuit breaker without an instantaneous trip is utilized, one of the following or approved equivalent means shall be provided:
(1) Zone-selective interlocking
(2) Differential relaying
(3) Energy-reducing maintenance switching with a local status indicator
FPN: An energy-reducing maintenance switch allows a worker to set a circuit breaker trip unit to instantaneous while the worker is working within an arc-flash boundary as defined in NFPA 70E, and then to set the trip unit back to a normal setting after the potentially hazardous work is complete.
Panel Statement: The modifications meet the intent of the submitter. The addition of “without an instantaneous trip” more accurately reflects the applications referred to by the submitter. “Other approved means” was added to allow for future technology. The title change more accurately reflects the subject. The addition of “a local status indicator” helps assure that the switch will be returned to the proper position at the completion of work.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 3
Explanation of Negative:
DARLING, D.: Primary direction of NFPA 70E is to De-Energize electrical equipment for worker safety. The proposed features will reduce but will not eliminate the electric hazards which can only be eliminated by removing all energy sources.
If any work needs to be performed on energized equipment a hazard risk analysis must be conducted justifying why the system cannot be de-energized. A similar requirement for first de-energizing electrical equipment unless it is infeasible to do so exists in OSHA Subpart `S”.
FREDERICKS, C.: I am voting against the panel action to accept. The proposal’s intent to protect workers is good, but the language as accepted could unnecessarily restrict other design and operational options that would provide for an equally safe system. These options could include application of PPE that is rated to meet or exceed the available arc flash hazard energy, current limitation, available fault current reduction, arc resistant equipment, and de-energized maintenance. Some of these methods are operational rather than specific to the installation design. As a minimum, these alternate methods should be recognized in a fine print note.
MANCHE, A.: NEMA supports performance enhancements that provide increased worker safety, as covered in NFPA 70E.
However, there has been no substantiation presented that this requirement will always enhance the protection being sought by the submitter. The new

language introduces added equipment in all instances for such devices when having such functionality on selected devices in the system may require the same PPE Category protection for the electrical worker in accordance with NFPA 70E. No data was provided to support that an instantaneous trip function in all circuit breakers will ensure the enhancement in safety sought by the submitter. Overcurrent device instantaneous levels can be set well above any real-world current level that may be induced during an arc flash event. NEMA interprets the submitters goal as seeking a means to enhance worker safety, neither the proposal nor the panel action addresses such an enhancement directly by simply requiring additional product features that may or may not meet the goal of the submitter. Additionally, any performance requirement must be the same for all overcurrent devices, and not specific to circuit breakers.

The TCC should also review this proposal to ensure it resides within the scope of article 240. The scope, and FPN found in the scope, establishes that this article has jurisdiction over the overcurrent protection of conductors and equipment to protect them from excessive or dangerous temperatures. No where is CMP-10 charged with the scope of protecting personnel from hazards arising from the maintenance of electrical systems.

Comment on Affirmative:

COOK, D.: I support the submitted effort to provide greater protection of those required to perform electrical task on energized equipment. I agree with the Panel actions that add “other approved means” to address future technology and require the local status indicator with the energy-reducing maintenance switch. As an enforcement representative I have some concern about the difficulty of identifying non-instantaneous trip circuit breakers in the field. Text similar to that in 500.4(A) could be included to read: Where non-instantaneous trip circuit breakers are installed, documentation shall be available to those authorized to design, install, inspect, maintain, or operate those devices. I also have concerns that complex overcurrent protection schemes that involve field assembly, calibration, and testing to determine functionality. Text to require commissioning of those installations by an accredited party and documentation for that commissioning should be provided to the Authority Having Jurisdiction (AHJ). Typical inspection departments do not have the resources to evaluate that type equipment.

OCKULY, G.: It is my understanding that this requirement will apply to power circuit breakers that do not have an instantaneous trio or where the instantaneous trip is turned to the off position. This requirement would not apply to molded case and insulated case circuit breakers as listed to UL 489.

10-83 Log #214 NEC-P10 **Final Action: Accept**
(240.91 (New))

Note: The following proposal 10-56 and comment 10-27 were returned to Committee at the A2007 Association Technical Meeting and/or subsequent Standards Council Meeting. In accordance with 4.7.1(d) and 4.7.2(c) of the Regulations Governing Committee Projects, it is now being processed as a Proposal for this revision cycle.

Submitter: Dorothy Kellogg, American Chemistry Council, Carl J. Fredericks, The Dow Chemical Company

Recommendation: ROP Text Recommendation: Add new 240.91, as follows:

240.91 Protection of Conductors. Conductors shall be protected in accordance with 240.4, unless otherwise permitted in 240.91(A).

(A) Devices Rated over 800 Amperes. Where the overcurrent device is rated over 800 amperes, the ampacity of the conductors it protects shall be equal to or greater than 95% of the rating of the overcurrent device defined in 240.6, where the conductor is protected within recognized time vs. current limits for all short circuit currents of up to 1000 seconds duration.

Substantiation: Problem: Existing NEC rules that effectively require large conductor overload protection at 100% of the ampacity by the overcurrent device are unnecessary and result in inefficient use of conductor materials in Supervised Industrial Installations.

Substantiation: The proposal introduces the equivalent of a “next standard size” exception for large conductors in Supervised Industrial Installations. In these installations, conductors are protected against overload by load calculation and by monitoring, and against short circuit by selection of the overcurrent device as part of an overcurrent coordination study. These factors make overload protection by the overcurrent protection device less critical for these installations. The proposed rule would allow standard conductor sizes to be more readily used with standard overcurrent device sizes in these installations.

ROC Text Recommendation: Continue to accept, but revise the wording as follows:

240.91 Protection of Conductors. Conductors shall be protected in accordance with 240.91(A) or (B).

(A) General. Conductors shall be protected in accordance with 240.4.

(B) Devices Rated over 800 Amperes. Where the overcurrent device is rated over 800 amperes, the ampacity of the conductors it protects shall be equal to or greater than 95% of the rating of the overcurrent device defined in 240.6, where the conductor is protected within recognized time vs. current limits for all short circuit currents of up to 1000 seconds duration.

Substantiation: This is a proposed editorial change, refelecting better code text that was developed to improve the clarity.

Substantiation: This proposal 10-56 and comment 10-27 were returned to Committee at the A2007 Association Technical Meeting and/or subsequent Standards Council Meeting. In accordance with 4.7.1(d) and 4.7.2(c) of the Regulations Governing Committee Projects, it is now being processed as a Proposal for this revision cycle.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 3

Explanation of Negative:

COOK, D.: If the negative comments for the proposal and comment ballots of the 2008 NEC cycle have been addressed, they are not provided. No substantiation is provided to indicate the terminations to equipment in Supervised Industrial Installations will perform different than those installed in other installations.

HIDAKA, J.: This proposal should be rejected as it will permit conductor protection above their ampacity for most circuit breaker frame sizes above 800 A. From a review of UL 489, the Standard for Molded Case Circuit Breakers, Molded Case Switches and Circuit Breaker Enclosures, all standard circuit breaker frame sizes rated 1200 – 4000 A (above 4000 A, the breaker is assumed to be bus connected) would allow either the next smaller size conductor, or a reduction by one, the total number of conductors per phase. This will increase the heating load of electrical equipment intended to house circuit breakers. Multiple circuit breakers employing the 95% rule only aggravates the situation further and would subject switchboards and panelboards to more heat than the equipment would have been subjected to during certification/design testing. No substantiation has been submitted to show that a 95 percent ampacity rule permits the safe application of conductors above 800 A. Test data or other substantiation needs to be submitted that demonstrates that the conductors and equipment would not sustain damage from carrying the current permitted by this proposal.

MANCHE, A.: Proposal 10-83 should be rejected because it will permit conductor protection above their ampacity for all currents above 800A. This will also impact the performance of electrical equipment negatively.

Thus the panel continues to take a position that equipment can be used outside the permitted listing safety standard requirements of the equipment. But there is no method to determine the safe use of electrical equipment outside the listing parameters. Only the manufacturer understands the performance of the components within the equipment such as the fuse clip, blade hinge, lubricant, terminals, and plating. The interaction of multiple overcurrent devices within equipment further complicates any attempt to reduce the conductor size and not impact adjacent components. Consider a fusible switchboard with not only devices over 800A, but also those 800A and below. The increase in heat from smaller conductors will not only increase the heat on devices over 800A, but the additional heat will also impact the integrity of neighboring devices 800A or less.

It is foreseeable that a revision to the UL Product Standards to reduce conductor sizes during testing will drive either a derating of present product designs (1200A fuse switch possibly becoming a 1000A switch) or a redesign of products could drive a larger footprint with more copper within the equipment to compensate for the thermal impact of this change. Any short-term savings in wire size will likely be offset by an increase in equipment size and costs in the near future, not only for supervised installations but for all electrical installations.

There has been no substantiation presented that this has or can be accomplished in a safe manner. This change, presumably based on theory, is likely to impact the entire industry by increasing the cost of equipment and by possibly driving larger equipment. These could increase the size of the equipment rooms or reduce working space to NEC minimums.

Lastly, the Panel did not address the questions and technical concerns presented in Comment 10-30 during the 2008 NEC ROC. Failure to address these concerns places the manufacturer in the unfortunate position of having an NEC requirement that is in direct conflict with NEC 110.3 (B).

Comment on Affirmative:

DARLING, D.: The proposed action should have been Accept in Part: The phrase “***all***” and “***up to 1,000 seconds duration***” should be deleted. No published data is currently available to warrant the 1,000 second duration for cable damage curves.

Revised final wording should be:

240.91 Protection of Conductors. Conductors shall be protected in accordance with 240.91(A) or (B).

(A) General. Conductors shall be protected in accordance with 240.4.

(B) Devices Rated over 800 Amperes. Where the overcurrent device is rated over 800 amperes, the ampacity of the conductors it protects shall be equal to or greater than 95% of the rating of the overcurrent device defined in 240.6, where the conductor is protected within recognized time vs. current limits for ~~all~~ short circuit currents of ~~up to 1000~~ seconds duration.

10-84 Log #287 NEC-P10 **Final Action: Reject**
(Table 240.92(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "equation" in two places.
Substantiation: The term formula refers to a chemical composition whereas an equation refers to a mathematical expression, which follows in both cases.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Reject
Panel Statement: Webster's 11th Collegiate Dictionary, the official dictionary for NFPA, defines formula as "A general fact, rule or principle expressed in usually mathematical symbols."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 250 — GROUNDING

5-51a Log #CP503 NEC-P05 **Final Action: Accept**
(Figure 250.1, Title of Part X, 250.180, 250.182 250.188)

TCC Action: The Technical Correlating Committee directs the panel to clarify the panel action on this proposal with respect to retaining the term "high-voltage" in the first sentence of the revised 250.188(A) and anywhere else in this Article.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 5,
Recommendation: Revise the following 2008 NEC sections to read:
X. Grounding of Systems and Circuits of Over 1 kV ~~and over~~ ~~(High Voltage)~~
250.180 General. Where ~~high-voltage~~ systems over 1 kV are grounded, they shall comply with all applicable provisions of the preceding sections of this article and with 250.182 through 250.190, which supplement and modify the preceding sections.
250.182 Derived Neutral Systems. A system neutral point derived from a grounding transformer shall be permitted to be used for grounding ~~high-voltage~~ systems over 1 kV.
250.188 Grounding of Systems Supplying Portable or Mobile Equipment. Systems supplying portable or mobile equipment ~~high-voltage~~ over 1 kV, other than substations installed on a temporary basis, shall comply with 250.188(A) through (F).
(A) Portable or Mobile Equipment. Portable or mobile high-voltage equipment shall be supplied from a system having its neutral conductor grounded through an impedance. Where a delta-connected ~~high-voltage~~ system over 1 kV is used to supply portable or mobile equipment, a system neutral point and associated neutral conductor shall be derived.
(D) Ground-Fault Detection and Relaying. Ground-fault detection and relaying shall be provided to automatically de-energize any ~~high-voltage~~ system over 1 kV component that has developed a ground fault. The continuity of the equipment grounding conductor shall be continuously monitored so as to de-energize automatically the ~~high-voltage~~ over 1 kV circuit to the portable or mobile equipment upon loss of continuity of the equipment grounding conductor.
(F) Trailing Cable and Couplers. Over 1 kV ~~High-voltage~~ system trailing cable and couplers for interconnection of portable or mobile equipment shall meet the requirements of Part III of Article 400 for cables and 490.55 for couplers.
In Figure 250.1 Revise text block to read: Part X Grounding of systems and circuits of over 1kV ~~and over (high voltage)~~.
Substantiation: The term "high-voltage" as used in the NEC is not consistent throughout industry standards. These revisions add clarity, remove any potential conflicts and provide consistency with Articles 280 and 285.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-52 Log #3111 NEC-P05 **Final Action: Accept in Principle**
(250.2.Bonding Jumper, System)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised Text:
Bonding Jumper, System. The conductor that connects ~~connection between~~ the grounded system ~~circuit~~ conductor at a grounded separately derived system to one or more of the following: ~~and~~ the grounding electrode conductor, the equipment bonding jumper or conductor, or the equipment grounding conductor ~~at a separately derived system~~.
Substantiation: This proposal intends to make changes to the definition to clarify the function of the system bonding jumper. In reality, the system bonding jumper can be installed in several ways. For example, if a multi-barrel lug is connected to the XO terminal of a transformer, the system bonding jumper, grounding electrode conductor, grounded conductor, and bonding jumper can be connected at that connector. If a multi-barrel lug is connected to the transformer or generator enclosure, it is common to connect the system bonding jumper, grounding electrode conductor and the bonding jumper or conductor to that connector. The grounded conductor should always connect directly to the XO terminal.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
The connection between the grounded circuit conductor, and the supply-side bonding jumper, ~~and~~ or the equipment grounding conductor, or both, at a separately derived system.
Panel Statement: The change is needed to correctly use the term "supply-side bonding jumper" and to include additional connections that are permitted or required. In addition, the revision identifies the function of the system bonding jumper as related to the equipment grounding conductor.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-53 Log #4009 NEC-P05 **Final Action: Accept in Principle**
(250.2.Bonding Jumper, System)

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:
Bonding Jumper, System
The connection between the grounded circuit conductor and the equipment bonding jumper ~~equipment grounding conductor at~~ for a separately derived system.
Substantiation: The system bonding jumper is connected to the equipment bonding jumper either in the source or the first system disconnecting means and the text should be changed to match the terms used. for consistency and usability. The term "at" was replaced with "for" because this connection is not always installed at the system, it may be in the disconnecting means.
Panel Meeting Action: Accept in Principle
Panel Statement: See CMP-5 action on Proposal 5-52. The panel concludes this action meets the intent of the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-54 Log #56 NEC-P05 **Final Action: Reject**
(250.2.Ground Fault)

Note: This Proposal appeared as Comment 5-27 on Proposal 5-57 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 5-57 was:
Accept the proposal in principle, but consider the following suggested wording:
Ground Fault. An unintentional, electrically conducting connection between ~~an ungrounded or grounded~~ a normally current carrying conductor of an electrical circuit, and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute-Electric Light & Power Group
Recommendation: Accept in Principle the proposal. Change the definition to read as follows:
Ground Fault. An unintentional, electrically conducting connection between an ungrounded conductor of an electrical circuit and the grounded conductor or normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment or earth.
Substantiation: In the National Electrical Code, calling the connection between the normally, current-carrying, grounded, unbalanced current return path and the not-normally, current-carrying, equipment grounding conductor path will cause confusion in the industry and a conflict within the National Electrical Code as it discusses prescriptive requirements for ground-fault protection in 230.95, 215.10, 240.13, 517.17 and Part IV and Part V of Article 430. This definition will also cause conflict and confusion between the National Electrical Code and the Codes and Standards of the Institute of Electrical and Electronic Engineers (IEEE). One such standard is ANSI/IEEE Std 242 – 2001, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems termed the "Buff Book". This reference sets the current standard for fault current calculation and system protection and the proper selection, application, and coordination of components that may be required to protect industrial and commercial power systems against abnormalities that could reasonably be expected to occur in the course of electrical system operation.
Other IEEE Standards such as the ANSI/IEEE Std 141-1993, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants and the ANSI/IEEE Std 241-1990, IEEE Recommended Practice for Electric Power Systems in Commercial Buildings both reference appropriate editions of ANSI/IEEE Std 242 for fault current calculations. Also, the Bussman, Electrical Protection Handbook discusses and uses the methodologies developed in ANSI/IEEE Std 242 to discuss and recommend overcurrent protection as well as protection from ground faults in accordance with the requirements of the National Electrical Code.
The principle issue in Proposal 5-57 is the use of the phrase "a normally current carrying conductor" in the definition developed by CMP-5 in the Recommendation portion of the comment.
Many times "a normally current carrying conductor" is an ungrounded

conductor (typically referred as a line conductor or a phase conductor). However, a grounded conductor or a neutral conductor is also "a normally current carrying conductor". Connection of a grounded conductor or a neutral conductor of an electric circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment or earth is not a ground fault. Rather the term for this connection is not currently defined in any standard. Defining a grounded conductor or neutral conductor connection to the ground or non-current carrying grounded metal members goes against the history of the term as it is used in calculating the magnitude and phase angle of unbalanced currents during accidental connection of single-line to ground short-circuits or double-line to ground short-circuits.

The history of the term "ground fault" and ground fault current calculations dates back to 1926 when A. P. Mackerras used a mathematical method previously developed by Dr. C. L. Fortescue (later called Symmetrical Components) to establish and publish his work on the determination of single-phase short-circuits on three-phase systems. Unbalanced (unsymmetrical) currents during a single-phase, line-to-ground, short-circuit (termed ground fault) in a three-phase system using the mathematical method could be broken down into three, symmetrical currents to ease the complex circuit calculations. These three symmetrical models of the unsymmetrical current, voltage or impedance are the positive-sequence component, the negative-sequence component and the zero-sequence component.

In order to use the theory of symmetrical components on three-phase systems (that is now widely accepted as a standard practice) with Ohms law for AC systems,

$$\left(I = \frac{E}{Z} \right)$$

voltages (E) and circuit impedances (Z) are broken down into their respective symmetrical sequence components.

Calculations are made at the symmetrical sequence component level and re-constructed back to the unsymmetrical level for an answer to determine the magnitude and phase angle of current. Single-phase systems are much simpler to calculate a shorted phase to ground or shorted phase to neutral current.

In a three-phase wiring system, both the positive-sequence component and the negative-sequence component impedance are based on the resistance (wire resistance) and reactance (geometry) of the individual phase or line conductors. The zero-sequence component impedance is based on the resistance and reactance of the common return path. This work pre-dates the work of Eustace C. Soares and the equipment-grounding conductor philosophy currently found in the National Electrical Code (separate grounded conductor and equipment grounding conductor generally beyond the main disconnecting means in the NEC wired system).

It is interesting to note that the concept of defining Ground Fault and Short Circuit is not a new concept. It was recommended in 1966 by Eustace Soares himself to end the confusion between the definition of a short circuit and a ground fault. He proposed the following two definitions.

SHORT CIRCUIT: A conducting connection, whether intentional or accidental, between any of the conductors of an electrical system whether it be from line to line or line to the grounded conductor.

GROUND FAULT: A conducting connection, whether intentional or accidental between any of the conductors of an electrical system and the conducting material which encloses the conductors or any conducting material that is grounded or that may become grounded.

Here is the reason why these definitions were not accepted in the past. In the NEC system, both the grounded conductor path (usually a wire or busbar) and the equipment-grounding conductor path (generally, a wire, a metallic raceway or metallic conductor enclosure) are part of the zero-sequence component impedance. Connecting these two conducting paths (grounded path and grounding path) together does not constitute a fault and will not cause a high current to flow in the system. Rather, connecting these two together roughly relates to paralleling two impedances together and reducing the overall impedance. This is one technical reason why in patient care areas of health care facilities, a parallel equipment-grounding conductor inside a metallic raceway is used as required by 517-13. It reduces the zero-sequence impedance and improves the effective fault current path (as discussed in 250.4) for line-to-ground faults.

Connecting the grounded conductor to the equipment-grounding conductor path will cause normal unbalanced load current to flow on non-normally current carrying metallic raceways, metallic enclosures and other metallic paths such as building steel, plumbing, metallic support structures and etc. This current flow outside of the normal conductor path is generally undesired (but, not necessarily unsafe) in premises wiring installed in accordance with the National Electrical Code.

The proposed definition in 5-57 falls apart in service enclosures, enclosures such as meter sockets prior to the main disconnecting means, and metallic service raceways. If the bare grounded conductor comes in contact with one of these enclosures, is it a ground fault or a short circuit or just a normal occurrence provided it was intentional? What happens if an electrician intentionally makes an inappropriate connection and re-grounds the grounded conductor in a feeder supplied panel board? Does an erroneously made, intentional connection vitiate the proposed definition of ground fault in 5-57?

If definition of "ground fault" is approved as it appears in Proposal 5-57 of the ROP, the National Electrical Code will now permit ground faults as the normal occurrences with the connection of the main bonding jumper at the service, the system bonding jumper at a separately derived system, or the connections as permitted in 250.32 (B).

I would agree that a term that describes the inappropriate grounding connection (grounding error) between a grounded conductor and the equipment grounding conductor path beyond the main disconnecting means should be developed. However, the term "ground fault" is not the correct term for this occurrence. The revised wording of the definition shown below in this comment accurately defines the term "ground fault".

Ground Fault. An unintentional, electrically conducting connection between an ungrounded conductor of an electrical circuit and the grounded conductor or normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment or earth.

Further, if this definition of ground fault is accepted, the definition of short circuit could be defined as follows in a future edition of the NEC.

Short Circuit. An unintentional, electrically conducting connection between two or three ungrounded conductors of an electrical circuit.

References:

C. F. Wagner, R. D. Evans, Symmetrical Components, McGraw-Hill Book Company, Inc., New York and London, 1933.

ANSI/IEEE Std 141-1993, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (Red Book).

ANSI/IEEE Std 241-1990, IEEE Recommended Practice for Electric Power Systems in Commercial Buildings (Gray Book).

ANSI/IEEE Std 242 – 2001, Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book).

Bussman Electrical Protection Handbook, Copyrighted October 1996, Cooper Industries, Bussman Division. USA.

W. I. Summers, Editor, Soares' Grounding Electrical Distribution Systems for Safety, International Association of Electrical Inspectors, Park Ridge, IL, 1981.

ANSI/NFPA 70 – The National Electrical Code, 2005 Edition, Copyrighted 2004, National Fire Protection Association, Inc., Quincy, MA.

Panel Meeting Action: Reject

Panel Statement: The proposed definition is not correct. A connection between the grounded conductor and an ungrounded conductor is a short-circuit, not a ground-fault. The current definition is consistent within the context in which the term ground-fault is used in the NEC.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-55 Log #4192 NEC-P05 **Final Action: Reject**

(250.2.Likely to Become Energized)

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Add new text as follows:

<u>Likely to Become Energized (New) The failure of insulation on.</u>

Substantiation: This term is used numerous times in Article 250 and is not presently defined in the NEC. It is provided as a term in the NEC Style manual Annex B. Including it in the NEC will increase the understanding of what this term means and will increase usability.

Panel Meeting Action: Reject

Panel Statement: The proposed definition is unclear and appears to be incomplete. CMP-5 concludes that this term is used in more than one article.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-56 Log #579 NEC-P05 **Final Action: Reject**

(250.2.Objectionable Currrent)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting

Recommendation: Add new text as follows:

<u>**Objectionable Current.** Any steady state of electrical current on grounding conductors or conductive metal parts of equipment that normally does not carry electric current, except for temporary ground fault current flow that is intended to facilitate the operation of the overcurrent protective device or ground-fault detectors on high-impedance grounded systems.</u>

Substantiation: This section (250.6) is unenforceable because the NEC does not define what objectionable currents are, it does define what objectionable currents are not, which is no help to the installer or inspector. The lack of a definition creates a great deal of confusion to installers and inspectors, because everyone has a definition and performs the electrical installation or inspection to their definition. As an instructor, how can you give any examples of objectionable currents, or an installation installed and arranged in a manner that will prevent objectionable current, without a definition of the term?

Panel Meeting Action: Reject

Panel Statement: Objectionable currents are not always steady-state currents. The recommendation does not improve the understanding or application of 250.6. See the panel action and statement on Proposal 5-26.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-57 Log #249 NEC-P05 **Final Action: Accept**
(Table 250.3)

Submitter: John W. Young, Siemens Energy & Automation
Recommendation: Delete the following line from Table 250.3:
~~Closed-loop and programmed power distribution 780.3~~
Substantiation: Article 780 – Closed Loop and Programmed Power Distribution was deleted from the 2008 NEC. The reference Section – 780.3 – no longer exists.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-58 Log #2775 NEC-P05 **Final Action: Reject**
(250.3)

Submitter: Chris Fackler, FSG Electric
Recommendation: Make all flow charts show the article and section like in 250.3
Substantiation: Allows flow charts to have a quick reference in order to allow users to achieve full comprehention.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided proposed text for this proposal, including the wording to be added, revised (and how revised), or deleted in accordance with 4.3.3(c) of the NFPA Regulations Governing Committee Projects. Also, the submitter has not provided a statement of the problem or substantiation for the proposal in accordance with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-58a Log #CP505 NEC-P05 **Final Action: Accept**
(250.4(A)(1) FPN)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
FPN: An important consideration for limiting the imposed voltage is the routing of bonding and grounding <u>electrode</u> conductors so that they are not any longer than necessary to complete the connection without disturbing the permanent parts of the installation and so that unnecessary bends and loops are avoided.
Substantiation: The revision has been made to correlate with the deletion of the term “Grounding Conductor” in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term “grounding conductor” from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman’s report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term “grounding conductor.”

5-59 Log #1552 NEC-P05 **Final Action: Reject**
(250.4(A)(2), (3), and (4))

Submitter: Steven French, I.B.E.W. Electrician/Apprentice Instructor / Rep. I.B.E.W. Local #176
Recommendation: Add new text as follows:
250.4 General Requirements for Grounding and Bonding.
The following general requirements identify what grounding and bonding of electrical systems are required to accomplish. The prescriptive methods contained in Article 250 shall be followed to comply with the performance requirements of this section.
(A) Grounded Systems.
(1) Electrical System Grounding. Electrical systems that are grounded shall be connected to earth in a manner that will limit the voltage imposed by lightning, line surges, or unintentional contact with higher-voltage lines and that will stabilize the voltage to earth during normal operation.
FPN: An important consideration for limiting the imposed voltage is the routing of bonding and grounding conductors so that they are not any longer than necessary to complete the connection without disturbing the permanent parts of the installation and so that unnecessary bends and loops are avoided.
(2) Grounding of Electrical Equipment. **<u>General.</u>** Normally non-current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected to earth so as to limit the voltage to ground on these materials.
(3) Bonding of Electrical Equipment. <u>General.</u> Normally non–current-carrying conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.
(4) Bonding of Electrically Conductive Materials and Other Equipment. <u>General.</u> Normally non–current-carrying electrically conductive materials that are likely to become energized shall be connected together and to the electrical supply source in a manner that establishes an effective ground-fault current path.
Substantiation: This would emphasize to the user that non–current-carrying electrically conductive materials that are likely to become energized shall be grounded or bonded as a **<u>general rule,</u>** except where permitted elsewhere in the code.
Panel Meeting Action: Reject
Panel Statement: The requirements in 250.4 are performance requirements. This section identifies what grounding and bonding of electrical systems are required to accomplish. The term “general” is in the title of the section. Adding the term “general” three more times will not add clarity to the code.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-60 Log #2701 NEC-P05 **Final Action: Reject**
(250.4(B)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add “or polarity” after “different phase”.
Substantiation: Edit. The requirement should apply to dc systems.
Panel Meeting Action: Reject
Panel Statement: The word “polarity” is not reserved to denote DC systems and is used interchangeably with “phase” or “line” to indicate a different potential.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-61 Log #605 NEC-P05 **Final Action: Reject**
(250.4(B)(4), FPN)

Submitter: Gregory P. Bierals, Samaritan’s Purse World Medical Mission
Recommendation: Add new text to read as follows:
Ungrounded systems may necessitate the evaluation of overcurrent devices based upon their single-pole short-circuit interrupting rating, which may be less than their normal interrupting rating.
Substantiation: If a second ground-fault occurs on an opposite phase before the first ground-fault is cleared, the full phase-to-phase voltage (480 V, 600 V, or 240 V) would appear across only one pole of the affected overcurrent device. This condition may result in a fault current that exceeds the single-pole interrupting capability.
Panel Meeting Action: Reject
Panel Statement: The recommended requirement is covered by Article 240.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-62 Log #2773 NEC-P05 **Final Action: Reject**
(250.6(A))

Submitter: Kerry G. Ginther, Conifer, CO
Recommendation: Revise text as follows:
Arrangement to prevent objectionable current. The ~~grounding~~ <u>bonding</u> of electrical systems, circuit conductors, surge arrestors, surge protective devices, and conductive normally non-current-carrying metal parts of equipment shall be installed and arranged in a manner that will prevent objectionable current.
Substantiation: Misuse of the term grounding when bonding the electrical systems together is what is inferred. The wording change would coincide with the definitions of grounding and bonding given in Article 100.
Panel Meeting Action: Reject
Panel Statement: Grounding is the better term. Circuit conductors are not “bonded” but are connected to grounded. Surge arresters and surge protective devices are grounded, many times directly by a grounding electrode conductor, not bonded for the earth connection.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BRENDER, D.: The second sentence of the Panel Statement is incomplete and should read, “Circuit conductors are not “bonded” but are connected to grounded system conductors.”

5-63 Log #658 NEC-P05 **Final Action: Reject**
(250.6(A), FPN (New))

Submitter: Gregory P. Bierals, Samaritan’s Purse World Medical Mission
Recommendation: Add new text to read as follows:
FPN: The normal capacitive charging current in equipment grounding conductors is not the objectionable current addressed in this section.
Substantiation: Negligible capacitive charging current is normal and unavoidable, especially in AC systems where equipment grounding conductors are run with or enclose the circuit conductors.
Panel Meeting Action: Reject

Panel Statement: The panel concludes that the proposed text does not add useful information to 250.6(A). The level at which current becomes objectionable is based on equipment and system design and is variable.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-64 Log #3463 NEC-P05 **Final Action: Accept**
(250.6(C))

Submitter: G. Scott Harding, F. B. Harding, Inc.
Recommendation: Revise text to read as follows:
250.6(C) Temporary Currents Not Classified as Objectionable Currents. Temporary currents resulting from ~~accidental~~ abnormal conditions, such as ground faults, shall not be classified as objectionable current for the purposed specified in 250.6(A) and (B).
Substantiation: Under normal conditions, current does not travel on Equipment grounding Conductors, Grounding Electrode Conductors, etc. Ground faults occur when abnormal conditions are present, not necessarily during accidental conditions. An accident is not needed to create a ground fault. "Abnormal" is also utilized in the Article 100 definition of a circuit breaker and would seen to be the applicable word in this case.
Article 100 definition of Circuit Breaker: A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also of making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-65 Log #136 NEC-P05 **Final Action: Reject**
(250.8)

Submitter: Alan A. Loch, Trinity Associates, Inc.
Recommendation: Revise as follows:
"Sheet metal screws and self-tapping screws shall not be used to connect grounding conductors to enclosures. Bolts, washers, lock washers, and nuts or something of equal strength shall be used. The ground bus should be tested at maximum fault current, not just 1200 amps."
Substantiation: A 2500 KVA transformer had its 4000 amp switch close in on a bolted fault t ground. The 50,000 plus amps fault current blew apart the self-tapping attached ground bus.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The submitter is asking the code to introduce requirements that are a part of a product safety standard. There are many standard and self-tapping type screws that provide for the connection of two threads into the enclosure. Self-tapping screws are used extensively in device boxes without any documented problems. The substantiation referenced and the additional documentation refers to a product related issue that should not be addressed in the National Electrical Code.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-66 Log #1000 NEC-P05 **Final Action: Reject**
(250.8)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Grounding ~~conductors and~~ bonding ~~jumpers~~ shall be accomplished ~~connected~~ by one of the following means unless otherwise specified or permitted elsewhere in this Code.
(1) through (8)-no change.
(9) Metal raceway threaded connections
(10) Locknuts or locknuts and bushings connections of metal raceways and cables identified for use as grounding or bonding conductors.
(B) No change.
Substantiation: Present text does not address means other than grounding or bonding jumpers which are permitted elsewhere in the Code, e.g., 230.50, 240.20(D), 240.100(A)(2), 250.4(A) and (B), and 430.225(B).
Panel Meeting Action: Reject
Panel Statement: The proposed revision changes the scope of the requirement without technical substantiation. The use of the proposed numbers 9 and 10 are already allowed by the NEC as bonding connections. Section 250.8 applies to wire type conductors and jumpers and their respective connectors and not conduits. Threaded and other fittings are listed for grounding under separate standards while the conduits are not listed for grounding, but are accepted for grounding per Section 250.118.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-67 Log #3046 NEC-P05 **Final Action: Reject**
(250.8)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(A) Permitted Methods. Grounding conductors and bonding jumpers shall be connected only by one of the following means:
(1) Listed pressure connectors
(2) Terminal bars
(3) Pressure connectors listed as grounding and bonding equipment
(4) Exothermic welding process
(5) Machine screw-type fasteners that engage not less than two threads or are secured with a nut
(6) Thread-forming machine screws that engage not less than two threads in the enclosure
(7) Connections that are part of a listed assembly
(8) Other listed means
~~(B) Methods Not Permitted. Connection devices or fittings that depend solely on solder shall not be used.~~
Substantiation: There are many who argue that the existing 250.8(A) is not written in language that is easily enforced. By adding the word "only" this argument is silenced, and furthermore it allows (B) to be deleted.
Panel Meeting Action: Reject
Panel Statement: The addition of the word "only" does not add clarity to the code. The deletion of 250.8(B) is not substantiated, as it is useful text for the user as it is still specifically cited by AHJs from time to time.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-68 Log #4146 NEC-P05 **Final Action: Reject**
(250.8)

Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Revise 250.8 to relocate the requirements of 250.12 into 250.8 as follows:
250.8 Connection of Grounding and Bonding Equipment.
(A) Permitted Methods. Grounding conductors and bonding jumpers shall be connected by one of the following means:
(1) Listed pressure connectors
(2) Terminal bars
(3) Pressure connectors listed as grounding and bonding equipment
(4) Exothermic welding process
(5) Machine screw-type fasteners that engage not less than two threads or are secured with a nut
(6) Thread-forming machine screws that engage not less than two threads in the enclosure
(7) Connections that are part of a listed assembly
(8) Other listed means
(B) Methods Not Permitted. Connection devices or fittings that depend solely on solder shall not be used
(C) Clean Surfaces. Nonconductive coatings (such as paint, lacquer, and enamel) on equipment to be grounded shall be removed from threads and other contact surfaces to ensure good electrical continuity or be connected by means of fittings designed so as to make such removal unnecessary.
Substantiation: The 2008 NEC cycle revised 250.8 to clarify what connectors and connection methods could be used and what would not be acceptable. The title for this section is "Connection of Grounding and Bonding Equipment" which seems to cover more than the methods. Presently, in 250.12 there is the requirement to have clean surfaces that is really another aspect of connecting grounding and bonding equipment and devices. The relocation of 250.12 as paragraph "C" under 250.8 seems to be logical and an improvement for clarity by putting these requirements – the methods and the requirement for clean surfaces - together.
A companion proposal to delete the requirements of 250.12 is being submitted.
Panel Meeting Action: Reject
Panel Statement: The panel concludes that this section is easier to cite in a stand-alone section, 250.12.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-68a Log #CP506 NEC-P05 **Final Action: Accept**
(250.8(A))

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
(A) Permitted Methods. Equipment ~~G~~grounding conductors, grounding electrode conductors, and bonding jumpers shall be connected by one of the following means:
Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted.

The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-69 Log #3837 NEC-P05 **Final Action: Reject**
(250.8(A)(1))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Delete text to read as follows:
~~(1) Listed pressure connectors~~
Substantiation: This text allows products such as wire connectors (UL 486) and General compression tank to be used to terminate grounding and bonding conductors. Because Article 250 is specific to grounding and bonding as well as UL 467, only products meeting these requirements should be used for safety and reliability. (See also 250.2 and 250.4(A)(5) for the purpose along with 250.8(A)(3).)
Panel Meeting Action: Reject
Panel Statement: The intent of the existing requirements is the allowance of UL 486 series standard connectors to be used for the connection of grounding and bonding equipment. There was no technical substantiation that standard listed connectors such as used in panelboards, switchboards, and elsewhere have been an issue. The list in 250.8 needs to include both listed pressure connectors and pressure connectors listed for grounding and bonding to ensure the end user understands that it is generally acceptable to use listed pressure connectors such as wire connectors under UL 486A-486B unless required by other sections to use those that are listed for grounding and bonding.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-70 Log #3838 NEC-P05 **Final Action: Reject**
(250.8(A)(2))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Revise text to read as follows:
(2) Terminal Bars <u>Listed or Recognized as Grounding and Bonding Equipment</u>
Substantiation: This text allows products such as wire connectors (UL 486) to be used to terminate grounding and bonding conductors. Because Article 250 is specific to grounding and bonding as well as UL 467, along with the fact that there are terminal bars that meet UL 467, only those products should be used for safety and reliability. (See also 250.2 and 250.4(A)(5) for the purpose.)
Panel Meeting Action: Reject
Panel Statement: Terminal bars are sometimes evaluated as part of an assembly such as for panelboards in UL 67 and are not necessarily specifically evaluated to UL 467. Terminal bars can be individual or accessory parts of equipment. The intent of the existing requirements is the allowance of terminal bars to generally be used for the connection of grounding and bonding equipment. There is no technical substantiation provided to change this allowance. Recognized components should not be referenced in the NEC, as they are not suitable for field installation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-71 Log #186 NEC-P05 **Final Action: Reject**
(250.8(A)(3))

Submitter: Bryan P. Holland, City of North Port
Recommendation: Revise as follows:
(A) Permitted Methods.
~~(3) Pressure connectors listed as grounding and bonding equipment.~~
Substantiation: The connectors identified in (3) are already covered by those identified in (1) Listed pressure connectors. The listing of (1) and (3) is redundant and unnecessary. (1) Listed pressure connectors include all those in (3).
Panel Meeting Action: Reject
Panel Statement: The substantiation is not correct. A listed pressure connector is not always listed as grounding and bonding equipment. Conversely, the listing process for connectors listed as grounding and bonding equipment does not make these suitable for use as standard listed connectors. The processes for the listing are different and each connector type needs to be identified in 250.8.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-72 Log #3839 NEC-P05 **Final Action: Reject**
(250.8(A)(3))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Revise text to read as follows:
(3) Pressure connectors listed <u>or recognized</u> as rounding and bonding equipment.
Substantiation: Assemblies are listed and components are recognized such as terminal bars and connectors that can be added to assemblies such as switches, switchboards, and panelboards. This addition clarifies that a component can be added instead of an assembly replacement if an enhancement is required to meet 250.4(A).
Panel Meeting Action: Reject
Panel Statement: Recognized components are not intended for field installation. Recognized components must be evaluated in the end use product by a testing laboratory.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-73 Log #3791 NEC-P05 **Final Action: Reject**
(250.8(A)(5))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Delete the following text:
~~(5) Machine screw-type fasteners that engage not less than two threads or secured with a nut~~
Substantiation: This text is too vague and is being interpreted to allow grounding and bonding conductors to be wrapped around a screw for terminating to an enclosure, (see also 2502., 250.4(A)(5), and 408.40). This text needs to be revised to mean the attachment of UL 467 listed or recognized terminal bars or pressure connectors.
Panel Meeting Action: Reject
Panel Statement: Grounding and bonding conductors or the connectors for these conductors are required to be secured to a metal box by machine screws or thread forming machine screws that provide 2 threads into the enclosure. This provision was added to the 2008 NEC to resolve the questions surrounding the use of sheet metal screws and similar fastening devices. The submitter has not provided technical substantiation that these types of fastening devices have created any problems or a reason for eliminating a proven method of securing conductors to boxes.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-74 Log #3840 NEC-P05 **Final Action: Reject**
(250.8(A)(5))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Delete text to read as follows:
~~(5) Machine screw-type fasteners that engage not less than two threads or secured with a nut.~~
Substantiation: This text is too vague and is being interpreted to allow grounding and bonding conductors to be wrapped around a screw for terminating to an enclosure. (See also 250.2, 250,4(A)(5), and 408.40.) This text needs to be revised to meet the attachment of UL 467 listed or recognized terminal bars or pressure connectors.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement for Proposal 5-73.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-75 Log #3794 NEC-P05 **Final Action: Reject**
(250.8(A)(6))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Delete text as follows:
~~(6) Thead-forming machine screws that engage not less than two threads in the enclosure.~~
Substantiation: This text is too vague and is being interpreted to allow grounding and bonding conductors to be wrapped around a screw for teminating to an enclosure (see also 250.2, 250.4(A)(5) and 408.40). This text needs to be revised to mean the attachment of UL467 listed or recognized terminal bars or pressure connectors.
Panel Meeting Action: Reject
Panel Statement: Grounding and bonding conductors or the connectors for these conductors are required to be secured to a metal box by machine screws or thread forming machine screws that provide 2 threads into the enclosure. This provision was added to the 2008 NEC to resolve the questions surrounding the use of sheet metal screws and similar fastening devices. The submitter has not provided technical substantiation that these types of fastening devices have created any problems or a reason for eliminating a proven method of securing conductors to boxes.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-76 Log #3921 NEC-P05 **Final Action: Reject**
(250.8(A)(8))

Submitter: Tim Cookson, PowerEdge Technologies
Recommendation: Delete text as follows:
~~(8) Other listed means~~
Substantiation: This text is too vague and could be interpreted to mean any electrical, non-electrical, or combination of different listed products connected together.
Panel Meeting Action: Reject
Panel Statement: "Listed" means defines products and methods that have been evaluated by a Nationally Recognized Testing Laboratory for this application.

It is intended to be non-specific as there are numerous methods that can be developed in accordance with the product safety standard. This allows for additional products that do not fit into the list to be introduced into the marketplace without requiring specific code revisions.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-77 Log #1398 NEC-P05 **Final Action: Reject**
(250.10(1))

Submitter: Jayson Ouillette, Rep. IBEW Local 252
Recommendation: Revise text as follows:
Arranged within an enclosure or covering ~~In installations~~ where they are not likely to be damaged.
Substantiation: Change of wording clarifies intent to protect ground clamps. Current wording may be confusing (i.e., They shall be protected from physical damage...where not likely to be damaged!). Current wording can be interpreted to be contradictory.
Panel Meeting Action: Reject
Panel Statement: Grounding clamps and fittings are not necessarily installed in enclosures such as a ground rod clamp that may be directly buried. The recommended text does not provide the additional clarity sought by the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-78 Log #2147 NEC-P05 **Final Action: Reject**
(250.12)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text as follows:
Nonconductive coatings (such as paint, lacquer, ~~and~~ enamel, rust and any form of corrosion) on equipment to be grounded shall be removed from threads and other contact surfaces to ensure good electrical continuity or be connected by means of fittings designed so as to make such removal unnecessary.
Substantiation: All types of grounding and bonding clamps are installed on rusted pipes, rods and the like. Electrical connections are not always made on new equipment. This article needs to include cleaning of old rusty surfaces for a good electrical connection with existing installs.
Panel Meeting Action: Reject
Panel Statement: The list of items cited in this section is not all-inclusive, rather they are provided as examples. Any nonconductive coating is already required to be removed to ensure good electrical continuity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
PORTER, C.: The current list of examples are all products that are purposefully applied to enclosures, by adding in examples of rust and corrosion it becomes clear that coatings that may arise due to conditions of the environment and were not purposefully applied should be considered as well.

5-79 Log #4147 NEC-P05 **Final Action: Reject**
(250.12)

Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Delete text to read as follows:
~~250.12 Clean Surfaces.~~
~~Nonconductive coatings (such as paint, lacquer, and enamel) on equipment to be grounded shall be removed from threads and other contact surfaces to ensure good electrical continuity or be connected by means of fittings designed so as to make such removal unnecessary.~~
Substantiation: Delete 250.12. This is the companion proposal to 250.8 where the text of this section was relocated to 250.8 as paragraph "C".
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-68.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
TEMBLADOR, R.: While we concur with the panel action and statement on this proposal, the title of this section should be revised to "Electrical Continuity" to better reflect the intent and objective of this section. The revision would offer language consistent with the title of section 300.10.

5-80 Log #3280 NEC-P05 **Final Action: Reject**
(250.13 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add the following:
250.XX: DIRECT-BURIED CONDUCTORS Direct-buried bonding and grounding conductors shall comply with Column 1 of Table 300.5.
Substantiation: Grounding and bonding conductors are critical components and should be specifically required to comply with depth requirements.
Panel Meeting Action: Reject
Panel Statement: CMP-5 has addressed the issue of burial depths in previous revision cycles. The substantiation has not provided technical justification to add this requirement.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-81 Log #2338 NEC-P05 **Final Action: Reject**
(250, Part II)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Change the current heading for Part II of Article 250 to include the words "and System Bonding" as follows: **II. System Grounding and System Bonding.**
Substantiation: In the pursuit of improving code organization, changing the heading for Part II of Article 250 as shown above would justify the use of the word "bonding" over 50 times in this part of the article, and would also provide a clear reason for including 250.28, all of which deals ONLY with bonding, in Part II of Article 250. This proposed change lends clarity to the present code text, which also includes a Part V entitled "Bonding," by helping to distinguish between (supply) "system" bonding and "other" (equipment or interconnection) bonding.
Panel Meeting Action: Reject
Panel Statement: Part II of Article 250 provides rules related to system grounding. Bonding connections are functions included to accomplish the system grounding requirements addressed in Part II. Bonding functions, jumpers, connections, methods, and requirements are covered in Part V of Article 250.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
BRETT, JR., M.: I disagree with the committee action. The submitter is correct in that the Main Bonding Jumper and the system Bonding jumper rules are found in Part ll. These are the most important rules for bonding in Article 250. I also agree the common bonding requirements to complete a grounding electrode system or equipment bonding jumpers to assure continuity are important functions. Reference titles bonding are appropriate for Parts 2 through 6 also the figure 250.1 should be revised to reflect this.

5-82 Log #455 NEC-P05 **Final Action: Accept**
(250.20(B) & 250.21)

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Revise text to read as follows:
Change the text "50 Volts to less than 1000 Volts" in the two codes sections noted above.
I have also submitted a proposal to make this change in Table 685.3.
Substantiation: In Article 250, the grounding provisions for these two code sections currently mention "50 Volts to 1000 Volts". Other Article 250 code sections mention 1 kV and Over. Although minor, the code text as noted can create a code requirement conflict when working on systems of 1000 volts or 1 kV. What code sections apply for these systems? This code change is simply a correlation issue. Sections 200.2(A); 250.21(A)(3); 250.24(C); 250.170, Exception 1; and, 250.174 all mention circuits of less than 100 volts.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BOWMER, T.: There is an editorial error in Panel Substantiation - the last phrase of the substantiation should be "...less than 1,000 volts" not ".. less than 100 volts".

5-83 Log #3226 NEC-P05 **Final Action: Accept**
(250.20(D))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 5-101 that has deleted 250.20(D).
This action will be considered by the panel as a public comment.
Submitter: Mark R. Hilbert, State of New Hampshire
Recommendation: Revise as follows:
(D) Separately Derived Systems. Separately derived systems, as covered in 250.20(A) or (B), shall be grounded as specified in 250.30~~(A)~~. Where an alternate source such as an on-site generator is provided with transfer equipment that includes a grounded conductor that is not solidly interconnected to the service-supplied grounded conductor, the alternate source (derived system) shall be grounded in accordance with 250.30~~(A)~~.
Substantiation: This proposal is being submitted as part of series of proposals addressing a revision of 250.30. The removal of the specific reference to 250.30(A) and just referencing 250.30 will allow the new 250.30(B), regarding buildings or structures supplied by separately derived systems, to become part of the requirements for grounding separately derived systems. This revision would also allow any applicable future changes in 250.30 to be included without having to change this section each time.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER, D.: The Panel action on this proposal should be "Reject". 250.20(D) is deleted by the Panel action on Proposal 5-101.

5-84 Log #2702 NEC-P05 **Final Action: Reject**
(250.21(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:

(3)a: The system is used exclusively for control <u>or signaling</u> circuits.

c. Continuity of control <u>or signal</u> power is essential ~~required~~.

Substantiation: The provision should include signaling circuits. The provision should be limited to continuity that is deemed essential for safety or other valid reasons.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any technical substantiation to support such a change. Signal circuits can be considered to be control circuits and the additional words are not needed. There is no substantiation for replacing the word "required" with "essential".
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-85 Log #578 NEC-P05 **Final Action: Accept in Principle**
(250.21(B))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text as follows:

(B) Ground Detectors. Ungrounded alternating current systems as permitted in 250.21(A)(1) through (A)(4) operating at not less than 120 volts and not exceeding 1000 volts shall have ground detectors installed on the system. <u>The ground detection system shall be installed as close as practicable to the service equipment where the service is supplied ungrounded or as close as practicable to the ungrounded separately derived system source location.</u>

Substantiation: This proposal seeks clarification as to the appropriate and functional location for ground detection equipment for an ungrounded service or ungrounded separately derived system. The current requirement is that ground detection be provided on the system, but no location is specified. The problem is that if the detection equipment is installed at the branch circuit or feeder in a location multiple levels downstream from the source or service, the disconnecting of a feeder or branch circuit to which the ground detection equipment is connected could result in an unmonitored, ungrounded system as a whole.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
(B) Ground Detectors. Ground detectors shall be installed in accordance with (B)(1) and (B)(2).
(1) Ungrounded alternating current systems as permitted in 250.21(A)(1) through (A)(4) operating at not less than 120 volts and not exceeding 1000 volts shall have ground detectors installed on the system.
(2) The ground detection ~~system~~ <u>sensing equipment</u> shall be ~~installed~~ <u>connected</u> as close as practicable to ~~service equipment~~ where the <u>system receives its supply</u>. ~~service is supplied ungrounded or as close as practicable to the ungrounded separately derived system source location.~~
Panel Statement: The recommendation has been revised to specify it is the connection of the sensors, rather than the system that needs to be installed close to the source in order to monitor as much of the system as possible and not be incapacitated by the opening of a switch or overcurrent protective device. The indicating device can be located at any convenient location. Additionally the recommendation has been revised to comply with the NEC Manual of Style.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-86 Log #3668 NEC-P05 **Final Action: Reject**
(250.21(B))

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Revise text as follows:

250.21(B) Ground Detectors. Ungrounded alternating current systems as permitted in 250.21(A)(1) through (A)(4) operating at not less than 120 volts and not exceeding 1000 volts shall have ground detectors installed on the system. <u>The ground detector system shall have alarm annunciating equipment located in a readily accessible, conspicuous location for personnel to monitor.</u>

Substantiation: Often times the ground detection systems are installed in locked, remote, equipment or electrical rooms where the alarms can not be readily heard or noticed by personnel. The initial ground fault alarm could sound for days or longer, without any response from personnel.
Panel Meeting Action: Reject
Panel Statement: The process of establishing the method of indicating of the ground-fault detection system activation is a design and operation consideration and has to take into account individual factors associated with the installation. The substantiation does not support the use of audible or visual ground-fault indication only.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:

MOHLA, D.: The proposal should have been accepted in principle to ensure that a ground alarm is conveyed to an attended location for detection and mitigation purposes.

5-86a Log #CP502 NEC-P05 **Final Action: Accept**
(250.21(C) New)

Submitter: Code-Making Panel 5,
Recommendation: Add a new Section 250.21(C) to read:
Marking. If systems are ungrounded, they shall be legibly marked "Ungrounded System" at the source or first disconnecting means of the system. The marking shall be of sufficient durability to withstand the environment involved.
Substantiation: Presently, if voltage measurements indicate that one phase conductor is grounded individuals are not sure if the system is intended to be grounded or if one conductor has faulted to ground. If the system is grounded, as in a corner grounded application, identification of that conductor is required by 200.6, one is never sure if this was overlooked in the original installation. Individuals consider removing covers of energized equipment, exposing them to electrical hazards, because the systems are supplying multiple loads that owners do not want to shut down.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-87 Log #3780 NEC-P05 **Final Action: Reject**
(250.24)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:

"Grounding <u>Electric Utility</u> Service Supplied Alternating-Current Systems."

Substantiation: Adding the words "Electric Utility" before "Service Supplied... " further clarifies the intent of the article.
Panel Meeting Action: Reject
Panel Statement: The recommendation is not necessary because of the definition of "Service" in Article 100.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-88 Log #3398 NEC-P05 **Final Action: Reject**
(250.24(A))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

250.24(A) System Grounding Connections. A premises wiring system supplied by a grounded ac service shall have a grounding electrode conductor connected to the grounded service<u>-entrance</u> conductor, at each service, in accordance with 250.24(A)(1) through (A)(5).

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: The broad application of the currently defined term "service conductor" is critical to ensuring that the Article 250 requirements can be properly applied to all installations of service conductors. Acceptance of this proposal would limit application of requirements for service conductors to only service-entrance conductors. It is important that the term "service conductor" remain in this section as conductors, in addition to service-entrance conductors, supply services. This includes service-lateral conductors. These conductors are often installed by electrical contractors and are on the premises wiring side of the service point. CMP-5 is receptive to comments based on actions taken by other code-making panels relative to this proposed terminology revision.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

WHITE, C.: Although I am voting affirmative on this proposal I would like to point out for future reference that the panel did concur with the overall concept these proposals are based on. And, that the panel feels that it needs to wait until CMP-4 has had an opportunity to act on the definition changes that are proposed in support of these proposals. Since several panels have similar proposals that are dependent on the actions of Panel 4, this issue will need to be correlated by the TCC.

5-89 Log #3431 NEC-P05 **Final Action: Reject**
(250.24(A)(1))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

250.24(A)(1) General. The grounding electrode conductor connection shall be made at any accessible point from the load end of the service drop or service lateral to and including the terminal to which the grounded service-entrance conductor is connected to the service disconnecting means.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-88.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

WHITE, C.: See My Affirmative with Comment on 5-88.

5-90 Log #3406 NEC-P05 **Final Action: Reject**
(250.24(A)(2))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

250.24(A)(2) Outdoor Transformer. Where the transformer supplying the service is located outside the building, at least one additional grounding connection shall be made from the grounded service-entrance conductor to a grounded electrode, either at the transformer or elsewhere outside the building.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-88.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

WHITE, C.: See My Affirmative with Comment on 5-88.

5-91 Log #4191 NEC-P05 **Final Action: Reject**
(250.24(A)(2))

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Delete text as follows:

~~(2) Outdoor Transformer. Where the transformer supplying the service is located outside the building, at least one additional grounding connection shall be made from the grounded service conductor to a grounding electrode, either at the transformer or elsewhere outside the building.~~

~~*Exceptional: The additional grounding electrode conductor connection shall not be made on high impedance grounded neutral systems. The system shall meet the requirements of 250.36.*~~

Substantiation: This language provides a requirement that is not within the NEC scope and should be deleted. A transformer supplying the service is under the utilities jurisdiction. If the transformer is customer owned, the conductors supplying the building or structure are feeders or branch circuits. Those conductors are not covered by 250.24 which apply to services. Possibly this requirement could be added to 250.32 if CMP 5 desires.

Panel Meeting Action: Reject

Panel Statement: The language in 250.24(A)(2) provides a requirement that is within the scope of the NEC. A transformer supplying the service that is under the utilities' jurisdiction may, in fact, have a service point in the transformer enclosure or adjacent to it. In these applications the installation of the service drops or service lateral is covered in the NEC and thus the rule applies. This requirement provides a first line of defense for protecting the electrical system where the supply transformer is located outside of the building or structure.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-92 Log #3227 NEC-P05 **Final Action: Accept**
(250.24(A)(5), FPN)

Submitter: Mark R. Hilbert, State of New Hampshire
Recommendation: Revise text as follows:
(5) Load-Side Grounding Connections. A grounded conductor shall not be connected to normally non-current-carrying metal parts of equipment, to equipment grounding conductor(s), or be reconnected to ground on the load side of the service disconnecting means except as otherwise permitted in this article.
FPN: See 250.30~~(A)~~ for separately derived systems, 250.32 for connections at separate buildings or structures, and 250.142 for use of the grounded circuit conductor for grounding equipment.
Substantiation: This proposal is being submitted as part of series of proposals addressing a revision of 250.30. The removal of the specific reference to 250.30(A) and just referencing 250.30 will allow the new 250.30(B), regarding buildings or structures supplied by separately derived systems, to be recognized part of the requirements for grounding separately derived systems. This revision would also allow any applicable future changes in 250.30 to be included without having to change this FPN each time.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

(Note: Sequence 5-93 was not used)

5-94 Log #1487 NEC-P05 **Final Action: Reject**
(250.24(C))

Submitter: Steven Carter, Los Alamos, NM
Recommendation: 250.24 Grounding Service-Supplied Alternating-Current Systems.
(C) Grounded Conductor Brought to Service Equipment. Where an AC system operating at less than 1000 volts is grounded at any point, the grounded conductor(s) shall be run to each service disconnecting means and shall be connected to each disconnecting means grounded conductor(s) terminal or bus. A main bonding jumper shall connect the grounded conductor(s) to the ~~disconnecting means enclosure~~ grounding electrode conductor at any single point on the system from the source to the first system disconnecting means or overcurrent device. The grounded conductor(s) shall be installed in accordance with 250.24(C)(1) through (C)(3).
Substantiation: Bonding the grounded conductor and the grounding electrode conductor in more than one place is in conflict with 250.6. This is substantiated in 250.30(A)(1) where bonding the GC and the GEC together in more than one place is prohibited. Requiring multiple connections between the GC and the GEC in services and prohibiting the same connections in separately derived systems is not in line with the clear and consistent position that the NEC needs to have on this issue.
Panel Meeting Action: Reject
Panel Statement: The main bonding jumper must connect the grounded conductor(s) to the disconnecting means enclosure to provide an effective ground-fault current path as required by 250.4. All service disconnecting means must have an effective ground-fault current path back to the utility and have a reference to ground, which means they need both the main bonding jumper and a connection to the grounding electrode conductor.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-95 Log #3112 NEC-P05 **Final Action: Accept**
(250.24(C), (C)(1), (C)(2), and (C)(3))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised text.
(C) Grounded Conductor Brought to Service Equipment. If ~~Where~~ an ac system operating at less than 1000 volts is grounded at any point, the grounded conductor(s) shall be routed with the ungrounded conductors ~~run~~ to each service disconnecting means and shall be connected to each disconnecting means grounded conductor(s) terminal or bus. A main bonding jumper shall connect the grounded conductor(s) to each service disconnecting means enclosure. The grounded conductor(s) shall be installed in accordance with 250.24(C)(1) through (C)(4) ~~(3)~~.
Exception: If ~~Where~~ two or more ~~than one~~ service disconnecting means are located in a single assembly listed for use as service equipment, it shall be permitted to connect ~~run~~ the grounded conductor(s) to the assembly common grounded conductor(s) terminal or bus. The assembly shall include a main bonding jumper for connecting the grounded conductor(s) to the assembly enclosure.
(1) ~~Routing and~~ Sizing for a Single Raceway. The grounded ~~This~~ conductor shall ~~be routed with the phase conductors and shall~~ not be smaller than the required grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the largest ungrounded service-entrance phase conductor(s). In addition, for sets of service-entrance phase conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12½ percent of the circular mil area of the largest set of service-entrance phase conductors. ~~The grounded conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than that of the ungrounded conductors.~~
(2) Parallel Conductors in Two or More Raceways. If ~~Where~~ the service-entrance phase conductors are installed in parallel in two or more raceways, the grounded conductor shall also be installed in parallel. The size of the grounded conductor in each raceway shall be based on the total circular mil area of the parallel ungrounded conductors in the raceway as indicated in (C)(1) ~~this section~~. ~~Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded service-entrance conductor in the raceway~~ but not smaller than 1/0 AWG.
(3) Delta Connected Service. The grounded conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than that of the ungrounded conductors.
Retain the existing FPN to follow (C)(2).
Renumber existing 250.24(C)(3) as (C)(4)
Substantiation: Many of the proposed changes are intended to be editorial, to correct terminology or be clarification of application of other NEC rules that apply. The requirement on routing the grounded conductor with the ungrounded conductors is moved to the opening paragraph for clarity.
The rules for all service-entrance conductors being installed in a single raceway like a wireway and for conductors installed in parallel in separate raceways are provided in separate sub-sections.
The rules on sizing the grounded conductor of 3-phase systems are located in their own sub-section for ease of locating and proper application.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-96 Log #4367 NEC-P05 **Final Action: Reject**
(250.24(C) Exception)

Submitter: Terry L. Schneider, Berwick Electric Co.
Recommendation: Revise text as follows:
Exception: Where more than one service disconnecting means are located in a single assembly or have a common enclosure ahead of the service disconnecting means, it shall be permitted to run the grounded conductor(s) to the assembly common grounded conductor(s) terminal or bus or main bonding jumpers to each main disconnecting means terminated on a common terminal or bus within the common enclosure ahead of the service disconnecting means. The assembly or common enclosure ahead of the assembly shall include a main bonding jumper for connecting the grounded conductor(s) to the ~~assembly~~ enclosure.
Substantiation: The present wording mandates that you bond the grounded conductor inside each enclosure. This leads to normal current flow on the nipples, enclosures and conduits when you have a CT can or common gutter ahead of the service disconnects and you bond the neutral in the other enclosures. This will provide an alternative for bonding that meets the intent for bonding of service equipment but eliminate the normal grounded neutral current on the enclosures and other raceways. This practice is prohibited on separately derived systems and could be provided as an alternative for service equipment
Panel Meeting Action: Reject
Panel Statement: Use of the grounded conductor for grounding is permitted on the supply side of the service disconnecting means enclosures as indicated in 250.142(A) and 250.92(B)(1). Parallel paths for neutral current on the line side of the service are not prohibited, and the submitter has not provided, substantiation that this has been a compromise in safety.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-97 Log #595 NEC-P05 **Final Action: Reject**
(250.24(C)(2))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Revise the existing paragraph as follows:
Existing text: ...~~Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded service-entrance conductor in the raceway but not smaller than 1/0 AWG.~~
New text: ...Where installed in two or more raceways, the size of the grounded conductor in each raceway shall not be smaller than 12 1/2 percent of the total circular mil area of the phase conductors in all conduits, but not smaller than 1/0 AWG.
The first sentence of the paragraph to remain unchanged.
Substantiation: One of the functions the grounded conductor performs is to carry fault current back to the source. If Table 250.66 is used alone, the grounded conductor may be too small to perform this function if the other parallel grounded conductors have been damaged. This change utilizes the same philosophy as found in 250.122(F) for equipment grounding conductors.

For example, if there are 5-500 kcmil ungrounded conductors per phase in parallel, based on the present wording of 250.24(C)(2) and 250.66 the minimum size grounded conductor would be a 1/0 AWG CU in each conduit. With the proposed change, the minimum size of conductor would be a 350 kcmil in each conduit. Based on the 12 1/2 percent rule found in 250.24(C)(1), the 350 kcmil should be able to clear the upstream overcurrent protective device.

Panel Meeting Action: Reject

Panel Statement: The substantiation provided does not support revising the current requirements to mandate larger grounded conductors.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-98 Log #3424 NEC-P05 **Final Action: Reject**
(250.24(D))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

250.24(D) Grounding Electrode Conductor. A grounding electrode conductor shall be used to connect the equipment grounding conductors,the service-equipment enclosures, and, where the system is grounded, the grounded service-entrance conductor to the grounded electrode(s) required by Part III of this article. This conductor shall be sized in accordance with 250.66, either at the transformer or elsewhere outside the building.

High-impedance grounded neutral system connections shall be made as covered in 250.66.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-88.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

WHITE, C.: See My Affirmative with Comment on 5-88.

5-99 Log #3411 NEC-P05 **Final Action: Reject**
(250.24(E))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

250.24(E) Ungrounded System Grounding Connections. A premises wiring system that is supplied by an ac service that is ungrounded shall have, at each service, a grounding electrode conductor connected to the grounding electrode(s) required by Part III of this article. The grounding electrode conductor shall be connected to a metal enclosure of the service-entrance conductors at any accessible point from the load end of the service drop or service lateral to the service disconnecting means.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-88.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

WHITE, C.: See My Affirmative with Comment on 5-88.

5-100 Log #3781 NEC-P05 **Final Action: Reject**
(250.24(F))

Submitter: Steven R. Musial, II, CJL Engineering

Recommendation: Add new text to read as follows:

250.24(F) Equipment Grounding Conductor. Under no conditions shall an equipment grounding conductor be connected to the ground bus of service entrance equipment in which the grounding conductor originates on the supply side of electric utility metering.

Substantiation: It is not uncommon for electrical contractors to include a grounding conductor, which originates with the electric utility’s ground bus inside a pad-mounted transformer, in the same conduit with the phase and neutral conductors in lieu of or in addition to the exterior made electrode system established on the load side of the electric utility meter. This practice allows primary short circuit current to enter into customer equipment on the load side of metering.

Panel Meeting Action: Reject

Panel Statement: The title and subject of this recommended action do not correlate with the definition of equipment grounding conductor. Equipment grounding conductors are not present on the supply side of a service disconnecting means. The proposal would restrict use of metallic conduits from being used as the wiring method enclosing service-entrance conductors without substantiation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-101 Log #3113 NEC-P05 **Final Action: Accept in Principle**
(250.30)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: New Text as opening paragraph:

250.30. Grounding Separately Derived Alternating-Current Systems. In addition to complying with 250.30(A) for grounded systems or as provided in 250.30(B) for ungrounded systems, separately derived systems shall comply

with 250.20, 250.21, 250.22, 250.24(A)(2) and 250.26.
Delete 250.20(D).

Move FPN No. 1 and 2 following 250.20(D) to follow the above opening paragraph.

Substantiation: This proposal will bring rules for services that are essential for the safety of separately derived systems into effect without repeating them here. For example:

250.20 provides a list of systems that are required to be grounded.

250.21 provides a list of ac systems of 50 to 1000 Volts that are not required to be grounded.

250.21(B) requires ground detectors on ungrounded alternating current systems. This rule should apply equally to separately derived systems for safety.

250.22 provides a list of circuits not to be grounded. This rule should apply equally to separately derived systems for safety.

250.24(A)(2) Outdoor Transformers. This rule should apply equally to separately derived systems for safety. After all, many, many outdoor distribution systems are under the ownership and control of the property owner and are often separately derived systems.

250.26 Conductor to Be Grounded — Alternating-Current Systems. This rule needs to apply equally to separately derived systems as to services.

Panel Meeting Action: Accept in Principle
Section 250.20(D) is deleted by the action on this proposal. For the remainder of the proposal, see the panel action on Proposal 5-102.

Panel Statement: Other action by the panel is included in Proposal 5-102. The panel concludes these actions meet the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-102 Log #3224 NEC-P05 **Final Action: Accept in Principle in Part**
(250.30)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal in accordance with 3.2.3 of the NEC Style Manual related to the use of acronyms.

This action will be considered by the panel as a public comment.

Submitter: Mark R. Hilbert, State of New Hampshire

Recommendation: Revise as follows:

250.30 Grounding Separately Derived Alternating-Current Systems. A separately derived ac system shall be grounded in accordance with (A, (B) or (C).

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a gronded conductor shall not be connected to normally non-current-carrying metal parts of equipment, to equipment grounding conductors, or be reconnected to ground on the load side of the point of grounding of a separately derived system.

FPN: See 250.32 for connections at separate buildings or structures, and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: Impedance grounded neutral system grounding connections shall be made as specified in 250.36 or 250.186.

(1) System Bonding Jumper. An unspliced system bonding jumper in compliance with 25.0.28(A) through (D) that is sized based on the derived phase conductors shall be used to connect the equipment grounding conductors of the separately derived system to the grounded conductor. This connection shall be made at any single point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices.

Exception No. 1: For separately derived systems that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie, a single system bonding jumper connection to the tie point of the grounded circuit conductors from each power source shall be permitted.

Exception No. 2: A system bonding jumper at both the source and the first disconnecting means shall be permitted where doing so does not establish a parallel path for the rounded conductor. Where a grounded conductor is used in this matter, it shall not be smaller than the size specified for the system bonding jumper but shall not be required to be larger than the ungrounded conductor(s). For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.

Exception No. 3: The size of the system bonding jumper for a system that supplies a Class 1, Class 2, or Class 3 circuit, and is derived from a transformer rated not more than 1000 volt-amperes, shall not be smaller than the derived phase conductors and shall not be small than 14 AWG copper or 12 AWG aluminum.

(2) Equipment Bonding Jumper Size. Where an equipment bonding jumper of the wire type is run with the derived phase conductors from the source of a separately derived system to the first disconnecting means, it shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors.

(3)~~(8)~~ Grounded Conductor. Where a grounded conductor is installed and the system bonding jumper connection is not located at the source of the separately derived system, 250.30(A)~~(8)~~(3)(a), (A)~~(8)~~(3)(b) and (A)~~(8)~~(3)(c) shall apply.

(a) Routing and Sizing. This conductor shall be routed with the derived phase conductors and shall not be smaller than the required grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the largest ungrounded derived phase conductor. In addition, for phase conductors larger than 100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 121/2 percent of the area of the largest derived phase conductor. The grounded conductor of a 3-phase, 3-wire delta system shall have an ampacity not less than that of the ungrounded conductors.

(b) Parallel Conductors. Where the derived phase conductors are installed in parallel, the size of the grounded conductor shall be based on the total circular mil area of the parallel conductors, as indicated in this section. Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded conductors in the raceway but not smaller than 1/0 AWG.

FPN: See 310.4 for grounded conductors connected in parallel.

(c) Impedance Grounded System. The grounded conductor of an impedance grounded neutral system shall be installed in accordance with 250.36 or 250.186.

(4) ~~(7)~~ Grounding Electrode. A separately derived system shall have a ~~The~~ grounding electrode ~~shall be~~ that is located as near as practicable to and preferably in the same area as the grounding electrode conductor connection to the system. The grounding electrode shall be the nearest one of the following:

(1) Metal water pipe grounding electrode as specified in 250.52(A)(1)

(2) Structural metal grounding electrode as specified in 250.52(A)(2)

Exception No. 1: Any of the other electrodes identified in 250.52(A) shall be used where the electrodes specified by 250.30(A)~~(7)~~(4) are not available.

Exception No. 2: Where a separately derived system is supplying a building or other structure a grounding electrode shall be installed in accordance with 250.32(A).

Exception No. ~~2~~ 3 to (1) and (2): Where a separately derived system originates in listed equipment suitable for use as service equipment, the grounding electrode used for the service or feeder equipment shall be permitted as the grounding electrode for the separately derived system.

FPN: See 250.104(D) for bonding requirements of interior metal water piping in the area served by separately derived systems.

(5)~~(3)~~ Grounding Electrode Conductor, Single Separately Derived System. A grounding electrode conductor for a single separately derived system shall be sized in accordance with 250.66 for the derived phase conductors and shall be used to connect the grounded conductor of the derived system to the grounding electrode as specified in 250.30(A)~~(7)~~(4). This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected.

Exception No. 1: Where the system bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor to the equipment grounding terminal, bar, or bus, provided the equipment grounding terminal, bar, or bus is of sufficient size for the separately derived system.

Exception No. 2: Where a separately derived system originates in listed equipment suitable as service equipment, the grounding electrode conductor from the service or feeder equipment to the grounding electrode shall be permitted as the grounding electrode conductor for the separately derived system, provided the grounding electrode conductor is of sufficient size for the separately derived system. Where the equipment grounding but internal to the equipment is not smaller than the required grounding electrode conductor for the separately derived system, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

Exception No. 3: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derivedfrom a transformer rated not more than 1000 volt-amperes, provided the grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1). Exception No. 3, and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(6)~~(4)~~ Grounding Electrode Conductor, Multiple Separately Derived Systems. Where more than one separately derived system is installed, it shall be permissible to connect a tap from each separately derived system to a common grounding electrode conductor. Each tap conductor shall connect the grounded conductor of the separately derived system to the common grounding electrode conductor. The grounding electrode conductors and taps shall comply with 250.30(A)~~(4)~~(6)(a) through (A)~~(4)~~(6)(c). This connection shall be made at the same point on the separately derived system where the system bonding jumper is installed.

Exception No. 1: Where the system bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor to the equipment grounding terminal, bar, or bus, provided the equipment grounding terminal, bar or bus is of sufficient size for the separately derived system.

Exception No. 2: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the system grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A(1),
Exception No. 3 and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(a) Common Grounding Electrode Conductor Size. The common grounding electrode conductor shall not be smaller than 3/0 AWG copper or 250 kcmil aluminum.

(b) Tan Conductor Size. Each tap conductor shall be sized in accordance with 250.66 based on the derived phase conductors of the separately derived system it serves.

Exception: Where a separately derived system originates in listed equipment suitable as service equipment, the grounding electrode conductor from the service or feeder equipment to the grounding electrode shall be permitted as the grounding electrode conductor for the separately derived system, provided the grounding electrode conductor is of sufficient size for the separately derived system. Where the equipment ground bus internal to the equipment is no smaller than the required grounding electrode conductor for the separately derived system, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

(c) Connections. All tap connections to the common grounding electrode conductor shall be made at an accessible location by one of the following methods:

(1) A listed connector.

(2) Listed connections to aluminum or copper busbars not less than 6 mm × 50 mm 1/4 in. × 2 in.). Where aluminum busbars are used, the installation shall comply with 250.64(A).

(3) The exothermic welding process.

(4) Tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice or joint.

(7)~~(5)~~ Installation. The installation of all grounding electrode conductors shall comply with 250.64(A), (B), (C), and (E).

(8)~~(6)~~ Bonding. Structural steel and metal piping shall be connected to the grounded conductor of a separately derived system in accordance with 250.104(D).

(B) Separately Derived Systems Supplying a Building or Other Structure. Where a grounded separately derived system is supplying a building or other structure, a separate equipment bonding or grounding conductor that provides an effective ground fault current path shall be installed with the supply conductors from the source to the building or other structure disconnecting means in accordance with (1) or (2).

(1) Supply Side of Overcurrent Device. The separate equipment bonding jumper on the supply side of each building or other structure overcurrent device shall be sized in accordance with 250.102(C) based on the size of the derived phase conductors.

(2) Load Side of Overcurrent Device. The separate equipment grounding conductor on the load side of each building or other structure overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device.

(C) ~~(B)~~ Ungrounded Systems. The equipment of an ungrounded separately derived system shall be grounded as specified in 250.30~~(B)~~(C)(1) and ~~(B)~~(C)(2).

(1) Grounding Electrode Conductor. A grounding electrode conductor, sized in accordance with 250.66 for the derived phase conductors, shall be used to connect the metal enclosures of the derived system to the grounding electrode as specified in 250.30~~(B)~~(C)(2). This connection shall be made at any point on the separately derived system from the source to the first system disconnecting means.

(2) Grounding Electrode. Except as permitted by 250.34 for portable and vehicle-mounted generators, the grounding electrode shall comply with 250.30(A)~~(7)~~(4).

Substantiation: Revising this section as suggested will provide a clearer understanding of installations for separately derived systems. The new 250.30(B) will address situations where buildings or other structures are supplied by a separately derived system. A new sentence has been added following the title of the section to alert users that a separately derived system must be grounded in accordance with either (A)(B) or (C).

The requirements for the grounded conductor have been moved to 250.30(A)(3) to follow the requirements for the equipment bonding jumper as the grounded conductor should be the next consideration when there is a grounded conductor and the system bonding jumper is not located at the source.

The next considerations should be the grounding electrode so the requirements have been moved to 250.30(A)(4) and text has been added to identify that a separately derived system is clearly required to have a grounding electrode. A new Exception No. 2 (mandatory) has been added and the former Exception No. 2 (non-mandatory) has been moved to No. 3.

The new exception will address situations where a separately derived system is supplying a building or other structure and the grounding electrode may not necessarily be at the same location as the grounding electrode conductor connection to system but will be required to meet the same requirements as other supplies to a separate building or other structure.

Although the rest of the items in 250.30(A)(5) through (8) have been renumbered accordingly, the requirements have not been changed.

A new 250.30(B) has been added to address situations where a building or other structure has been supplied by a separately derived system such as where the transformer is located outside the building and the system is customer owned. This new section will provide guidance not formally included and the requirements parallel the move in recent Code cycles toward not using the grounded conductor to ground or bond equipment or to connect to a grounding electrode. The new (B)(1) and (2) are consistent with the language in 250.35 and a companion proposal submitted for 250.32. The revised text will add consistency to all three sections.

Companion proposals to other sections and chapters as appropriate are being made to address the above proposed changes.

Panel Meeting Action: Accept in Principle in Part

The panel does not accept the recommended revision for new Section 250.30(B).

Revise the remainder of the recommendation to read:

250.30 Grounding Separately Derived Alternating-Current Systems. In addition to complying with 250.30(A) for grounded systems or as provided in 250.30(B) for ungrounded systems, separately derived systems shall comply with 250.20, 250.21, 250.22, 250.24(A)(2) and 250.26.

FPN No. 1: An alternate ac power source such as an on-site generator is not a separately derived system if the grounded conductor is solidly interconnected to a service-supplied system grounded conductor. An example of such situations is where alternate source transfer equipment does not include a switching action in the grounded conductor and allows it to remain solidly connected to the service-supplied grounded conductor when the alternate source is operational and supplying the load served.

FPN No. 2: See 445.13 for the minimum size of conductors that must carry fault current. For systems that are not separately derived and are not required to be grounded as specified in 250.30, see 445.13 for minimum size of conductors that must carry fault current. **(5-101)**

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a grounded conductor shall not be connected to normally non–current-carrying metal parts of equipment, to equipment grounding conductors, or be reconnected to ground on the load side of the system bonding jumper ~~point of grounding of a separately derived system~~. **(5-103)**

FPN: See 250.32 for connections at separate buildings or structures, and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: Impedance grounded neutral system grounding connections shall be made as specified in 250.36 or 250.186.

(1) System Bonding Jumper. An unspliced system bonding jumper shall be installed. It shall be sized in compliance with 250.28(A) through (D) ~~that is sized based on the derived phase conductors shall be used to connect the equipment grounding conductors of the separately derived system to the grounded conductor~~. This connection shall be made at any single point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices, in accordance with (a) or (b). If the source is located outside the building or structure supplied, a system bonding jumper shall be installed at the grounding electrode connection in compliance with (C).

Exception No. 1: For systems installed in accordance with 450.6, ~~separately derived systems that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie,~~ a single system bonding jumper connection to the tie point of the grounded circuit conductors from each power source shall be permitted. **(P 5-107)**

Exception No. 2: A system bonding jumper at both the source and the first disconnecting means shall be permitted if ~~where~~ doing so does not establish a parallel path for the grounded conductor. If ~~Where~~ a grounded conductor is used in this manner, it shall not be smaller than the size specified for the system bonding jumper but shall not be required to be larger than the ungrounded conductor(s). For the purposes of this exception, connection through the earth shall not be considered as providing a parallel path.

Exception No. 3: The size of the system bonding jumper for a system that supplies a Class 1, Class 2, or Class 3 circuit, and is derived from a transformer rated not more than 1000 volt-amperes, shall not be smaller than the derived phase conductors and shall not be smaller than 14 AWG copper or 12 AWG aluminum.

(a) Installed at the Source. The system bonding jumper shall connect the grounded conductor to the supply-side bonding jumper and the normally non–current-carrying metal enclosure.

(b) Installed at the First Disconnecting Means. The system bonding jumper shall connect the grounded conductor to the supply-side bonding jumper, the disconnecting means enclosure, and the equipment grounding conductor(s). The system bonding jumper shall remain within the enclosure where it originates. **(5-105)**

(2) Supply Side ~~Equipment~~ Bonding Jumper ~~Size~~. If the source of a separately derived system and the first disconnecting means are located in separate enclosures, a SSBJ or conductor shall be installed with the circuit conductors from the source enclosure to the first disconnecting means. The bonding jumper shall be of the wire, bus, or nonflexible metal raceway type. If a ~~Where an equipment~~ SSBJ ~~bonding jumper~~ of the wire type is installed ~~run with the derived phase conductors from the source of a separately derived system to the first disconnecting means~~, it shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors. If a bus is installed as the SSBJ, it shall have a circular mil area not less than the bonding jumper of the wire type as determined in 250.102(C). This conductor shall not be required to be larger than the derived circuit conductors. **(5-110, 5-111)**

(3) ~~(8)~~ Grounded Conductor. If ~~Where~~ a grounded conductor is installed and the system bonding jumper connection is not located at the source, ~~of the separately derived system,~~ 250.30(A)(3)(a) through (A)(3)(d) ~~250.30(A)(8)(a), (A)(8)(b), and (A)(8)(c)~~ shall apply.

(a) ~~Routing and~~ Sizing for a Single Raceway. The grounded ~~This~~ conductor shall ~~be routed with the phase conductors and shall~~ not be smaller than the required grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the largest ungrounded service-entrance phase conductor(s). In addition, for sets of ungrounded ~~phase~~ conductors larger than 1100 kcmil copper or 1750 kcmil aluminum, the grounded conductor shall not be smaller than 12½ percent of the circular mil area of the largest set of ungrounded ~~phase~~ conductors. ~~The grounded conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than that of the ungrounded conductors.~~

(b) Parallel Conductors in Two or More Raceways. If ~~Where~~ the ungrounded ~~phase~~ conductors are installed in parallel in two or more raceways, the grounded conductor shall also be installed in parallel. The size of the grounded conductor in each raceway shall be based on the total circular mil area of the parallel ungrounded conductors in the raceway as indicated in (a) ~~this section~~. ~~Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded service-entrance conductor in the raceway~~ but not smaller than 1/0 AWG.

FPN: See 310.4 for grounded conductors connected in parallel.

(c) Delta Connected Service. The grounded conductor of a 3-phase, 3-wire delta service shall have an ampacity not less than that of the ungrounded conductors.

(d)~~(c)~~ Impedance Grounded System. The grounded conductor of an impedance grounded neutral system shall be installed in accordance with 250.36 or 250.186. **(P 5-95)**

(4) ~~(3)~~ Grounding Electrode. The grounding electrode shall be as near as practicable to and preferably in the same area as the grounding electrode conductor connection to the system. The grounding electrode shall be the nearest one of the following:

(1) Metal water pipe grounding electrode as specified in 250.52(A)(1)

(2) Structural metal grounding electrode as specified in 250.52(A)(2)

Exception No. 1: Any of the other electrodes identified in 250.52(A) shall be used if ~~where~~ the electrodes specified by 250.30(A)(4)~~(7)~~ are not available.

Exception No. 2 to (1) and (2): If ~~Where~~ a separately derived system originates in listed equipment suitable for use as service equipment, the grounding electrode used for the service or feeder equipment shall be permitted as the grounding electrode for the separately derived system.

FPN No. 1: See 250.104(D) for bonding requirements of interior metal water piping in the area served by separately derived systems.

FPN No. 2: See 250.50 and 250.58 for requirements of bonding all electrodes together if located at the same building or structure. **(5-118)**

(5) ~~(3)~~ Grounding Electrode Conductor, Single Separately Derived System. A grounding electrode conductor for a single separately derived system shall be sized in accordance with 250.66 for the derived phase conductors. It shall be used to connect the grounded conductor of the derived system to the grounding electrode as specified in 250.30(A)(4) ~~(7)~~. This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected.

Exception No. 1: If ~~Where~~ the system bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor to the equipment grounding terminal, bar, or bus, provided the equipment grounding terminal, bar, or bus is of sufficient size for the separately derived system.

Exception No. 2: If ~~Where~~ a separately derived system originates in listed equipment suitable as service equipment, the grounding electrode conductor from the service or feeder equipment to the grounding electrode shall be permitted as the grounding electrode conductor for the separately derived system, provided the grounding electrode conductor is of sufficient size for the separately derived system. If ~~Where~~ the equipment grounding bus internal to the equipment is not smaller than the required grounding electrode conductor for the separately derived system, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

Exception No. 3: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 3, and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(6) ~~(4)~~ Grounding Electrode Conductor, Multiple Separately Derived Systems.

A common grounding electrode conductor for multiple separately derived systems shall be permitted. If installed, the common grounding electrode conductor shall be used to connect the grounded conductor of the separately derived systems to the grounding electrode as specified in 250.30(A)(4). ~~Where more than one separately derived system is installed, it shall be permissible to connect a tap from each separately derived system to a common grounding electrode conductor.~~ A grounding electrode conductor tap shall then be installed from each separately derived system to the common grounding electrode conductor. Each tap conductor shall connect the grounded conductor of the separately derived system to the common grounding electrode conductor. ~~The grounding electrode conductors and taps shall comply with 250.30(A)(4)(a) through (A)(4)(c).~~ This connection shall be made at the same point on the separately derived system where the system bonding jumper is connected ~~installed~~. **(5-113, 5-114)**

Exception No. 1: If ~~Where~~ the system bonding jumper specified in 250.30(A)(1) is a wire or busbar, it shall be permitted to connect the grounding electrode conductor tap to the equipment grounding terminal, bar, or bus, provided the equipment grounding terminal, bar, or bus is of sufficient size for the separately derived system.

Exception No. 2: A grounding electrode conductor shall not be required for a system that supplies a Class 1, Class 2, or Class 3 circuit and is derived from a transformer rated not more than 1000 volt-amperes, provided the system grounded conductor is bonded to the transformer frame or enclosure by a jumper sized in accordance with 250.30(A)(1), Exception No. 3 and the transformer frame or enclosure is grounded by one of the means specified in 250.134.

(a) Common Grounding Electrode Conductor ~~Size~~. The common grounding electrode conductor shall be permitted to be one of the following:

(1) A wire-type conductor shall not be smaller than 3/0 AWG copper or 250 kcmil aluminum.

(2) The metal frame of the building or structure that complies with 250.52(A)(2) or is connected to the grounding electrode system by a conductor not smaller then 3/0 AWG copper or 250 kcmil aluminum. **(5-116)**

(b) Tap Conductor Size. Each tap conductor shall be sized in accordance with 250.66 based on the derived phase conductors of the separately derived system it serves.

Exception: If ~~Where~~ a separately derived system originates in listed equipment suitable as service equipment, the grounding electrode conductor from the service or feeder equipment to the grounding electrode shall be permitted as the grounding electrode conductor for the separately derived system, provided the grounding electrode conductor is of sufficient size for the separately derived system. If ~~Where~~ the equipment ground bus internal to the equipment is not smaller than the required grounding electrode conductor for the separately derived system, the grounding electrode connection for the separately derived system shall be permitted to be made to the bus.

(c) Connections. All tap connections to the common grounding electrode conductor shall be made at an accessible location by one of the following methods:

(1) A ~~listed~~ connector listed as grounding and bonding equipment. **(5-117)**

(2) Listed connections to aluminum or copper busbars not less than 6 mm × 50 mm (¼ in. × 2 in.). If ~~Where~~ aluminum busbars are used, the installation shall comply with 250.64(A).

(3) The exothermic welding process.

Tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice or joint.

(7) ~~(5)~~ Installation. The installation of all grounding electrode conductors shall comply with 250.64(A), (B), (C), and (E).

(8) ~~(6)~~ Bonding. Structural steel and metal piping shall be connected to the grounded conductor of a separately derived system in accordance with 250.104(D).

(B) Ungrounded Systems. The equipment of an ungrounded separately derived system shall be grounded and bonded as specified in 250.30(B)(1) through ~~and~~ (B)(3) ~~(2)~~.

(1) Grounding Electrode Conductor. A grounding electrode conductor, sized in accordance with 250.66 for the derived phase conductors, shall be used to connect the metal enclosures of the derived system to the grounding electrode as specified in 250.30(B)(5) or (6) as applicable ~~(2)~~. This connection shall be made at any point on the separately derived system from the source to the first system disconnecting means. If the source is located outside the building or structure supplied, a grounding electrode connection shall be made in compliance with (C).

(2) Grounding Electrode. Except as permitted by 250.34 for portable and vehicle-mounted generators, the grounding electrode shall comply with 250.30(A)(4)~~(7)~~.

(3) Bonding Path and Conductor. A bonding jumper or conductor consisting of a non-flexible metal raceway or conductor of the wire or bus type shall be installed from the source of a separately derived system to the first disconnecting means. A bonding jumper of the wire type shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors. **(5-121)**

250.30(C) Outdoors Source. If the source of the separately derived system is located outside the building or structure supplied, a grounding electrode connection shall be made at the source location to one or more grounding electrodes in compliance with 250.50. In addition, the installation shall comply with (A) for grounded systems or with (B) for ungrounded systems.

Exception: The grounding electrode conductor connection shall not be made at the outdoor source for high-impedance grounded neutral systems. The system shall meet the requirements of 250.36. **(5-102)**

Panel Statement: The panel accepts the reorganization of Section 250.30 as provided in this proposal. Text is being added by the panel to ensure proper rules for separately derived systems that have their source outside the building or structure served. The proposed new Section 250.30(B) is not accepted as the subject of buildings or structures supplied by a feeder or branch circuit are more properly covered in 250.32. The action on this proposal includes the concepts or text from the following proposals: 5-101, 5-103, 5-104, 5-105, 5-106, 5-107, 5-109, 5-110, 5-111, 5-113, 5-114, 5-116, 5-117, 5-118, and 5-121.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

HARDING, G.: Continue to accept the proposal. This section was restructured and modified after extensive work by several code panel members both before and at the ROP Meeting with the goal to improve usability and clarity. The full panel provided further review and comment at the ROP meeting.

JOHNSTON, M.: Continue to accept this proposal which incorporates several important proposed revisions as well as a restructuring for improved usability. This section as revised is the result of extensive work completed by several members of CMP-5 before the ROP meeting and additional work and input provided by the full panel during the full panel during the ROP.

5-103 Log #2986 NEC-P05 **Final Action: Accept in Principle**
(250.30(A))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a grounded conductor shall not be connected to normally non–current-carrying metal parts of equipment, to equipment grounding conductors, or be reconnected to ground on the load side of the ~~point of grounding~~ system bonding jumper of a separately derived system.

FPN: See 250.32 for connections at separate buildings or structures, and 250.142 for use of the grounded circuit conductor for grounding equipment.

Exception: Impedance grounded neutral system grounding connections shall be made as specified in 250.36 or 250.186.

Substantiation: The term system bonding jumper is clearly defined, whereas the term "point of grounding" is not.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-104 Log #3464 NEC-P05 **Final Action: Accept in Principle**
(250.30(A))

Submitter: G. Scott Harding, F. B. Harding, Inc.
Recommendation: Revise text to read as follows:

250.30 Grounding Separately Derived Alternating-Current Systems.

(A) Grounded Systems. A separately derived ac system that is grounded shall comply with 250.30(A)(1) through (A)(8). Except as otherwise permitted in this article, a grounded conductor shall not be connected to normally non–current-carrying metal parts of equipment, to equipment grounding conductors, or be reconnected to ground on the load side of the ~~point of~~ grounding electrode connection point of a separately derived system.

Substantiation: The phrase "point of grounding" is made more specific by noting its location as the connection point of the grounding electrode conductor. This provides better clarity.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-105 Log #3114 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(1))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised Text.

(1) System Bonding Jumper. An unspliced system bonding jumper in compliance with 250.28(A) through (D) that is sized based on the largest derived phase conductor or set of conductors shall be installed to connect the system grounded conductor to the grounding electrode conductor and the bonding conductor or jumper ~~used to connect the equipment grounding conductors of the separately derived system to the grounded conductor~~. This connection shall be made at any single point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices. The system bonding jumper shall remain within the enclosure where it originates.

Retain the existing exceptions.

Substantiation: This proposal intends to make changes to this section to clarify the function of the system bonding jumper and common installation methods. In reality, the system bonding jumper can be installed in several ways. For example, if a multi-barrel lug is connected to the XO terminal of a transformer, the system bonding jumper, grounding electrode conductor, grounded conductor, and bonding jumper can be connected at that connector. If a multi-barrel lug is connected to the transformer or generator enclosure, it is common to connect the system bonding jumper, grounding electrode conductor and the bonding jumper or conductor to that connector. The grounded conductor should always connect directly to the XO terminal.

The new last sentence is intended to address an interpretation and installation practice that seems incorrect. Some have stated this section permits the system bonding jumper to be installed from the source (for example a transformer) through a raceway to the enclosure for the system disconnecting means. As such, the system bonding jumper is being installed between enclosures in place of the bonding jumper or conductor.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-106 Log #4010 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(1))

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:

System Bonding Jumper. An unspliced system bonding jumper in compliance with 250.28(A) through (D) that is sized based on the derived phase conductors shall be used to connect the equipment bonding jumper(s) ~~grounding conductors~~ of the separately derived system to the grounded conductor. This connection shall be made at any single point on the separately derived system from the source to the first system disconnecting means or overcurrent device, or it shall be made at the source of a separately derived system that has no disconnecting means or overcurrent devices.

Substantiation: The system bonding jumper is connected to the "equipment bonding jumper" not the "equipment grounding conductor". Section 250.30(A)(2) uses the term "equipment bonding jumper".
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-107 Log #2389 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(1) Exception No. 1)

Submitter: Thomas F. Mueller, Southern Company
Recommendation: Revise text to read as follows:

Exception No. 1: For ~~separately derived~~ systems that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie, a single system bonding jumper connection to the tie point of the grounded circuit conductors from each power source shall be permitted.

Substantiation: Separately derived systems are defined as systems that have no direct electrical connections "including a solidly connected grounded circuit conductor." The exception is describing two systems that have a grounded conductor connection, and, therefore, the systems are not separately derived. Deletion of the words "separately derived" will eliminate confusion.
Panel Meeting Action: Accept in Principle
Revise 250.30 Exception No 1 to read:
Exception No. 1: For systems installed in accordance with 450.6, ~~separately derived systems that are dual fed (double ended) in a common enclosure or grouped together in separate enclosures and employing a secondary tie,~~ a single system bonding jumper connection to the tie point of the grounded circuit conductors from each power source shall be permitted.
Panel Statement: The panel has revised the application of the exception to relate to transformer systems covered in 450.6. This action has been incorporated into the panel action on Proposal 5-102.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-108 Log #2547 NEC-P05 **Final Action: Reject**
(250.30(A)(1) Exception No. 4 (New))

Submitter: Mike Jones, Purdue University
Recommendation: Add new Exception No. 4 to 250.30(A)(1), to read as follows:

Exception No. 4: A system bonding jumper shall be permitted to contain splices when the system bonding jumper is part of a manufactured busway system containing factory splices.

Substantiation: When power delivery into a building has been defined to be through a separately derived system, the grounded (Neutral) conductor is permitted to be bonded at the transformer via the system bonding jumper. In these circumstances, the bonding jumper consists of a conductor routed from the grounded conductor (neutral point) of the transformer to the equipment ground bus in the first system disconnecting means. (Please refer to the 2008 NEC Handbook, Exhibit 250.13 for illustration). In many cases, the wiring method from the transformer to the first system disconnecting means is power busway. When power busway is used, the ground in the busway then becomes the system bonding jumper. (Depending on the busway manufacturer, the busway ground can be either a separate bus bar or the busway case itself. Due to the nature and construction of power busway, the ground bus (serving as the system bonding jumper) will contain factory splices at each busway joint. Presently, the only way to comply with 2008 NEC 250.30(A)(1) is to route a separate conductor, sized per 2008 NEC 250.28(D), from the grounded conductor (neutral point) of the transformer to the equipment ground bus in the service entrance rated switchgear (serving as the first system disconnecting means). (This separate conductor is routed adjacent to the power busway).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: System bonding jumpers are typically installed within an enclosure such as a transformer, a generator, or the first disconnecting means. A manufactured busway system would not be appropriate for this purpose.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-109 Log #817 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(2))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add new text to read as follows:

Where the source of the separately derived system is located outside the building, the connection of the grounded supply conductor to the grounding electrode(s) shall be made at the source of the separately derived system or elsewhere outside the building.

Substantiation: Where the source of the separately derived system (transformer, generator, etc.) is outside the building, transient voltages associated with lightning or external power faults may be a constant threat. This new reference would be consistent with 250.24(A)(2) for service supplied systems and would provide better protection from transient voltages.

Panel Meeting Action: Accept in Principle

Add a new Section 250.30 to read:

250.30(C) Outdoors Source. If the source of the separately derived system is located outside the building or structure supplied, a grounding electrode connection shall be made at the source location to one or more grounding electrodes in compliance with 250.50. In addition, the installation shall comply with (A) for grounded systems or with (B) for ungrounded systems.

Exception: The grounding electrode conductor connection shall not be made at the outdoor source for high-impedance grounded neutral systems. The system shall meet the requirements of 250.36.

Add a new last sentence of 250.30(A)(1) to read:

If the source is located outside the building or structure supplied, a system bonding jumper shall be installed at the grounding electrode connection in compliance with (C)."

Add a new last sentence of 250.30(B)(1) to read:

If the source is located outside the building or structure supplied, a grounding electrode connection shall be made in compliance with (C)."

Panel Statement: The panel has made revisions to the proposal to incorporate the concepts in the proposal into this section. The panel concludes this action meets the intent of the recommendation. This action has been incorporated into the panel action on Proposal 5-102.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-110 Log #3047 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(2))

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

(2) Equipment Bonding Jumper Size. Where an equipment bonding jumper of the wire type is run with the derived phase conductors from the source of a separately derived system to the first disconnecting means, it shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors. This conductor shall not be required to be larger than the derived phase conductors.

Substantiation: As currently written, a small transformer with 12 AWG secondary conductors would require an 8 AWG bonding jumper. This is contrary to the general rule(s) of not requiring a bonding conductor to be larger than the circuit conductors.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-111 Log #3115 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(2))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing text of the 2008 NEC as follows:

(2) ~~Equipment~~ Bonding Jumper ~~Size~~. If the source of a separately derived system and the first disconnecting means are located in separate enclosures, a bonding jumper or conductor shall be installed with the circuit conductors from the enclosure for the separately derived system to the first disconnecting means. The bonding jumper shall be of the wire, or bus, or nonflexible metal raceway type. If a ~~Where an equipment~~ bonding jumper of the wire type is installed ~~run with the derived phase conductors from the source of a separately derived system to the first disconnecting means~~, it shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors. If a bus is installed as the bonding jumper, it shall have a circular mil area not less than the bonding jumper of the wire type as determined in 250.102(C).

Substantiation: As presently worded, this section does not clearly require the installation of an equipment bonding jumper from the separately derived system to the first disconnecting means and must do so. This proposal intends to correct that. In addition, this proposal adds needed language to recognize that metal raceways of the "nonflexible type" are not suitable for use as an equipment bonding conductor or jumper. Sections 250.118(5), (6) and (7) demonstrate the very limited current-carrying capability of these flexible raceways. They are not suitable to function as the fault-current path described in 250.4.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-112 Log #4368 NEC-P05 **Final Action: Reject**
(250.30(A)(3) Exception No. 4)

Submitter: Terry L. Schneider, Berwick Electric Co.

Recommendation: Add the following new text:

Where the grounding conductor used for bonding the primary of a separately derived system is a wire and is sized in accordance with 250.30(A)(2) shall be permitted to be used as the grounding electrode conductor if it meets the requirements of 250.30(A)(7) and is installed in accordance with 250.64.

Substantiation: It is unclear in the code, (many jurisdictions prohibit) if it is permissible to install the grounding electrode conductor with the supply conductors for a separately derived system. Some jurisdictions are requiring a separate conductor for the primary ground and another for the grounding electrode conductor when they terminate in the same place on both ends. This will help clarify the intent of the code panel.

Panel Meeting Action: Reject

Panel Statement: CMP-5 has created a new definition for a supply-side bonding jumper that is installed from the source of a separately derived system to the first system disconnecting means. Its function and location in the separately derived system does not allow it to be used as an equipment grounding conductor.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-113 Log #3116 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(4))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing text of the 2008 NEC as follows:

(4) Grounding Electrode Conductor, Multiple Separately Derived Systems. If ~~Where~~ the grounding electrode required in 250.30(A)(7) is not present in the area served by the separately derived system, and more than one separately derived system is installed, it shall be permissible to install a common grounding electrode conductor from the grounding electrode system required in 250.50 to serve the separately derived systems. A ~~connect a~~ grounding electrode conductor tap shall then be installed from each separately derived system to the ~~a~~ common grounding electrode conductor. Each tap conductor shall connect the grounded conductor of the separately derived system to the common grounding electrode conductor. The grounding electrode conductors and taps shall comply with 250.30(A)(4)(a) through (A)(4)(c). This connection shall be made at the same point on the separately derived system where the system bonding jumper is installed.

The remainder of this section is to remain unchanged by this Proposal.

Substantiation: Changes to this section include:

(1) Clarifying that the common grounding electrode conductor and tap provisions apply only if the grounding electrode required in 250.30(A)(7) is not available. If available in the area served by the separately derived system, the grounding electrodes specified in 250.30(A)(7) should be used.

(2) Clarifies that the common grounding electrode conductor, if installed, must connect to the building or structure grounding electrode system.

(3) Other changes are intended to be editorial.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-114 Log #4469 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(4))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise text to read as follows:
[250.30(A)] **(4) Grounding Electrode Conductor, Multiple Separately Derived systems.** "...This connection shall be made at the same point on the separately derived system where the system bonding jumper is ~~installed~~ connected."
Substantiation: By changing the word to match that of 250.30(A)(3), code users are given consistent terminology and are therefore less prone to confusion regarding the code's intent.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-115 Log #1725 NEC-P05 **Final Action: Reject**
(250.30(A)(4)(a))

Submitter: Ronald E. Hackett, Village of Buffalo Grove / Rep. NE Suburban IAEI
Recommendation: Add new text as follows:
(a) Common Grounding Electrode Conductor Size. The common grounding electrode conductor shall not be smaller than 3/0 AWG or 250 kcmil aluminum.
The National Electrical Code does not place a limit on the length of the grounding electrode conductor. For example, for runs over 100 ft, the grounding electrode conductor may be required to be larger than a #3/0 AWG copper or 250 kcmil aluminum.
Substantiation: For clarification purposes, the proposal above should be included under 250.30(A)(4)(a). There is a misconception in that in all situations the grounding electrode conductor (GEC) is required to be as short as practical. However, as short as practical may mean hundreds of feet. A clarification for the users' of the NEC would benefit knowing that for some situations, like distance, the GEC may be required to be larger than a #3/0 AWG copper or 250kcmil aluminum.
The understanding in the field, and what is being communicated in continuing education classes is that the largest grounding electrode conductor ever required is a 3/0 AWG copper or 250 –kcmil aluminum. The 2008 National Electrical Code Handbook concurs. See attached sheet. (No "sheet" was received by NFPA with this proposal).
This proposal will provide the user of the National Electrical Code an example where the GEC may be required to be larger than specified. Where an AHJ or an engineer specifies a larger GEC than a 3/0 AWG copper or 250 –kcmil aluminum due to distance, all concerned users of the National Electrical Code then would be afforded guidance from the code by finding positive code language.
If the National Electrical Code remains silent on this topic, the grounding electrode system may be insufficiently sized when called to carry out its performance function. It is imperative that the National Electrical Code re-work all code sections concerning the size of the GEC. It must be made clear in all instances that a 3/0 AWG copper or 250 –kcmil aluminum conductor is the minimum and not the maximum. This proposal will clarify, avoid arguments, and result in a more user friendly understanding concerning sizing the GEC.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation that a hazard exists. The proposal does not include language suitable for mandatory enforcement but rather makes statements.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-116 Log #4148 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(4)(a))

Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Revise 250.30(A)(4)(a) to read as follows:
(a) The common grounding electrode conductor shall be permitted to be one of the following:
(1)~~The common grounding electrode~~A wire type conductor ~~shall~~ not be smaller than 3/0 AWG copper or 250 kcmil aluminum.
(2) The metal frame of the building or structure that is connected to the grounding electrode system by a conductor not smaller than 3/0 AWG copper or 250 kcmil aluminum.
Substantiation: This is a companion proposal to correct a technical error in 250.52(A)(2) specifying what a structural metal grounding electrode is. The issue found in trying to resolve in the 2008 cycle was that the metal frame of the building is often really being used as a common grounding electrode conductor, but 250.30(A) did not recognize that. This proposal would clearly allow the metal frame of a building that is connected to the grounding electrode system to be recognized as a common grounding electrode conductor and used just as the wire type is permitted now. The size of the conductor connecting the metal frame of the building to the grounding electrode system was set to be the same as what is required for the wire type common grounding electrode conductor.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-117 Log #2238 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(4)(c))

Submitter: Gregory J. Steinman, Thomas & Betts Corporation
Recommendation: Revise 250.30(A)(4)(c)(1) as follows:
(c) *Connections.* All tap connections to the common grounding electrode conductor shall be made at an accessible location by one of the following methods:
(1) A ~~listed~~ connector listed as grounding and bonding equipment.
(2) Listed connections to aluminum or copper busbars not less than 6 mm × 50 mm (1/4 in. × 2 in.). Where aluminum busbars are used, the installation shall comply with 250.64(A).
(3) The exothermic welding process.
Tap conductors shall be connected to the common grounding electrode conductor in such a manner that the common grounding electrode conductor remains without a splice or joint.

Substantiation: Grounding electrode conductors are expected to experience lightning induced current since they can be installed on exteriors of buildings and structures. Listed connectors are not required to pass a short time high current test. Connectors listed as grounding and bonding equipment must pass a short time high current test to confirm the ability of the connector to conduct safely these currents.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 5-102 in which the recommended text has been incorporated without any change. The panel concludes this action meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
DOBROWSKY, P.: The substation for the proposal does support being consistent with 250.64(A). Stating that a connector has to be listed as grounding and bonding equipment in list item (1) but allowing any listed connector in list item (2) does not make sense. If any listed connector is acceptable then list item 1 is not necessary.

5-118 Log #4142 NEC-P05 **Final Action: Accept in Principle**
(250.30(A)(7), FPN 2)

Submitter: Larry LeVoir, City of Irvine
Recommendation: Add new text to read as follows:
Add Fine Print Note
FPN No. 2: See 250.50 and 250.58 for requirements of bonding all electrodes together where located in the same building or structure.
Substantiation: Although this is required by the Code by sections 250.50 and 250.58, it seems to be overlooked by many installers and inspectors. Where a separately is located in a building without grounding electrodes of building steel or water piping nearby, installers will commonly install a ground rod at the separately derived system. This ground rod is required to be properly bonded back to the grounding electrode system in the building or structure. This requirement was also reinforced by obtaining an informal interpretation from NFPA. Informal interpretation NFPA 70 - 2002 (Log #25594) has been provided with this proposal. The Fine Print Note will reinforce and remove doubt as to whether this is required.
Note: Supporting Material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-119 Log #229 NEC-P05 **Final Action: Reject**
(250.30(A)(7) Exception No. 3)

Submitter: Don A. Hursey, Durham County Inspections Department
Recommendation: For existing premises wiring systems only the metal water pipe shall no be limited to (1.5 m) (5 ft.) from the point of entrance to the building.
Substantiation: For existing buildings that are multistory and the only available grounding electrode is the metal water pipe, in so many instances it is impossible to install a new separately derived system on the upper floors and install the grounding electrode conductor all the way back to within 5 ft of entrance.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation to delete the requirement for the connection of the grounding electrode conductor to a grounding electrode currently indicated in Section

250.30(A)(7). The issue of connecting to a metal water pipe for purposes of serving as a grounding electrode conductor is adequately covered in Sections 250.52 and 250.53.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-120 Log #596 NEC-P05 **Final Action: Reject**
(250.30(A)(8)(b))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Revise the existing paragraph as follows:
Existing text: ...~~Where installed in two or more raceways, the size of the grounded conductor in each raceway shall be based on the size of the ungrounded conductors in the raceway but not smaller than 1/0 AWG.~~
New text:... Where installed in two or more raceways, the size of the grounded conductor in each raceway shall not be smaller than 12 1/2 percent of the total circular mil area of the phase conductors in all conduits, but not smaller than 1/0 AWG.
The first sentence of the paragraph to remain unchanged.
Substantiation: One of the functions the grounded conductor performs is to carry fault current back to the source. If Table 250.66 is used alone, the grounded conductor may be too small to perform this function if the other parallel grounded conductors have been damaged. This change utilizes the same philosophy as found in 250.122(F) for equipment grounding conductors. For example, if there are 5-500kcmil ungrounded conductors per phase in parallel, based on the present wording of 250.30(A)(8)(b) and T250.66 the minimum size grounded conductor would be a 1/0AWG CU in each conduit. With the proposed change, the minimum size of conductor would be a 350kcmil in each conduit. Based on the 12 1/2 percent rule found in 250.30(A)(8)(a), the 350kcmil should be able to clear the upstream overcurrent protective device.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-97.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-121 Log #3117 NEC-P05 **Final Action: Accept in Principle**
(250.30(B))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
(B) Ungrounded Systems. The equipment of an ungrounded separately derived system shall be grounded <u>and bonded</u> as specified in 250.30(B)(1) <u>through</u> and (B)<u>(3)</u>~~(2)~~.
(1) Grounding Electrode Conductor. A grounding electrode conductor, sized in accordance with 250.66 for the derived phase conductors, shall be used to connect the metal enclosures of the derived system to the grounding electrode as specified in 250.30(B)(2). This connection shall be made at any point on the separately derived system from the source to the first system disconnecting means.
(2) Grounding Electrode. Except as permitted by 250.34 for portable and vehicle-mounted generators, the grounding electrode shall comply with 250.30(A)(7).
<u>**(3) Bonding Path and Conductor.** A bonding jumper or conductor consisting of a non-flexible metal raceway or conductor of the wire or bus type shall be installed from the source of a separately derived system to the first disconnecting means. A bonding jumper of the wire type shall be sized in accordance with 250.102(C), based on the size of the derived phase conductors.</u>
Substantiation: The additional requirement ensures a low-impedance and adequate fault-current return path should a second ground-fault occur on a different phase from a first ground-fault before the first ground-fault is cleared. As clarified by CMP-5 in Section 250.4(B)(4) in the 2008 NEC, a second-ground fault on a different phase from the first ground-fault becomes a phase-to-phase fault.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-102 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-122 Log #4468 NEC-P05 **Final Action: Reject**
(250.32 Exception No. 2 (New))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise text to read as follows:[
250.32(A)] Designate current exception as "Exception <u>No. 1</u>." Add new exception no.2 as follows:
<u>Exception No. 2: A grounding electrode shall not be required for manufactured homes with permanent foundations that comply with 550.32(A).</u>
Substantiation: There is an apparent conflict in code requirements between sections 250.32(A) and the last sentence of 550.32(B), which states that "Where the service is not installed in or on the unit {manufactured home with permanent foundation}, the installation shall comply with the other provisions of this section. Presumably that invokes part (A) of 550.32 with the last sentence that says, "Grounding at the DISCONNECTING MEANS shall be in accordance with 250.32. That leaves the door open for an electrode being installed **only at the disconnecting means** and NOT at the "building or structure" that is, in fact, the manufactured home. Acceptance of this proposal resolves that conflict and restore consistency in the code.
Panel Meeting Action: Reject
Panel Statement: In accordance with Section 90.3 requirements in Chapter 5 can modify or amend the general requirements in Chapters 1 through 4. If the service equipment is to be located in or on the unit it must be permanently anchored to the foundation and the GEC must be routed to the service. If the service equipment is mounted in or on the unit, the provision of 550.32(A) applies.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-123 Log #3048 NEC-P05 **Final Action: Reject**
(250.32(A) Exception)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(A) Grounding Electrode. Text remains unchanged
Exception: A grounding electrode shall not be required where only a single branch circuit, including a multiwire branch circuit, supplies the building or structure. ~~and the branch circuit includes an equipment grounding conductor for grounding the normally non–current-carrying metal parts of equipment.~~

Substantiation: The proposed deleted text is unnecessary, as providing an equipment grounding conductor, generally speaking, is not optional. The proposed deleted text simply muddies the waters that were made clearer in the 2008 changes to this section. If a grounded conductor is used for bonding equipment, as permitted by exception, it should not change the allowance for a single circuit without a grounding electrode system.
Panel Meeting Action: Reject
Panel Statement: The requirement for an equipment grounding conductor is essential to this provision and it cannot be deleted. The present text is clear as to the condition under which the exception is permitted to be applied.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-124 Log #4599 NEC-P05 **Final Action: Reject**
(250.32(A) Exception)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Revise the Exception to read as follows:
<u>Exception:</u> A grounding electrode at a separate building or structure shall not be required where no branch circuits originate at that building or structure. The branch circuit(s) shall include an equipment grounding conductor for grounding the noncurrent-carrying parts of all equipment.
Substantiation: This rewrite differs from the 2008 NEC in that a second building fed with branch circuits from another can be wired without a grounding electrode if there is none available. The 1996 NEC, without any technical substantiation, removed the prior provision that an electrode had to be provided only if the second building itself supplied the multiple branch circuits (i.e., was supplied with a feeder.) In its rejection of this proposal in the 1999 cycle, the panel reiterated the intent while continuing to omit any technical substantiation for the 1996 change. The 1993 wording assured that a suitable enclosure (usually a panelboard) was available to make the connection. This proposal restores that allowance in those cases where there are multiple branch circuits, but they originate in the first building. This is very common in dwellings with detached garages. Note that if a qualified grounding electrode is available, however, it must be used. That was required in the 1993 NEC and would be unchanged under this proposed revision.
There are severe practical constraints associated with imposing the current NEC limitations on multiple branch circuits arriving from another location. The smallest grounding electrode conductor permitted by 250.66 is 8 AWG, and there only if run in raceway or cable armor. Generally the smallest conductor will be a 6 AWG. Terminating such a conductor properly in a device box installed for a GFCI receptacle (as an example) is problematic at best given the volume constraints imposed by 314.16. If such a receptacle were the only load served, the current exception would allow this to be avoided. Exactly how does a second branch circuit supplying a luminaire (as an example) create a greater safety concern? The current wording is plainly excessive, and the variance from the feeder rules that governed from the 1987 through the 1993 editions of the NEC has never been substantiated despite repeated attempts to restore such a provision.
Panel Meeting Action: Reject
Panel Statement: The proposed exception would allow multiple circuits to feed a building that has no grounding electrode systems. The panel concludes that this would lessen the current requirement without justification. The panel does not agree with the submitted assertions regarding previous editions of the NEC.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-125 Log #899 NEC-P05 **Final Action: Reject**
(250.32(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
For a grounded system ~~at the~~ supplying a separate building or structure a wire-type equipment grounding conductor shall be run with the circuit conductors and be... (remainder unchanged).
Substantiation: The wording of this provision implies a wire type conductor, although 250.118 describes other types. See 547.9(B)(3)(1).
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation to support eliminating equipment grounding conductors of other than the wire type. Several additions and a deletion of text in the recommendation have not been supported in the substantiation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-126 Log #3225 NEC-P05 **Final Action: Accept in Principle**
(250.32(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal in accordance with 3.2.3 of the NEC Style Manual related to the use of acronyms.
This action will be considered by the panel as a public comment.
Submitter: Mark R. Hilbert, State of New Hampshire
Recommendation: Revise 250.32(B) as follows:
(B) Grounded Systems. For a grounded system at the separate building or structure, an equipment bonding or grounding conductor that provides and effective ground fault current path ~~as described in 250.118~~ shall be run with the supply conductors and be connected to the building or structure disconnecting means and to the grounding electrode(s) in accordance with (1) or (2). The equipment bonding or grounding conductor shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. ~~The equipment grounding conductor shall be sized in accordance with 250.122.~~ Any installed grounded conductor shall not be connected to the equipment grounding conductor or to the grounding electrode(s).
(1) Buildings or Structures Supplied From a Building or Structure. Where a building or structure is supplied from another building or structure, the separate equipment grounding conductor shall be as described in 250.118 and sized in accordance with 250.122.
(2) Buildings or Structures Supplied From a Separately Derived System. Where a building or structure is supplied from a separately derived system, the separate equipment or bonding conductor shall be in accordance with 250.30(B).
Exception: For existing premises wiring systems only, the grounded conductor run with the supply to the building or structure shall be permitted to be connected to the building or structure disconnecting means and to the grounding electrode(s) and shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded where all the requirements of (1), (2), and (3) are met:
(1) An equipment bonding or grounding conductor is not run with the supply to the building or structure.
(2) remains unchanged
(3) remains unchanged
Substantiation: Section 250.32(B) has been revised to specifically state that the equipment bonding conductor is to provide and effective fault current path and to include installations where the building or structure has been supplied by a separately derived system such as where the transformer is located outdoors and is customer owned.
Item No. 1 of the exception to (B) has been revised to address situations where an equipment bonding conductor has been included with the supply conductors to the building or structure. The remainder of the exception is unchanged.
The proposed text is consistent with 250.35, the proposed revisions to 250.30 and the move in the previous Code cycles to not use the grounded conductor to ground or bond equipment or to connect to a grounding electrode.
Companion proposals are being submitted to other Articles as appropriate to address the above changes.
Panel Meeting Action: Accept in Principle
Revise the recommendation for Section 250.32(B) to read:
(B) Grounded Systems.
(1) Supplied by a Feeder or Branch-Circuit. ~~For a grounded system at the separate building or structure,~~ An equipment grounding conductor as described in 250.118 shall be run with the supply conductors and be connected to the building or structure disconnecting means and to the grounding electrode(s). The equipment grounding conductor shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. The equipment grounding conductor shall be sized in accordance with 250.122. Any installed grounded conductor shall not be connected to the equipment grounding conductor or to the grounding electrode(s).
Exception: For existing premises wiring systems only, the grounded conductor run with the supply to the building or structure shall be permitted to be connected to the building or structure disconnecting means and to the grounding electrode(s) and shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded if ~~where~~ all the requirements of (1), (2), and (3) are met:
(1) An equipment grounding conductor is not run with the supply to the building or structure.
(2) There are no continuous metallic paths bonded to the grounding system in each building or structure involved.
(3) Ground-fault protection of equipment has not been installed on the supply side of the feeder(s).
If ~~Where~~ the grounded conductor is used for grounding in accordance with the provision of this exception, the size of the grounded conductor shall not be smaller than the larger of either of the following:
(1) That required by 220.61
(2) That required by 250.122
(2) Supplied by Separately Derived System.
(a) Having Overcurrent Protection. If overcurrent protection is provided where the conductors originate, the installation shall comply with (B)(1).
(b) Without Overcurrent Protection. If overcurrent protection is not provided where the conductors originate, the installation shall comply with 250.30(A). If installed, the SSBJ shall be connected to the building or structure disconnecting means and to the grounding electrode(s).
Panel Statement: The panel has incorporated requirements for electrical systems in buildings or structures supplied by separately derived systems.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-127 Log #3528 NEC-P05 **Final Action: Reject**
(250.32(B))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise the existing text of the 2008 NEC as follows:
(B) Grounded Systems. For a grounded system at the separate building or structure, an equipment grounding conductor as described in 250.118 shall be run with the supply conductors and be connected to the building or structure disconnecting means and to the grounding electrode(s). The equipment grounding conductor shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded. The equipment grounding conductor shall be sized in accordance with 250.122. Any installed grounded conductor shall not be connected to the equipment grounding conductor or to the grounding electrode(s).
~~Exception: For existing premises wiring systems only, the grounded conductor run with the supply to the building or structure shall be permitted to be connected to the building or structure disconnecting means and to the grounding electrode(s) and shall be used for grounding or bonding of equipment, structures, or frames required to be grounded or bonded where all the requirements of (1), (2), and (3) are met:~~
~~(1) An equipment grounding conductor is not run with the supply to the building or structure.~~
~~(2) There are no continuous metallic paths bonded to the grounding system in each building or structure involved.~~
~~(3) Ground-fault protection of equipment has not been installed on the supply side of the feeder(s).~~
~~Where the grounded conductor is used for grounding in accordance with the provision of this exception, the size of the grounded conductor shall not be smaller than the larger of either of the following:~~
~~(1) That required by 220.61~~
~~(2) That required by 250.122~~
Substantiation: Deleting this exception will complete the transition CMP-5 has made over the last several NEC cycles to ensure conductive paths between buildings or structures are not in parallel with a grounded or neutral conductor. Deleting the exception will be similar to other transitions in the NEC the most recent of which was replacing the term "lighting fixture" with "luminaire."
Deleting the Exception will not have negative consequences on existing installations since the provisions of a new edition of the NEC does not apply to installations made under previous editions unless the new NEC is specifically modified by the AHJ during the adoption process. Several states or other local inspection jurisdictions have not permitted the neutral or grounded conductor to be regrounded at buildings or structures supplied for some time.
Panel Meeting Action: Reject
Panel Statement: The language proposed for deletion was included in the 2008 cycle to allow changes to premises wiring in existing structures without requiring replacing the feeder to the structure. This provision for existing installations is similar to the provisions for existing branch circuits supplying ranges and clothes dryers in Section 250.140.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
BRENDER, D.: The concepts in the proposal should have been accepted. The reference to "premises wiring" has caused confusion among installers and inspectors. Generally, electrical inspectors allow an installation made under a previous edition of the NEC to remain intact unless it is modified at which time compliance with the edition of the NEC in effect is required.
WILLIAMS, D.: This proposal should be accepted.The 2008 Code required a separate equipment grounding conductor for a feeder to a separate building.

The exception in the 2008 code was to let people know what was accepted in the previous code cycles. It is not necessary to continue to have this exception in the code. All installations that fall under this exception were approved at that time and the current code would not require them to make a change.

5-128 Log #239 NEC-P05 **Final Action: Reject**
(250.32(B) Exception No. 2)

Submitter: John Bayduss, Baytown, TX
Recommendation: Revise as follows:
There are no continuous ~~metallic~~ conductive paths bonded to the grounding system in each building or structure involved.
Substantiation: Concrete pathways can be considered conductive.
Panel Meeting Action: Reject
Panel Statement: There is no technical substantiation that concrete paths in parallel with the equipment grounding conductor have been a problem. This section applies only to metallic paths.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-129 Log #3531 NEC-P05 **Final Action: Accept in Principle**
(250.32(C))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise the existing text of the 2008 NEC as follows:
(C) Ungrounded Systems. For an ungrounded system at the separate building or structure, an equipment grounding conductor as described in 250.118 shall be installed with the supply conductors and be connected to the building or structure disconnecting means and to the grounding electrode(s). The grounding electrode(s) shall also be connected to the building or structure disconnecting means.
Substantiation: The additional requirement for an equipment grounding conductor ensures a low-impedance and adequate fault-current return path is provided should a second ground-fault occur on a different phase from a first ground-fault before the first ground-fault is cleared.
As clarified by CMP-5 in Section 250.4(B)(4) in the 2008 NEC, a second-ground fault on a different phase from the first ground-fault becomes a phase-to-phase fault. It is important that a properly sized equipment grounding conductor be installed with the supply conductors to provide an effective fault-current return path to facilitate the operation of an overcurrent device.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
(C) Ungrounded Systems. For an ungrounded system supplying a ~~at the~~ separate building or structure, an equipment grounding conductor as described in 250.118 shall be installed with the supply conductors and be connected to the building or structure disconnecting means and to the grounding electrode(s). The grounding electrode(s) shall also be connected to the building or structure disconnecting means.
Panel Statement: The revision to the recommendation clarifies that the ungrounded system is supplying the building or structure.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-130 Log #1508 NEC-P05 **Final Action: Reject**
(250.34)

Submitter: Tom Stalnaker, West Chester, PA
Recommendation: Add new text to read as follows:
(D) Ungrounded Neutral. The neutral conductor of a portable or vehicle mounted generator shall not be required to be grounded under the following conditions:
(1) Portable Generators. The generator supplies only equipment mounted on the generator, cord-and-plug-connected equipment through receptacles mounted on the generator, or both.
(2) Vehicle Mounted Generators. The generator supplies only equipment located on the vehicle or cord-and-plug-connected equipment through receptacles mounted on the vehicle or on the generator, or both equipment located on the vehicle and cord-and-plug-connected equipment through receptacles mounted on the vehicle or on the generator.
Substantiation: Many available small portable generators, which are also sometimes mounted on vehicles and grounded per 250.34(B), have the neutral isolated from ground, or floating. The current wording of the NEC does not address this situation unless the generator is connected to another system such as a premises wiring system. This change clarifies that if the generator is not connected to anything other than local cord-and-plug connected equipment, the generator and/or vehicle are not a premises wiring system needing the requirements of 250.26.
Panel Meeting Action: Reject
Panel Statement: A portable or vehicle-mounted generator is a separately derived system, and the neutral conductor is required to be bonded to the frame. If this were not so, the equipment grounding conductor would not function to carry fault current back to the source.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-131 Log #3049 NEC-P05 **Final Action: Reject**
(250.35(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
250.35 Permanently Installed Generators.
A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).
(A) Text to remain unchanged.
(B) Nonseparately Derived System. Where the generator is not installed as a separately derived system, an equipment bonding jumper shall be installed between the generator equipment grounding terminal and the equipment grounding terminal or bus of the enclosure of supplied disconnecting mean(s) in accordance with (B)(1) or (B)(2). A connection to a grounding electrode shall not be required at the generator.
(1) Text to remain unchanged.
(2) Text to remain unchanged.
Substantiation: This proposal is intended simply to help the code user to understand the requirements for nonseparately derived generators.
Panel Meeting Action: Reject
Panel Statement: System grounding at the generator is not required for systems that are not separately derived. A grounding electrode and grounding electrode conductor connection to the generator frame may be required for other reasons and this proposal would eliminate that with no technical substantiation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-132 Log #3465 NEC-P05 **Final Action: Accept**
(250.35(B))

Submitter: G. Scott Harding, F. B. Harding, Inc.
Recommendation: Revise text to read as follows:
250.35 Permanently Installed Generators.
(B) Nonseparately Derived System. Where the generator is not installed as a separately derived system, an equipment bonding jumper shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the enclosure of supplied disconnecting mean(s) in accordance with (B)(1) or (B)(2).
Substantiation: The addition of the comma and the word "bar" revises the text to be the same as that used in 250.30(A)(3), Exception 1; 250.30(A)(4,) Exception 1; and 250.24(A)(4). This clarifies that a lug, grounding bar or grounding bus can be utilized for the connection point.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-133 Log #3639 NEC-P05 **Final Action: Reject**
(250.35(B))

Submitter: Peter Ramus, City of Lebanon Codes Dept.
Recommendation: Revise text to read as follows:
250.35(B) Nonseparately Derived Systems. Where the generator is ~~not~~ installed as a nonseparately derived system, an equipment bonding jumper shall be installed between the generator equipment grounding terminal and the equipment grounding terminal or bus of the enclosure of supplied disconnection mean(s). ~~in accordance with (B)(1) or (B)(2).~~ Where the system supplied is grounded in accordance with 250.20, equipment bonding and grounding conductors between the generator and the location of the main or system bonding jumper of the system supplied shall be sized in accordance with 250.102(C), based on the terminal conductor size requirements of 445.13. Where the equipment grounding conductors are not of the wire or bus type, raceways shall be bonded as specified in 250.92(B), except for (B)(1). The requirements of this section shall apply to one feeder of multiple feeder applications.
(B)(1) Delete Entirely.
(B)(2) Delete Entirely.
Substantiation: Application of Table 250.122, per 250.35(B)(2), to grounding conductors on the load side of the first generator OC device is technically incorrect and inconsistent with other Code Sections. Per 250.35(B)(1), bonding jumpers on the line side of the first OC device are appropriately sized to Table 250.66. However, in nonseparately derived systems, the circuit for line side ground fault current continues through he equipment grounding conductors on the load side of the first OC device to the system or main bonding jumper of the system served by the generator. There is no precedence in the NEC supporting the downsizing of grounding conductors midway in the grounding circuit. But that is the result of applying Table 250.122 as permitted by 250.35(B)(2). All grounding conductors between the nonseparately derived generator and the system or main bonding jumper of the systems served, whether classified as equipment ground or bonding jumper, are components of the equipment grounding circuit of equipment located ahead of the generator OC protection. Therefore, at least one set should be sized per Table 250.66.
Application of the larger conductor sizes of Table 250.66, as opposed to

Table 250.122, is particularly important in installations where the nonseparately derived generator is hundreds of feet away from the point of system bonding such as in the case of units located outside, remote from the structure served. This change will provide consistency with Sections 250.30, 250.4(A)(3), 250.4(A)(5), and 445.13.

Panel Meeting Action: Reject

Panel Statement: The first sentence of the substantiation is not correct because equipment grounding conductors on the load side of the overcurrent protective device are properly sized per Section 250.122. This section already addresses what is proposed, and the recommendation does not add clarity or improve usability of the current rule.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-134 Log #3477 NEC-P05 **Final Action: Reject**
(250.35(B)(1) and (2))

Note: This proposal is reported as "Reject" as it did not receive the Simple Majority affirmative vote.

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

It was the further action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.

This action will be considered by the panel as a public comment.

Submitter: Danny Thomas, Henderson, NC

Recommendation: Revise text to read as follows:

Nonseparately Derived System. Where the generator is not installed as a separately derived system, an equipment bonding jumper shall be installed between the generator equipment grounding terminal and the equipment grounding terminal or bus of the enclosure of the supplied disconnecting means. This conductor shall be sized in accordance with (B)(1) ~~or (B)(2).~~ Where an equipment grounding conductor is installed it shall be installed between the generator equipment grounding terminal and the equipment grounding terminal or bus of the enclosure of the supplied disconnecting means. This conductor shall be sized in accordance with (B)(2).

Substantiation: In 250.35(B), it states for "nonseparately derived systems" to install "an equipment bonding jumper" between the generator equipment grounding terminal and the equipment grounding terminal or bus of the enclosure of supplied disconnecting means in accordance with (B)(1) or (B)(2). The subject of (B)(1) is the sizing of an "equipment bonding jumper".

In part (B)(2),m the subject in the sizing of an "equipment grounding conductor." Revising the text as written above clears this confusion up as to whether we are dealing with an equipment bonding jumper or an equipment grounding conductor and how to size them accordingly.

Panel Meeting Action: Reject

Panel Statement: The proposed text is not needed. The rules are consistent with the definitions of equipment bonding jumper and equipment grounding conductor.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 4 Negative: 12

Explanation of Negative:

BOWMER, T.: This proposal was accepted in principle at the Panel meeting and was mistakenly shown here as Reject. -- "The following test was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Based on the above explanation and text the new Panel Statement/ Substantiation should be as follows: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

BRENDER, D.: The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

BRETT, JR., M.: The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

DOBROWSKY, P.: Following is the suggested comment on the vote on **Proposal 5-134** to preserve the recommended action by the 250.30 Task Group as approved by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009.

"The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

HAMMEL, D.: "The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

HARDING, G.: This proposal should have been to accept with the actions as recommended by CMP-5 indicated below:

The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

JOHNSTON, M.: The panel action on this proposal should have been to Accept in Principle with the changes recommended by CMP-5 as indicated below:

The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

5-135 Affirmative

Continue to reject this proposal and note the following information is included for public review. The following information was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.36 High-Impedance Grounded Neutral Systems.

High-impedance grounded neutral systems in which a grounding impedance, usually a resistor, limits the ground-fault current to a low value shall be permitted for 3-phase ac systems of 480 volts to 1000 volts if ~~where~~ all the following conditions are met:

(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.

(2) Ground detectors are installed on the system.

(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

(C) System Grounding Connection. The system shall not be connected to ground except through the grounding impedance.

FPN: The impedance is normally selected to limit the ground-fault current to a value slightly greater than or equal to the capacitive charging current of the system. This value of impedance will also limit transient overvoltages to safe values. For guidance, refer to criteria for limiting transient overvoltages in ANSI/IEEE 142-1991, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

(D) Neutral Point to Grounding Impedance Conductor Routing. The conductor connecting the neutral point of the transformer or generator to the grounding impedance shall be permitted to be installed in a separate raceway from the ungrounded conductors. It shall not be required to run this conductor with the phase conductors to the first system disconnecting means or overcurrent device.

(E) ~~Equipment~~ Bonding Jumper. The ~~equipment~~ bonding jumper (the connection between the equipment grounding conductors and the grounding impedance) shall be an unspliced conductor run from the first system disconnecting means or overcurrent device to the grounded side of the grounding impedance.

(F) Grounding Electrode Conductor Location. The grounding electrode conductor shall be connected at any point from the grounded side of the grounding impedance to the equipment grounding connection at the service equipment or first system disconnecting means.

(G) ~~Equipment~~ Bonding Jumper Size. The ~~equipment~~ bonding jumper shall be sized in accordance with (1) or (2) as follows:

(1) If ~~Where~~ the grounding electrode conductor connection is made at the grounding impedance, the equipment bonding jumper shall be sized in accordance with 250.66, based on the size of the service entrance conductors for a service or the derived phase conductors for a separately derived system.

(2) If ~~Where~~ the grounding electrode conductor is connected at the first system disconnecting means or overcurrent device, the equipment bonding jumper shall be sized the same as the neutral conductor in 250.36(B).

Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

MELLO, C.: The following was included in the 250.30 Task Group report with the recommendation to Accept Proposal 5-134 in Principle with revisions. The task group report was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. However the panel action is shown as a Reject and should have been recorded as an Accept in Principle with the following revisions.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

MOHLA, D.: This proposal should be accepted in Principle consistent with the task group assigned to address this proposal.

Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

TEMBLADOR, R.: The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

WHITE, C.: The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

WILLIAMS, D.: "The following was included in the 250.30 Task Group report. The recommendation was to Accept Proposal 5-134 in Principle with the following action. This was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was reported as "Reject." The following information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.35 Permanently Installed Generators.

A conductor that provides an effective ground-fault current path shall be installed with the supply conductors from a permanently installed generator(s) to the first disconnecting mean(s) in accordance with (A) or (B).

(A) Separately Derived System. If ~~Where~~ the generator is installed as a separately derived system, the requirements in 250.30 shall apply.

(B) Nonseparately Derived System. If ~~Where~~ the generator is ~~not~~ installed as a nonseparately derived system, and overcurrent protection is not integral with the generator assembly, a SSBJ ~~an equipment bonding jumper~~ shall be installed between the generator equipment grounding terminal and the equipment grounding terminal, bar or bus of the ~~enclosure of supplied~~ disconnecting mean(s) ~~in accordance with (B)(1) or (B)(2).~~ It shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator

~~(1) Supply Side of Generator Overcurrent Device. The equipment bonding jumper on the supply side of each generator overcurrent device shall be sized in accordance with 250.102(C) based on the size of the conductors supplied by the generator.~~

~~(2) Load Side of Generator Overcurrent Device. The equipment grounding conductor on the load side of each generator overcurrent device shall be sized in accordance with 250.102(D) based on the rating of the overcurrent device supplied.~~

Panel Statement: This revision incorporates the concept of the SSBJ (supply-side bonding jumper) and makes other editorial changes. This proposal incorporates the proposed change in Proposal 5-132.

5-135 Log #607 NEC-P05 **Final Action: Reject**
(250.36(C), FPN 2 (New))

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

It was the further action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.

This action will be considered by the panel as a public comment.

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add new text to read as follows:

FPN: High-Impedance grounded neutral systems may necessitate the evaluation of overcurrent devices based upon their single-pole short-circuit interrupting rating, which may be less than their normal interrupting rating.

Substantiation: If a second ground-fault occurs on this type of system before the first ground-fault is cleared, the full phase-to-phase voltage (480 V or 600 V) would appear across only one pole of the affected overcurrent device. This condition may result in a fault current that exceeds the single-pole interrupting rating of the device.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-61.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 10 Negative: 6
Explanation of Negative:

DOBROWSKY, P.: Following is the suggested comment on the vote on **Proposal 5-135** to preserve the recommended action by the 250.30 Task Group as approved by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009.

"The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.36 High-Impedance Grounded Neutral Systems.
High-impedance grounded neutral systems in which a grounding impedance, usually a resistor, limits the ground-fault current to a low value shall be permitted for 3-phase ac systems of 480 volts to 1000 volts if ~~where~~ all the following conditions are met:

(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.
(2) Ground detectors are installed on the system.
(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

(C) System Grounding Connection. The system shall not be connected to ground except through the grounding impedance.

FPN: The impedance is normally selected to limit the ground-fault current to a value slightly greater than or equal to the capacitive charging current of the system. This value of impedance will also limit transient overvoltages to safe values. For guidance, refer to criteria for limiting transient overvoltages in ANSI/IEEE 142-1991, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

(D) Neutral Point to Grounding Impedance Conductor Routing. The conductor connecting the neutral point of the transformer or generator to the grounding impedance shall be permitted to be installed in a separate raceway from the ungrounded conductors. It shall not be required to run this conductor with the phase conductors to the first system disconnecting means or overcurrent device.

(E) ~~Equipment~~ Bonding Jumper. The ~~equipment~~ bonding jumper (the connection between the equipment grounding conductors and the grounding impedance) shall be an unspliced conductor run from the first system disconnecting means or overcurrent device to the grounded side of the grounding impedance.

(F) Grounding Electrode Conductor Location. The grounding electrode conductor shall be connected at any point from the grounded side of the grounding impedance to the equipment grounding connection at the service equipment or first system disconnecting means.

(G) ~~Equipment~~ Bonding Jumper Size. The ~~equipment~~ bonding jumper shall be sized in accordance with (1) or (2) as follows:

(1) If ~~Where~~ the grounding electrode conductor connection is made at the grounding impedance, the equipment bonding jumper shall be sized in accordance with 250.66, based on the size of the service entrance conductors for a service or the derived phase conductors for a separately derived system.

(2) If ~~Where~~ the grounding electrode conductor is connected at the first system disconnecting means or overcurrent device, the equipment bonding jumper shall be sized the same as the neutral conductor in 250.36(B).

Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

HAMMEL, D.: The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.
(2) Ground detectors are installed on the system.
(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

(C) System Grounding Connection. The system shall not be connected to ground except through the grounding impedance.

FPN: The impedance is normally selected to limit the ground-fault current to a value slightly greater than or equal to the capacitive charging current of the system. This value of impedance will also limit transient overvoltages to safe values. For guidance, refer to criteria for limiting transient overvoltages in ANSI/IEEE 142-1991, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

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(2) If ~~Where~~ the grounding electrode conductor is connected at the first system disconnecting means or overcurrent device, the equipment bonding jumper shall be sized the same as the neutral conductor in 250.36(B).

Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

MELLO, C.: The following was included in the 250.30 Task Group as a Panel Proposal but was not reflected in the record. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. The ballot should reflect a panel action as Accept in Principle with the revisions below as part of the panel action. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.
(2) Ground detectors are installed on the system.
(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

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Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

TEMBLADOR, R.: The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

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WHITE, C.: The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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WILLIAMS, D.: "The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

Comment on Affirmative:

BOWMER, T.: Although the proposal for anew FPN was rejected the actions on 5-61 and 5-134 addressed the concerns raised by proposal 5-135.

The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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Based on the above explanation and text the new Panel Statement/ Substantiation should be as follows: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100. Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

BRENDER, D.: The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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BRETT, JR., M.: The following was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

250.36 High-Impedance Grounded Neutral Systems.

High-impedance grounded neutral systems in which a grounding impedance, usually a resistor, limits the ground-fault current to a low value shall be permitted for 3-phase ac systems of 480 volts to 1000 volts if ~~where~~ all the following conditions are met:

(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.

(2) Ground detectors are installed on the system.

(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

(C) System Grounding Connection. The system shall not be connected to ground except through the grounding impedance.

FPN: The impedance is normally selected to limit the ground-fault current to a value slightly greater than or equal to the capacitive charging current of the system. This value of impedance will also limit transient overvoltages to safe values. For guidance, refer to criteria for limiting transient overvoltages in ANSI/IEEE 142-1991, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

(D) Neutral Point to Grounding Impedance Conductor Routing. The conductor connecting the neutral point of the transformer or generator to the grounding impedance shall be permitted to be installed in a separate raceway from the ungrounded conductors. It shall not be required to run this conductor with the phase conductors to the first system disconnecting means or overcurrent device.

(E) ~~Equipment~~ Bonding Jumper. The ~~equipment~~ bonding jumper (the connection between the equipment grounding conductors and the grounding impedance) shall be an unspliced conductor run from the first system disconnecting means or overcurrent device to the grounded side of the grounding impedance.

(F) Grounding Electrode Conductor Location. The grounding electrode conductor shall be connected at any point from the grounded side of the grounding impedance to the equipment grounding connection at the service equipment or first system disconnecting means.

(G) ~~Equipment~~ Bonding Jumper Size. The ~~equipment~~ bonding jumper shall be sized in accordance with (1) or (2) as follows:

(1) If ~~Where~~ the grounding electrode conductor connection is made at the grounding impedance, the equipment bonding jumper shall be sized in accordance with 250.66, based on the size of the service entrance conductors for a service or the derived phase conductors for a separately derived system.

(2) If ~~Where~~ the grounding electrode conductor is connected at the first system disconnecting means or overcurrent device, the equipment bonding jumper shall be sized the same as the neutral conductor in 250.36(B).

Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate.

HARDING, G.: Continue to reject this proposal and note the following information is included for public review. The following information was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.

(2) Ground detectors are installed on the system.

(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

(C) System Grounding Connection. The system shall not be connected to ground except through the grounding impedance.

FPN: The impedance is normally selected to limit the ground-fault current to a value slightly greater than or equal to the capacitive charging current of the system. This value of impedance will also limit transient overvoltages to safe values. For guidance, refer to criteria for limiting transient overvoltages in ANSI/IEEE 142-1991, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

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(1) If ~~Where~~ the grounding electrode conductor connection is made at the grounding impedance, the equipment bonding jumper shall be sized in

accordance with 250.66, based on the size of the service entrance conductors for a service or the derived phase conductors for a separately derived system.

(2) If ~~Where~~ the grounding electrode conductor is connected at the first system disconnecting means or overcurrent device, the equipment bonding jumper shall be sized the same as the neutral conductor in 250.36(B).

Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

JOHNSTON, M.: Continue to reject this proposal and note the following information is included for public review. The following information was included in the 250.30 Task Group as a Panel Proposal. The recommendation was accepted by CMP-5 at the Panel meeting in Hilton Head, SC on January 12-16, 2009. For some reason, this action was not included in the official NFPA report of the actions of CMP-5. This information needs to be included in the Report on Proposals so the public is fully informed of the actions of CMP-5.

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(1) The conditions of maintenance and supervision ensure that only qualified persons service the installation.

(2) Ground detectors are installed on the system.

(3) Line-to-neutral loads are not served.

High-impedance grounded neutral systems shall comply with the provisions of 250.36(A) through (G).

(A) Grounding Impedance Location. The grounding impedance shall be installed between the grounding electrode conductor and the system neutral point. If ~~Where~~ a neutral point is not available, the grounding impedance shall be installed between the grounding electrode conductor and the neutral point derived from a grounding transformer.

(B) Grounded System Conductor. The grounded system conductor from the neutral point of the transformer or generator to its connection point to the grounding impedance shall be fully insulated.

The grounded system conductor shall have an ampacity of not less than the maximum current rating of the grounding impedance but shall not ~~In no case shall the grounded system conductor~~ be smaller than 8 AWG copper or 6 AWG aluminum or copper-clad aluminum.

(C) System Grounding Connection. The system shall not be connected to ground except through the grounding impedance.

FPN: The impedance is normally selected to limit the ground-fault current to a value slightly greater than or equal to the capacitive charging current of the system. This value of impedance will also limit transient overvoltages to safe values. For guidance, refer to criteria for limiting transient overvoltages in ANSI/IEEE 142-1991, Recommended Practice for Grounding of Industrial and Commercial Power Systems.

(D) Neutral Point to Grounding Impedance Conductor Routing. The conductor connecting the neutral point of the transformer or generator to the grounding impedance shall be permitted to be installed in a separate raceway from the ungrounded conductors. It shall not be required to run this conductor with the phase conductors to the first system disconnecting means or overcurrent device.

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(G) ~~Equipment~~ Bonding Jumper Size. The ~~equipment~~ bonding jumper shall be sized in accordance with (1) or (2) as follows:

(1) If ~~Where~~ the grounding electrode conductor connection is made at the grounding impedance, the equipment bonding jumper shall be sized in accordance with 250.66, based on the size of the service entrance conductors for a service or the derived phase conductors for a separately derived system.

(2) If ~~Where~~ the grounding electrode conductor is connected at the first system disconnecting means or overcurrent device, the equipment bonding jumper shall be sized the same as the neutral conductor in 250.36(B).

Panel Statement: The panel corrects the previous use of the term "equipment bonding jumper" as the bonding jumper does not complete the equipment grounding conductor path as defined in Article 100.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This Panel proposal intends to use the word "if" where appropriate."

5-136 Log #2257 NEC-P05 **Final Action: Reject**
(250.50)

Submitter: John G. Narcizo, John G. Narcizo dba
Recommendation: Add that ALL reinforcing steel present in a building or structure shall be bonded to the grounding electrode system.
Substantiation: In reading 250.50 it states that concrete-encased electrode must be 1/2 in. thick and 20 ft under 2 in. of concrete. In reading this paragraph I would not need to bond 3/8 in. or smaller. I feel that all rods need to be bonded due to the protocol present from the power company.
Panel Meeting Action: Reject
Panel Statement: Reinforcing steel (rebar) that meets the requirements of 250.52(A)(3) are grounding electrodes and required to be connected together with other electrodes. There is no technical substantiation provided for the inclusion of all reinforcing steel.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-137 Log #2569 NEC-P05 **Final Action: Reject**
(250.50)

Submitter: Charles Palmieri, Palmieri Assoc.
Recommendation: Revise the text of 250.50, as indicated:

All grounding electrodes as described in 250.52(A)(1) through (A)~~(7)~~(8) that are present at each building or structure served shall be bonded together to form the grounding electrode system. Where none of these grounding electrodes exist, one or more of the grounding electrodes specified in 250.52(A)(4) through (A)~~(8)~~(9) shall be installed and used.

Substantiation: I have proposed a revision to 250.52(A)(3) and the new text creating (9) rather than (8) sub parts to 250.52(A). If those proposals are accepted, then an editorial change is required to this paragraph.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposals 5-142 and 5-143 where CMP-5 rejected division of existing 250.52(A)(3) in two different subsections. The proposed recommendation by the submitter is no longer applicable.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

(Note: Sequence 5-138 was not used)

5-139 Log #3523 NEC-P05 **Final Action: Reject**
(250.50)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: This is a companion proposal that should be considered separately, but in addition to a proposal by me for Section 250.50 FPN.

Add new text to read:

250.50(A) For engineered, supervised, industrial installations it shall be permissible to eliminate the bonding of the concrete-encased steel reinforcing bars in foundations to the grounding electrode system where it has been determined that corrosion of the steel reinforcing bars will occur due to galvanic corrosion and that the grounding electrode system has a resistance to ground of 25 ohms or less without the connection to the concrete-encased steel reinforcing bar.

Substantiation: Refer to the substantiation on the companion proposal.
Panel Meeting Action: Reject
Panel Statement: The corrosion concern between concrete encased rebar and copper wire has been specifically addressed in the Institute of Electrical and Electronic Engineers standard 142, *IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems* (Green Book). It clearly mentions " It should be noted that steel rebar, when encased in concrete, has approximately the same potential as copper and thus will not corrode." Industry has been using concrete encased reinforcing bar grounding systems with and without connecting to the copper wires without any reported concerns.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-140 Log #2207 NEC-P05 **Final Action: Reject**
(250.50, FPN)

Submitter: Paul Guidry, Fluor Enterprises, Inc
Recommendation: Add new text as follows:

FPN: Bonding of dissimilar metals will result in corrosion of one of the metals. Cathodic protection systems may need to be installed to mitigate the corrosion. Refer to NACE Standard Recommended Practice RP0290-2000, Item No. 21403, Impressed Current Cathodic Protection of Reinforcing Steel in Atmospherically Exposed Concrete Structures, and IEEE Std. 142 for more information regarding steel corrosion and other deterioration phenomena with concrete-encased electrodes.

Substantiation: During the 2008 NEC cycle Proposal 5-143 and subsequent Comment 5-77 were submitted to address the concerns associated with corrosion of concrete-encased rebar where bonded to copper grounding electrode conductors. Both were rejected. There seems to be a lack of understanding among the panel as to the problems that bonding copper and concrete-encased steel together creates with respect to corrosion. I think it is probably due to the fact that electrical engineers typically don't deal with corrosion issues. What electrical engineers are concerned with is safety of the electrical system- and rightly so. However, I believe that the panel must look at the bigger picture. If doing something for safety of the electrical system and it causes problems for the structural system, an effort must be made to correlate the two.

The panel refers to rebar in buildings being bonded to the copper grounding electrodes in the panel statements for the Proposal mentioned above. I agree that this usually won't present a problem in buildings since buildings typically don't have large amounts of copper installed for grounding electrodes. The issue arises in places such as petrochemical plants and refineries where there are usually large amounts of copper buried for a grounding grid. And, according to the changes that occurred in 2005 this grid must be bonded to the rebar that is installed in every pile cap, footing, or foundation. This will create a failure of the rebar if not addressed by the use of a cathodic protection system. Most electrical designers and engineers are not aware of the corrosion problem that occurs when bonding copper to steel. Adding the FPN will at least alert electrical designers and engineers to the fact that there is a corrosion problem. Ideally there would be an exception to 250.50 that would allow the connection between copper and rebar to not be made under engineering supervision. But, since the panel is apparently unwilling to permit this exception, the next best thing is to add the FPN.

I am currently on the working committee for IEEE Std. 142 (Green Book) and will incorporate the NEC requirement of bonding the copper electrodes to the steel rebar. I'm also attaching a copy of an article that was published in EC&M magazine in the June 2008 issue that addresses this problem and may help the panel understand what the issue is. It is based on IEEE PCIC paper #PCIC-2007-25, entitled "The Conflict and Solutions to Complying with the Grounding Revisions of the 2005 National Electrical Code for Cathodically Protected Facilities".

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-139.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-141 Log #2253 NEC-P05 **Final Action: Reject**

(250.52(3))

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector

Recommendation: Revise text to read as follows:

"...of a concrete foundation ~~or~~ footing that is in direct contact with the earth.

Substantiation: 250.52(3) Concrete-Encased Electrode.

The word "foundation" has confused many electrical inspectors. A foundation is what supports the loads of the structure. A foundation footing is what supports the foundation wall (all part of a foundation). The foundation footing is more likely to have better contact with the earth than a foundation wall. For instance, a foundation wall on a dwelling has barely any contact with the earth surrounding it. On one side, there is empty space (basement), on the other side; there is a protective film (waterproofing/damp-proofing) that separates the earth from foundation. Therefore, there is no direct contact between concrete and earth. On the other hand, the foundation footing is surrounded by earth on at least two sides, if not three. The reason for this deletion is to understand the intention of the code, which I understood to be near the bottom, as seen on the sample in the supporting material.

Thus, the deletion of the word "or" to better define the intent of the code, which I think is to use the structural steel members located in the foundation footing of a foundation and not the whole foundation (walls, piers, monolithic, etc.).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: A concrete encased electrode may be found in either a footing or foundation provided it is in direct contact with the earth.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-142 Log #2567 NEC-P05 **Final Action: Reject**

(250.52(3))

Submitter: Charles Palmieri, Palmieri Assoc.

Recommendation: Delete the texts as indicated. (3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm ($^1/_2$ in.) in diameter, ~~or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG~~. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means. Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.

Substantiation: 250.50 requires all electrodes mentioned in 250.52(A)(1) through (A)(7) when present at a structure shall be bonded together. It further indicates that when (A)(1), (2), and (3) are not present that 250.52(A)(4) through (A)(7) may be used. It would seem that the intent was to require bonding of the water pipes, building steel and concrete encased electrodes when construction dictated their installation. I am not aware of a construction requirement to install 20 feet of bare No 4. AWG Cu in a footing or foundation. I am proposing that a new subsection (8) be added to the 2011 Code to include the deleted electrode (No 4. AWG) as a permitted installed electrode.

Panel Meeting Action: Reject

Panel Statement: The grouping in this section is not intended to be sorted by trade. The present wording does not require that the concrete encased electrode be a construction requirement. Whether the conductor within the concrete is rebar or a copper conductor is immaterial.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-143 Log #2570 NEC-P05 **Final Action: Reject**

(250.52(8) (New))

Submitter: Charles Palmieri, Palmieri Assoc.

Recommendation: Add a new sub section number (8) to section 250.52(A) to read as follows renumber existing subsection (8), as (9).

(8) Other Concrete Encased Electrodes. At least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG, encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth.

Substantiation: I have proposed that the included text be removed from 250.52(A)(3) Concrete Encased Electrodes. I believe that its inclusion, as a permissible installed electrode will improve the readability of this section. The 4 AWG is not a requirement amongst the building Codes for the construction of a footing or foundation. And, 250.52(A)(1) through (3) seem to direct their language towards materials that are engineered into the construction of a structure. Existing Sub Parts (A)(4) through (7) seem to include electrodes that the electrician would install to provide a reliable grounding electrode system. Simply stated, my argument is that the No. 4 AWG bare conductor would be installed rather than utilized by the electrician.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-142.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-144 Log #3532 NEC-P05 **Final Action: Reject**

(250.52(A) (New))

Submitter: Phil Simmons, Olympia, WA

Recommendation: Add text to read as follows:

250.52 Grounding Electrodes.

(A) General. Only the portion of grounding electrode(s) installed below the frost level, as determined by the local authority having jurisdiction, shall be considered in direct contact with the earth.

Renumber existing 250.52(A) to (B) and existing (B) to (C).

Substantiation: Several authoritative sources show the conductivity of the earth is reduced sharply if the earth is frozen. Building codes typically require that footings for building foundations be installed below the frost line. Frozen earth will severely reduce the opportunity of the grounding electrode to make a connection to the earth. Underground metal water pipes are typically required to be buried below the frost level for obvious reasons.

This clarification needs to be added to the Code since CMP-5 made a change to 250.52(A)(4) for the 2008 NEC that permits concrete-encased electrodes to be installed vertically. Only the portion of the grounding electrode that is below the frost should be considered when determining whether a qualifying grounding electrode is present.

Panel Meeting Action: Reject

Panel Statement: All grounding electrodes have the same issue with frozen earth. The submitter has not provided any technical substantiation to support such a change.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER, D.: The Panel Statement is incorrect as some grounding electrodes are inherently installed below the frost line such as concrete-encased electrodes and underground metal water pipes. These are required to be below the frost level as building codes require the foundation and supply water pipes including fire protection water pipes to be below the frost level.

5-145 Log #3219 NEC-P05 **Final Action: Reject**

(250.52(A)(1))

Submitter: Paul J. Kennedy, Jr., Kennedy Seminars

Recommendation: Revise text as follows:

(A) Electrodes Permitted for Grounding.

(1) Metal Underground Water Pipe. The grounding electrode conductor shall be connected on the street side of the water meter for the first connection to the water pipe and within 5 ft of entering the building and shall be supported separately to that point. A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more (including any metal well casing bonded to

the pipe) and electrically continuous (or made electrically continuous by bonding around insulating joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductors. Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a part of the grounding electrode system or as a conductor to interconnected electrodes that are part of the grounding electrode system.

Substantiation: I have inspected many new services and have found that the electrician has made his first connection to the water pipe up near the ceiling and then tie wrapped down the pipe and around the water meter. The problem with this type of installation is that the water department takes off the second ground clamp so that they can replace the water meter. This results in a loss of connection from the service to the water pipe and this loss of connection could be deadly to the water department worker.

Panel Meeting Action: Reject

Panel Statement: A bonding jumper is required around water meters or similar equipment that may be removed for servicing. See Section 250.53(D)(1). It is not necessary to connect to the street side of the water meter in all applications. In many areas water meters are located outside of the building or structure and more than 10 ft away.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-146 Log #3534 NEC-P05 **Final Action: Accept**
(250.52(A)(1))

Submitter: Phil Simmons, Olympia, WA

Recommendation: Revise text to read as follows:

(1) Metal Underground Water Pipe. A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more (including any metal well casing bonded to the pipe) and electrically continuous (or made electrically continuous by bonding around insulating joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductor<u>(s) or jumper(s) if installed</u>. ~~Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system.~~

~~*Exception: In industrial, commercial, and institutional buildings or structures where conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system, provided that the entire length, other than short sections passing perpendicularly through walls, floors, or ceilings, of the interior metal water pipe that is being used for the conductor is exposed.*~~

Substantiation: Section 250.52(A) intends to describe the condition(s) under which a metallic object in the form of metal water pipe is recognized as a grounding electrode. The portions of this subsection proposed to be deleted relate to functions of the water pipe that do not relate to making a connection to the earth. Metallic water pipes located above the earth may function as a conductive path or a grounding electrode conductor but cannot be considered a part of a grounding electrode.

"… or jumper(s) if installed" is proposed to be added as bonding jumpers or conductors are not always installed.

A companion proposal has been made to add the concepts to 250.62 that are proposed for deletion here.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-147 Log #4011 NEC-P05 **Final Action: Accept in Principle**
(250.52(A)(1) and Exception)

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Delete text as follows:

(1) Metal Underground Water Pipe. A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more (including any metal well casing bonded to the pipe) and electrically continuous (or made electrically continuous by bonding around insulating joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductors. ~~Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system.~~

~~*Exception: In industrial, commercial, and institutional buildings or structures where conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system, provided that the entire length, other than short sections passing perpendicularly through walls, floors, or ceilings, of the interior metal water pipe that is being used for the conductor is exposed.*~~

Substantiation: The definition of "grounding electrode" is for objects that make a connection to the earth. An object that is not actually in the earth should not be described as an electrode but as presently allowed can be used as a conductor to make that connection The text that is proposed to be deleted is also being proposed to being added to 250.68 as new material in that location.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action on Proposal 5-146.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal as it is part of an overall effort to improve consistency in the use of grounding and bonding words and terms. The revisions in proposals 5-170, 5-182 and 5-212 preserve the allowances for metal water pipes to be used as conductive paths to grounding electrodes (grounding electrode conductor) which more accurately describes how they are currently being used. The revision is part of a larger effort to promote more consistent use of defined words and terms related to grounding and bonding, while at the same time improving clarity by providing specific language in this section that reflects how the building steel and water piping systems are actually being used which is inconsistent with the defined term "grounding electrode." This revision fixes that inconsistency in the NEC.

5-148 Log #4748 NEC-P05 **Final Action: Reject**
(250.52(A)(1) Exception)

Submitter: Charles M. Trout, Maron Electric Company

Recommendation: Delete 250.52(A)(1) Exception in its entirety

Substantiation: The body of the text in 250.52(A)(1) satisfactorily contains the necessary requirement for the use of a metal underground water pipe as a grounding electrode regarding the use of interior metal water piping. The exception permits a lesser degree of safety based on an undocumented qualified person hypothetically servicing the installation. No requirements are present to ensure that the conditions of maintenance and supervision will ensure that only qualified persons service the installation actually exist. This is a blatant example of a performance requirement with no prescriptive requirements to judge the effectiveness of compliance with the performance requirement.

Panel Meeting Action: Reject

Panel Statement: The exception is included for installations where it is not practicable to install the grounding electrode conductor all the way back to the service such as in some large commercial, industrial and institutional buildings. The definition of "qualified person" is contained in Article 100. The submitter has not provided sufficient technical substantiation to support removal of this provision. It should be noted that the panel action on Proposal 5-212 relocates the existing exception to a new Section 250.68(C).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-149 Log #3535 NEC-P05 **Final Action: Accept in Principle**
(250.52(A)(2))

Submitter: Phil Simmons, Olympia, WA

Recommendation: Revise text to read as follow:

(2) Metal Frame of the Building or Structure. The metal frame of the building or structure <u>if</u> ~~that is connected to the earth by any of the following methods:~~

~~(1)~~ 3.0 m (10 ft) or more of a single structural metal member <u>is</u> in direct contact with the earth or <u>is</u> encased in <u>not less than 50 mm (2 in.) of</u> concrete that is in direct contact with the earth

~~(2) Connecting the structural metal frame to the reinforcing bars of a concrete-encased electrode as provided in 250.52(A)(3) or ground ring as provided in 250.52(A)(4)~~

~~(3) Bonding the structural metal frame to one or more of the grounding electrodes as defined in 250.52(A)(5) or (A)(7) that comply with 250.56~~

~~(4) Other approved means of establishing a connection to earth~~

Substantiation: The definition of "Grounding Electrode" was revised in the 2008 NEC to read, "A conducting object through which a direct connection to earth is established." The options included in 250.52(A)(2)(2), (3) and (4) do not ensure a "direct connection" is being made by the metal frame of a building or structure.

The rule needs to include "… encased in not less than 50 mm (2 in.) …" to be consistent with the rules for concrete encased grounding electrodes in 250.52(A)(3).

A companion proposal is being made to 250.62 relating to the use of structural metal as a grounding electrode conductor as well as to interconnect other grounding electrodes.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 5-150.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept the revisions proposed to Section 250.52(A)(1) to provide consistency with the defined term "grounding electrode." The revisions in proposals 5-182 and 5-212 preserve the allowances for structural metal building frames to be used as conductive paths to grounding electrodes which more accurately describes how they are currently being used. The revision is part of a larger effort to promote more consistent use of defined words and terms related to grounding and bonding, while at the same time improving clarity by providing specific language in this section that reflects how the building steel and water piping systems are actually being used which is inconsistent with the defined term “grounding electrode.” This revision fixes that inconsistency in the NEC.

5-150 Log #3705 NEC-P05 **Final Action: Accept in Principle**
(250.52(A)(2))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise and Delete Wording to 250.52(A)(2) as follows:
(2) Metal Frame of the Building or Structure. The metal frame of the building or structure that is connected to the earth by any of the following methods:
(1) 3.0 m (10 ft) or more of a single structural metal member in direct contact with the earth ~~or encased in concrete that is in direct contact with the earth~~
(2) Where 3.0 m (10 ft) or more of a single structural metal member is encased in concrete and where the concrete is in direct contact with the earth for 3.0 m (10 ft) or more
(3) Where each of the hold-down bolts securing a single structural steel column are exothermic welded to at least 6.0 m (20 ft) of one or more concrete encased bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods not less than 13 mm (½ in.) in diameter
~~(2) Connecting the structural metal frame to the reinforcing bars of a concrete-encased electrode as provided in 250.52(A)(3) or ground ring as provided in 250.52(A)(4)~~
~~(3) Bonding the structural metal frame to one or more of the grounding electrodes as defined in 250.52(A)(5) or (A)(7) that comply with 250.56~~
~~(4) Other approved means of establishing a connection to earth.~~
Substantiation: This is meant to clarify where the metal frame of a building or structure is actually an electrode and remove existing language contained in 250.52(A)(2) that allows the metal frame to “act” as an electrode when in fact it is acting as a bonding jumper and part of the grounding electrode conductor in attaching the electrical systems grounded conductor to a concrete encased electrode or ground ring as in current subsection (A)(2)(2), or to a rod, pipe, or plate electrode as in current subsection(A)(2)(3).

It makes little sense to have a 400-ampere rated service with 500 kcmil copper ungrounded service conductors be attached to the metal frame of a building with a 1/0 copper grounding electrode conductor when the basis for the metal frame being an electrode is a 6 AWG copper grounding electrode conductor that runs between an ungrounded metal frame and a ground rod, pipe, or plate electrode as permitted in 250.52(A)(2)(3). This same principle applies in the application of allowing an ungrounded metal frame to be “declared grounded” when a 4 AWG from a concrete encased electrode or a 2 AWG from a ground ring electrode is used to support the steel frame as an electrode when a larger than 4 AWG copper or 2 AWG copper grounding electrode conductor is required because of the size of the ungrounded service conductors.

Subsection (A)(4) is not required and is inadequate. Other approved means is already provided for in 90.4 where it states, “By special permission, the authority having jurisdiction may waive specific requirements in this Code or permit alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.” The same degree of equivalent objectives should be the objective here and any deviation from the NEC should be in writing as is required when special permission is requested and granted.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
250.52(A)(2) Metal Frame of the Building or Structure. The metal frame of the building or structure that is connected to the earth by one or more of the following methods:
(1) At least one structural metal member that is in direct contact with the earth for 3.0 m (10 ft) or more, with or without concrete encasement.
(2) The hold-down bolts securing the structural steel column are connected to a concrete encased electrode that complies with 250.52(A)(3) located in the support footing or foundation. The hold-down bolts shall be connected to the concrete-encased electrode by welding, exothermic welding, the usual steel tie wires, or other approved means.
Panel Statement: The panel accepts the concepts from Proposals 5-149, 5-150, 5-151, and 5-152 and has combined them into the revised text. The panel revised the single structural metal member to permit the application of more than one of the structural metal members to qualify as a grounding electrode. The panel concludes the revised text meets the intent of all the submitters.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-151 Log #4012 NEC-P05 **Final Action: Accept in Principle**
(250.52(A)(2))

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Delete text as follows:
(2) Metal Frame of the Building or Structure. The metal frame of the building or structure that is connected to the earth by any of the following methods:
(1) 3.0 m (10 ft) or more of a single structural metal member in direct contact with the earth or encased in concrete that is in direct contact with the earth
~~(2) Connecting the structural metal frame to the reinforcing bars of a concrete-encased electrode as provided in 250.52(A)(3) or ground ring as provided in 250.52(A)(4)~~
~~(3) Bonding the structural metal frame to one or more of the grounding electrodes as defined in 250.52(A)(5) or (A)(7) that comply with 250.56~~
~~(4) Other approved means of establishing a connection to earth~~
Substantiation: The definition of “grounding electrode” is for objects that make a connection to the earth. An object that is not actually in the earth should not be described as an electrode but as presently allowed can be used as a conductor to make that connection. The text that is suggested to be deleted is also being proposed on being added to 250.68 to be used as a conductor.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 5-150.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-152 Log #4149 NEC-P05 **Final Action: Accept in Principle**
(250.52(A)(2))

Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Revise 250.52(A)((2) to read as follows:
250.52(A)(2) Metal Frame of the Building or Structure. The metal frame of the building or structure that is connected to the earth by any of the following methods:
(1) 3.0 m (10 ft) or more of a single structural metal member in direct contact with the earth or encased in concrete that is in direct contact with the earth
(2) Connecting the structural metal frame to the reinforcing bars of a concrete-encased electrode in the supporting footing or foundation as provided in 250.52(A)(3) ~~or ground ring as provided in 250.52(A)(4)~~
~~(3) Bonding the structural metal frame to one or more of the grounding electrodes as defined in 250.52(A)(5) or (A)(7) that comply with 250.56~~
~~(4)~~ (3) Other approved means of establishing a connection to earth
Substantiation: Section 250.52 is to define what constitutes a grounding electrode. The definition accepted by CMP-5 for the 2008 NEC specifies the grounding electrode be “A conducting object through which a direct connection to earth is established.” For correct application of the definition from Article 100, the structure metal needs to be the conducting object with a direct contact with the earth. Connection of the structural metal to another electrode such as a ground ring, rods, pipes or plates is not a direct connection but an indirect connection to earth, therefore not meeting the Article 100 definition. Part of the substantiation used to revise this section from the “effectively grounded” terminology was that some users were considering the bonding to the service as required in 250.104 as then creating the structural metal as being a grounding electrode. The conflict with using the structural metal as a “common grounding electrode conductor” for separately derived systems in 250.30(A) has been covered by a companion proposal so the need to continue to falsely define structural metal that is connected to earth by bonding to another electrode is no longer necessary. The added language in item (2) clarifies the rebar connection is to be the rebar in the specific footing or foundation for that structural metal member. This aspect follows from the original requirement and substantiation provided for structural metal when it came into the NEC.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 5-150.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-153 Log #1093 NEC-P05 **Final Action: Reject**
(250.52(A)(2)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
3.0 m (10 ft) or more of a ~~single~~ continuous (unbroken) structural metal member located in accordance with 250.52(A) ~~in direct contact with the earth or encased in concrete that is in direct contact with the earth~~.
Substantiation: “Single” implies a 10 ft section cannot be joined to another section. In contact with the earth includes a slab on grade and any portion of above ground concrete, but in contact with the earth, which may not provide a low impedence path to earth. This section does not correlate well with 250.52(A)(3) which also relates to concrete-encased electrodes.
Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation for the proposed changes. The reference to 250.52(A) does not provide any guidance as there is no text for this section except the list items. There was not technical substantiation for added and deleted text from existing code that was not indicated in the proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-154 Log #2760 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Tom Dwyer, City of Bismarck
Recommendation: Revise text to read as follows:
(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (1/2 in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means. Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system. Concrete-encased electrodes shall be supplemented with any of the other grounding electrodes permitted in 250.52(A).
Substantiation: The installation of the re-bar and the steel tie wires can be poorly installed. The electricians are not always aware of how the re-bar was installed. As a building inspector and licensed electrician I have witnessed many poor re-bar grounding installations that had to be corrected because the installations were made by concrete contractors who did not understand or care about a good grounding system. Many areas of the country do not require a concrete inspection and the first time the electrician looks at the re-bar ground is after the concrete has been installed. The grounding must be in the hands of the electricians.
Panel Meeting Action: Reject
Panel Statement: Research has determined that the concrete encased electrode is a suitable electrode. The submitter has not provided any technical substantiation to support this proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-155 Log #2877 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Mark A. Heller, Mark Heller Electric
Recommendation: Revise text to read as follows:
250.52(A)(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete in contact with earth, installed as specified in 250.53(I)(1) or (2). ~~located horizontally within and near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (1/2 in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means.~~ Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.
Substantiation: Relocates specific details of, and expands on guidance for the installation, construction of, and connection to Concrete-Encased Electrodes to 250.53 where similar guidance on other electrodes is located, and serves to clarify the previously worded version of 250.52(A)(3). (See proposal from same author for new text of proposed 250.53(I)).
Panel Meeting Action: Reject
Panel Statement: Rules contained in 250.52 A(3) are necessary to determine if the installed footing qualifies as an electrode. The panel concludes the requirements for the concrete encased electrode need to be located in 250.52(A)(3) for better clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-156 Log #3050 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (½ in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means. ~~Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.~~
Substantiation: This is a companion proposal one being made in 250.50 (adding a second exception). 250.52(A)(3) is the wrong location the proposed deleted text in this section. 250.52(A) simply describes what an electrode is…it has no requirements. The requirement for bonding electrodes together is found in 250.50. The proposed deleted text seems to be an exception to a rule that is not in this section (250.52).
Panel Meeting Action: Reject
Panel Statement: There is no companion proposal to relocate the deletion.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-157 Log #3051 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (½ in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means. Exposed or concealed reinforcing bars that are bonded to reinforcing bars meeting the criteria of this section shall be considered part of the electrode. Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.
Substantiation: There is a long standing debate as to whether or not a piece of rebar (connected to the footing/foundation steel) that pierces the concrete and is installed inside of a framed wall can be connected to and be used as a concrete encased electrode. This proposal is intended to clarify this practice is a permitted one.
Panel Meeting Action: Reject
Panel Statement: Only the portion of an electrode that is in contact with the earth can be called an electrode. The exposed portion of the rebar could be used as a connection point but cannot be considered as the electrode.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-158 Log #3536 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, ~~located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth,~~ consisting of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (½ in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars for use as a concrete-encased electrode shall be in one continuous 6.0-m (20-ft) length or, if in multiple pieces of reinforcing bars, shall ~~permitted to~~ be connected ~~bonded~~ together in compliance with building or structural codes by the usual steel tie wires, welding, or other effective means to create one or more 6.0-m (20-ft) length(s). If ~~Where~~ multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.
(a) Location. Metallic components shall be located horizontally within that portion of a concrete foundation or footing that is in direct contact with the earth or within vertical foundations or structural components or members that are in direct contact with the earth.
Substantiation: A new subsection is proposed to cover the location requirements of concrete-encased electrodes. This will make the requirements more user-friendly. Changes are proposed to add requirements on how to create the minimum 20-ft length of concrete-encased electrode. Methods of connecting lengths of reinforcing steel together are outside the scope of the NEC and thus this section should recognize the building or structural code for those requirements.
CMP-5 added the permission to use concrete-encased electrodes in a "vertical" orientation but now needs to "fill in the blanks" on how this style of electrode is to be installed or recognized. Some members of CMP-5 have stated it is their opinion the vertical grounding electrode must be in one 20-ft length. Others have opined that 4, 5-ft lengths should suffice. This proposal intends to require not less than one 20-ft length as that is the documentation that accompanied the original proposal to add the "Ufer ground" to Article 250 (so far as I can determine). Four, 5-ft lengths may perform adequately but documentation to support that premise has not been supplied to CMP-5. A concrete-encased grounding electrode installed in a vertical orientation needs to have direct earth contact to ensure the concrete-encased grounding electrode will maintain essential moisture level so as to remain conducive.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Reject
Panel Statement: Electrical Inspectors are not responsible for ensuring compliance with structural codes. Welding reinforcing steel may or may not be permitted by structural designs.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:

BRENDER, D.: The Panel action and statement are not responsive to the proposal or substantiation. It is a fallacy to assume the NEC is enforced by only electrical inspectors. There are a wide variety of enforcers included in the Fine Print Note to the definition of Authority having Jurisdiction in Article 100. In addition, many users of the NEC choose to comply with the NEC as being the minimum standard for safety.

The proposal does not require welding of the reinforcing steel but permits it. The AHJ or consulting engineer can permit or allow welding where appropriate.

Finally, the Panel Statement is inconsistent with its accepted text in proposal 5-150 where the Panel crafted the language, "The hold-down bolts shall be connected to the concrete-encased electrode by welding, exothermic welding, the usual tie wires, or other approved means."

5-159 Log #3608 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Roger J. Montambo, Glavan Industries, Inc.
Recommendation: Revise text to read as follows:

An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth shall consist~~ing~~ of at least 6.0 m (20 ft) of one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (1/2 in.) in diameter, or consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. ~~Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means.~~ Where multiple steel reinforcing bars or rods are used, the electrode and any portion of the reinforcing steel rising above the bottom wall plate line used to connect to the grounding electrode conductor shall be metallically joined together by welding or other listed means to form a continuous electrical electrode. Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.

Substantiation: There has never been any technical substantiation submitted with Proposal 5-144 during the 2002 Code revision cycle to Code-Making Panel-5 for accepting multiple steel reinforcing rods tied together by the "usual' tie-wires in place of a singular 20-foot continuous length of reinforcement steel for creating a concrete encased electrode. Therefore, unless testing of actual in-place concrete electrodes of multiple pieces of reinforcing steel shows the "usual" tie wires to be adequate, this change was questionable when accepted, and remains questionable as no follow-up testing has been performed to assure compliance to NEC 250.56 to our knowledge.

A. G U'fer's report to the AIEE on August 24, 1961 (Paper No. CP61-978) recording the development and test of this concrete-encased system installed at the Davis-Monthan Air Force Base in Tucson, AZ clearly suggested that further testing be performed. In the section titled 'Description of Installation' U'fer states that… "Across the upper ends of these vertical rods one-half inch steel reinforcing bars were laid horizontally and secured to the vertical rods embedded in the concrete of the footings, by welding to every alternate vertical rod in the footing." It is not clear if the rebar was a single piece, or simply constructed of welded sections (assume they were welded based on having access to such equipment). 'Wire ties' are not mentioned anywhere in the U'fer report. Why would anything other that a single piece of #4 rebar, or a single rebar constructed of welded sections comprising a 20 foot length, be considered if the original substantiation differs from the existing code based upon U'fer's own conclusions?

Panel Meeting Action: Reject
Panel Statement: Sections 250.8 and 250.70 already require that listed specific methods are to be used for making connections to electrodes. See the panel action and statement on Proposal 5-157.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-160 Log #3903 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Michael Gassman, ERICO International Corp.
Recommendation: Revise text as follows:

(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least one 6.0 m (20 ft) continuous length ~~of one~~ or ~~more~~ two bare, ~~or zinc galvanized~~, or other electrically conductive coated steel reinforcing bars or rods of not less than ~~13~~ 12.7 mm (1/2 in.) in diameter, or consisting of at least one length 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Two ~~R~~reinforcing bars or rods shall be permitted to be bonded together by ~~the usual steel tie wires or other~~ an effective electrical means. Where multiple concrete encased electrodes are present at a building or structure, the electrodes ~~it~~ shall be ~~permissible to~~ bonded ~~only one~~ into the grounding electrode system.

Substantiation: 1. IEEE Std 80, Sec 14.6 Concrete-encased electrodes

"Splitting of concrete may occur... because corroded steel... passage of a very high current,..."

2. NFPA 780 Sec. 4.13.3.2

"At least 6 m (20 ft) of one or more steel reinforcing bars... overlapping 20 diameters..."

3. IEEE Transactions on Power Apparatus and Systems, Vol. PAS-97, no. 1 January/February 1978

Testing of concrete electrodes under high fault conditions. Dick and Holliday concurred that concrete-encased electrodes do provide a low resistance ground, but also found minor to complete destruction from high current faults in the range of 500 to 2600 amperes.

4. Concrete International, Jan. 2007 - A Brief Look at Lightning Strikes

"Rapid heating can cause localized damage to concrete"

Corn silo investigation - Researchers concluded that strain in the concrete caused by thermal expansion at spark gaps throughout the concrete was a major contributor to the observed damage.

Michigan State Highway Department - Occurrence of spalling due to thunderstorm. Arcing between steel and concrete interface caused the damage.

5. Electrical Earthing Using Reinforced Concrete Foundations by P.G. Wright

"Difficulty was initially experienced in understanding the electrical properties of damp-proof material applied to structural foundations... a membrane barrier of such high resistivity as to preclude this method of earthing."

"The fault energy is dissipated as heat throughout the fault circuit but concentrated at those positions of greater resistance."

6. Typical faults are higher than in the 1940's when Ufer did his studies on concrete-encased electrodes.

7. IEEE Transactions on Industry Applications Vol. 32, No. 5, September/October 1996

"At high fault lightning currents, the Ufer ground needs and external metallic path to ground. Failure to provide a direct metallic path means that lightning or faults will be conducted from the rebar through the concrete into the earth. The water bound up in the concrete may be turned to steam and spall the concrete."

8. Concrete-encased electrodes are part of the grounding system and would require bonding to other electrical grounding systems per the NEC. A path would be required to an external system.

9. National Electrical Code Internet Connection, June 27, 2007

"A Ufer ground consisting solely of the tower foundation is a bad idea. Lightning surges passing through the foundation can vaporize the concrete and damage the foundation through rapid expansion of steam."

10. Tie wires are typically 16 gauge and have a current carrying capacity of 350 amps for 1/2 seconds

11. Bare copper conductor must be one length of 20 ft. A steel rod which is less conductive and is more electrically resistant may be assembled using upwards of 24 - 20 inch reinforcing bars or rods (overlapping X 20 diameters).

12. Tie wire is used as a mechanical support. It is not intended as an electrical connector.

13. If the concrete encased electrodes are not bonded together, a difference in potential will be set up between the competing electrodes. This is an unsafe condition.

14. Lightning Damage to Concrete Including Damage from Flying Concrete and Reinforcement (Shortcut to: http://www.srh.noaa.gov/lch/severe/ltg1.php)

Panel Meeting Action: Reject
Panel Statement: No substantiation was provided for limiting the steel reinforcing to one continuous 20-ft piece or two pieces. No substantiation was provided for removing zinc galvanized reinforcing steel. No field evidence was provided in the substantiation for eliminating the use of tie wires, which has been a common practice for many years.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-161 Log #4150 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Revise 250.52(A)(3) to read as follows:

(3) Concrete-Encased Electrode. An electrode consisting of rebar or wire encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth. The electrode shall consist~~ing~~ of at least 6.0 m (20 ft) of concrete encasing one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (½ in.) in diameter, or ~~consisting of~~ encasing at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Reinforcing bars shall be permitted to be bonded together by the usual steel tie wires or other effective means. Where multiple concrete-encased electrodes are present at a building or structure, it shall be permissible to bond only one into the grounding electrode system.

Substantiation: The research completed by Mr. Herbert Ufer, which is the basis for the concrete encased electrode, determined that a minimum of 20 feet of concrete containing rebar or wire in direct contact with the earth is a suitable electrode. This length of concrete in contact with the earth and encompassing that volume of earth provides the connection necessary as an electrode. The metal contained within the concrete provides the conductive means to connect to the earth through the concrete. With the change in the 2008 NEC allowing vertical installations for pier construction, some individuals has interpreted the

present language to allow several short lengths of rebar, for example 4 segments each 5 feet long, the sum being 20 feet, and encased in a 5 foot deep concrete pier to be considered a concrete encased electrode. Taken to the extreme, 20 one foot rebar segments in a 16 inch deep block of concrete could meet this interpretation and be called an electrode, but clearly this is not supported by the original research. The proposed language clarifies that the electrode is a system with a minimum of 20 feet of concrete in direct contact with the earth that encases rebar or copper wire of the lengths specified.
Panel Meeting Action: Reject
Panel Statement: The original work of Herbert Ufer does not require 20 ft of concrete. No substantiation was provided for this change. CMP-5 does not necessarily agree with all of the submitter's substantiation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-162 Log #4369 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Terry L. Schneider, Berwick Electric Co.
Recommendation: Revise text as follows:
An electrode encased by at least 50 mm (2 in.) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of at least 6.0 linear m (20 linear ft) of one or more…
Substantiation: Some jurisdictions have interpreted this to mean that you could install a 20' length of rebar coiled up, or 10-2' pieces could be tied together and meet the intent of the code. The revised text should help clarify the original intent in the 1968 NEC and not deviate in a direction not intended by the code panel.
Panel Meeting Action: Reject
Panel Statement: Adding the term linear does not improve the clarity of this section. The proposed change could be interpreted as requiring a single 20 ft piece of reinforcing steel.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-163 Log #4372 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Rand Veerman, Town of Normal
Recommendation: Revise text as follows:
(3) Concrete-Encased Electrode. An electrode encased by at least 50 mm (2 in) of concrete, located horizontally near the bottom or vertically, and within that portion of a concrete foundation or footing that is in direct contact with the earth, consisting of ~~at least 6.0 m (20 ft) of~~ one or more bare or zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (1/2 in) in diameter, or consisting of ~~at least 6.0 m (20 ft) of~~ bare copper conductor not smaller than 4 AWG.
The electrode length shall be sufficient to require a minimum of 6.0 m (20 ft.) of concrete in a single dimension in direct contact with the earth.
Substantiation: Currently a coil of wire or a group of rods tied together dropped in the pour is sufficient to meet the code This change requires electrode length sufficient that 20 linear feet of concrete in contact with the soil.
Panel Meeting Action: Reject
Panel Statement: The original work of Herbert Ufer does not require 20 ft of concrete. No substantiation was provided for this change.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-164 Log #4600 NEC-P05 **Final Action: Reject**
(250.52(A)(3))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the following sentence after the sentence ending with "...not smaller than 4 AWG."
"The segments comprising a concrete-encased electrode shall be electrically continuous but are permitted to be physically discontinuous, provided the total embedded length in concrete in direct earth contact is not less than 6.0 m (20 ft)."
Substantiation: This wording would allow for the benefits of Ufer grounding to be applied in buildings with piers that are not 20 ft deep into the earth, but rather as short as, for example, 5 ft within the earth on 4 corners. The section already allows multiple segments of rebar to comprise an electrode, as long as they are run together with the "usual steel tie wires". So, four 5-ft rebars tied together are already permitted to comprise one of these electrodes. What difference would there be if the same length of steel is in four locations, provided the bonding is correctly executed? This is arguably permitted by the current wording, but after discussions with several CMP 5 members it appears this was not fully discussed. This proposal will provide the vehicle for this discussion.
Panel Meeting Action: Reject
Panel Statement: The proposed language does not add clarity and can be misleading. The concept provided in the substantiation is permitted if the multiple pieces of reinforcing steel are bonded together.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-165 Log #2527 NEC-P05 **Final Action: Reject**
(250.52(A)(4))

Submitter: Don Ganiere, Ottawa, IL
Recommendation: Add new text as follows:
(4) Ground Ring or Ground Radial A ground ring encircling the building or structure, or a grounding radial in direct contact with the earth, consisting of at least 6.0 m (20 ft) of bare copper conductor not smaller than 2 AWG.
Substantiation: What is the magic about a ground ring? A 20 ft copper conductor not smaller than 2 AWG installed as a radial or lateral will perform at least as well as the ground ring encircling the building or structure. In fact a 20 ft radial will actually perform better than a 20 ft ring as a result if the over lapping sphere of influence that will exist with a 20 ft ring and would not exist with a 20 ft radial. Radials are specifically permitted by NFPA 780, 4.13.5 for lightning protection system and that is one of the primary purposes for the grounding electrodes required by the NEC. Grounding radials are commonly used for radio and TV transmission towers. The NEC currently permits what is really an 8 ft radial grounding electrode in 250.53(G). There should be no question that a 20 ft radial would be a better grounding electrode that an 8 ft rod buried horizontally.
Panel Meeting Action: Reject
Panel Statement: The function of a "radial electrode" for an Article 250 grounding electrode system differs from the function of grounding electrodes used for the purposes of NFPA 780. In addition to function in the event of lightning or other short-time events, grounding electrode systems for the purposes of the NEC provide protection for personnel and equipment. Encircling the building with the ground ring is tantamount to this function. The submitter has not provided documentation that demonstrates a "radial electrode" is equivalent to a ground ring encircling the building or structure.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-166 Log #4145 NEC-P05 **Final Action: Reject**
(250.52(A)(5))

Submitter: Chuck Mello, Underwriters Laboratories
Recommendation: Revise 250.52(A)(5) to read as follows:
(5) Rod and Pipe Electrodes. Rod and pipe electrodes shall not be less than 2.44 m (8 ft) in length and shall consist of the following materials.
(a) Pipe Electrodes. ~~Grounding~~ electrodes of pipe or conduit shall not be smaller than metric designator 21 (trade size ¾) and, where of steel, shall have the outer surface galvanized or otherwise metal-coated for corrosion protection.
(b) Rod Electrodes.Rod type electrodes shall comply with the following:
(1) Shall be constructed of steel or ~~Grounding electrodes of~~ stainless steel
(2) Where of steel, rods shall be coated by ~~and~~ copper or zinc ~~coated steel~~
(3) Shall be not less than 12.70 mm (½ in.) in diameter
Shall be listed as grounding and bonding equipment ~~at least 15.87 mm (5/8 in.) in diameter, unless listed and not less than 12.70 mm (½ in.) in diameter.~~
Substantiation: With the global market supply, a number of field reports have been received for ground rods. These field reports were for such issues as coatings less than the minimum requirements and inconsistent application of the coatings. Some areas on rods were found to have the minimum thickness coating and other areas on the same rod significantly less than allowed by the product standard. Some of these were Listed and others were not. Those that were listed allow appropriate corrective action to be taken by the listing laboratory, while no laboratory action can be taken for an unlisted product found out of compliance. It has also been observed that some ground rods in the market place are only 6 feet long and not the minimum 8 feet. Inspectors have a very difficult time ensuring an installed ground rod meets the requirements of the NEC. In addition the NEC should set the minimum safety requirements and the present language sets two levels for size without technical basis. The revised language would provide for assurance of properly constructed ground rods, correct length and suitable coatings, and provide a easy means via the listing mark for AHJs to confirm the ground rod meets the applicable standards. This would be also consistent with the panel's previous actions to require the connectors to attach the grounding electrode conductor to the ground rod to be listed as grounding and bonding equipment.
Panel Meeting Action: Reject
Panel Statement: The NEC cannot control the manufacture of noncompliant products. The substantiation states that some products were manufactured under the audit of an NRTL. The revised wording does not add clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-167 Log #2342 NEC-P05 **Final Action: Accept**
(250.52(A)(5)(b))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise 250.52(A)(5)(b) as follows: **(b) Rod-type g~~G~~rounding electrodes of stainless steel and copper or zinc coated steel shall be at least 15.87 mm (5/8 in.) in diameter, unless listed and not less than 12.70 mm (1/2 in.) in diameter.**
Substantiation: By distinguishing clearly that section (b) addresses only “rod” grounding electrodes, it reduces potential confusion for code users without being redundant or verbose. This also provides a similar level of detail as is given to section (a) also in 250.52(A)(5).
Panel Meeting Action: Accept
Panel Statement: The title of the section adequately describes what is covered by the requirements in 250.52(A)(5)(a) and (b).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-168 Log #3706 NEC-P05 **Final Action: Reject**
(250.52(A)(5)(b))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise text to read as follows:
Grounding electrodes of stainless steel and copper or zinc coated steel shall be at least 15.87 mm (5/8 in.) in diameter, unless listed~~ and not less than 12.70 mm (1/2 in.) in diameter~~.
Substantiation: Simplification. NEC does not establish the listing requirements.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not support removing a minimum requirement that may or may not be incorporated into the applicable product standard.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
MOHLA, D.: The National Electrical Code should not establish criteria for listing standards.
STEINMAN, G.: The UL 467 Standard requires the minimum size of a listed rod to be the identical size as presently described in the NEC, 12.7 mm (1/2 in). The NEC is intended to be an installation code and not a product design collection.

5-169 Log #3707 NEC-P05 **Final Action: Accept in Principle**
(250.52(A)(7))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise text to read as follows:
250.52 Grounding Electrodes.
(7) Plate Electrodes. Each plate electrode shall expose not less than 0.186 m2 (2 ft2) of surface to exterior soil. Electrodes of bare or coated iron or steel plates shall be at least 6.4 mm (1/4 in.) in thickness. Solid, uncoated ~~E~~electrodes of ~~nonferrous metal~~ copper shall be at least 1.5 mm (0.06 in.) in thickness.
Substantiation: While plate electrodes may result in higher resistance than a rod or pipe electrode in most soils, their use is primarily in rocky conditions where they are the electrode of last resort. There may be NO alternative in pure rock conditions and should be retained in the NEC.
“Bare or coated” plates include metal plate electrodes of bare steel, or coated with a conductive material such as zinc or copper.
What was referred to as “nonferrous metal” (because it does not contain iron) includes copper plates and which of course would be un-coated. Stainless-steel would not be nonferrous as it contains iron. This change is primarily editorial for clarification.
Electrical inspectors, due to confusing wording of coating types, and the words ‘ferrous’ and ‘nonferrous’ often interpret this section incorrectly. Therefore editorial changes minimize confusion in applying this paragraph.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
(7) Plate Electrodes. Each plate electrode shall expose not less than 0.186 m2 (2 ft2) of surface to exterior soil. Electrodes of bare or conductively coated iron or steel plates shall be at least 6.4 mm (1/4 in.) in thickness. Solid, uncoated electrodes of nonferrous metal ~~copper~~ shall be at least 1.5 mm (0.06 in.) in thickness.
Panel Statement: The panel action clarifies that any coating applied to the plate electrode is to be conductive. Additionally the term “nonferrous metal” has been retained so as to not limit the material to copper only.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
BRENDER, D.: The change from copper to “nonferrous” is incorrect as copper is not the only nonferrous metal, and many non-ferrous materials are not suitable for direct-burial applications.

5-169a Log #CP500 NEC-P05 **Final Action: Accept**
(250.53(A))

Submitter: Code-Making Panel 5,
Recommendation: Revise Section 250.53(A) to read:
(A) Rod, Pipe, and Plate Electrodes. Rod, pipe and plate electrodes shall meet the requirements of (A)(1) through (A)(3)
(1) Below Permanent Moisture Level. If practicable, rod, pipe, and plate electrodes shall be embedded below permanent moisture level. Rod, pipe, and plate electrodes shall be free from nonconductive coatings such as paint or enamel.
(2) Supplemental Electrode Required. A rod, pipe or plate electrode shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). The supplemental electrode shall be permitted to be bonded to one of the following:
(a) The rod, pipe or plate electrode
(b) The grounding electrode conductor
(c) The grounded service-entrance conductor
(d) The nonflexible grounded service raceway
(e) Any grounded service enclosure
Exception: If a single rod, pipe, or plate grounding electrode has a resistance to earth of 25 ohms or less, the supplemental electrode shall not be required.
(3) Supplemental Electrode. If multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart.
FPN: The paralleling efficiency of rods longer than 2.5 m (8 ft) is improved by spacing greater than 1.8 m (6 ft).
Substantiation: CMP-5 has received proposals related to Section 250.56 over several revision cycles. The common thread that resonates in the substantiation for these proposals is that the current text of Section 250.56 is confusing and can result in misapplication of the requirement. At this point CMP-5 has concluded that the substantiation accompanying any of these proposals does not warrant complete removal of the long-standing 25 ohm requirement from the Code. To that end, the panel has relocated the 25 ohm provision from Section 250.56 to an exception in a revised Section 250.53(A) covering the installation requirements for rod, pipe, and plate grounding electrodes. This relocation and revision should resolve many of the usability concerns cited in this and other proposals.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
HARDING, G.: Continue to accept the proposal. The relocation of the rule from 250.56 is better clarified at this location. The requirement as proposed, more accurately matches the standard industry practice of driving two rods unless the requirement of “a resistance to earth of 25 ohms or less” can be demonstrated.
JOHNSTON, M.: Continue to accept this proposal. The revisions propose requirements that are consistent with actual industry practices in the field today regarding the 25 ohm requirement in 250.56. It is understood that the actions here do result in the deletion of 250.56 even though it is not clearly indicated in the action on Proposal 5-176a.

5-169b Log #CP501 NEC-P05 **Final Action: Accept**
(250.53(B))

Submitter: Code-Making Panel 5,
Recommendation: Revise Section 250.53(B) to read:
(B) Electrode Spacing. Where more than one of the electrodes of the type specified in 250.52 (A)(5) or (A)(7) are used, each electrode of one grounding system (including that used for ~~air terminals~~ strike termination devices) shall not be less than 1.83 m (6 ft) from any other electrode or another grounding system.
The remainder of paragraph is the same as in the 2008 NEC.
Substantiation: The term “air terminals” is no longer used in NFPA 780, and has been replaced by the term “strike termination devices”. Panel 5 has already approved changes in terminology in Sections 250-60 (Proposal 5-179) and 250-106 FPN No. 1 (Proposal 5-258). Section 250.53(B) was omitted in error.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-170 Log #3537 NEC-P05 **Final Action: Accept in Principle**
(250.53(D))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
If ~~Where~~ used as a grounding electrode, metal underground water pipe grounding electrodes shall meet the requirements of 250.53(D)(1) through ~~and~~ (D)(3) ~~(D)(2)~~.
(1) Continuity. Continuity of the grounding path or the bonding connection to interior piping shall not rely on water meters or filtering devices and similar equipment.

(2) Supplemental Electrode Required. A metal underground water pipe shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). If ~~Where~~ the supplemental electrode is of the ~~a~~ rod, pipe, or plate type, it shall comply with 250.56. The supplemental electrode shall be ~~permitted to be~~ bonded to one of the following:
(a) the grounding electrode conductor,
(b) the grounded service-entrance conductor,
(c) a ~~the~~ nonflexible grounded service raceway, or
(d) any grounded service enclosure.
(e) as provided in 250.32(B)
Exception: The supplemental electrode shall be permitted to be bonded to the interior metal water piping at any convenient point as covered in 250.53(D)(3) Exception ~~250.52(A)(1) Exception~~.
(3) Limitation. Interior metal water piping, that is directly connected to an underground metal water pipe grounding electrode, and is located more than 1.52 m (5 ft) from the point of entrance of the water pipe into the building shall not be used as a conductor to interconnect electrodes that are part of the grounding electrode system.
Exception: In industrial, commercial, and institutional buildings or structures where documented conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a conductor to interconnect electrodes that are part of the grounding electrode system, if the entire length of the interior metal water pipe that is being used for the conductor is exposed other than short sections passing perpendicularly through walls, floors, or ceilings.
Substantiation: This proposal addresses the issue that interior or aboveground metal water piping is not a grounding electrode. It may serve as a bonding conductor and to interconnect other grounding electrodes for creation of a grounding electrode system. CMP-5 modified the definition of “grounding electrode” in the 2008 NEC to emphasize the conductive object is used to make a “direct connection to the earth.”

This proposal also relocates the limitations on the use of the interior metal water pipe associated with the underground water pipe grounding electrode from 250.52(A)(1) to this section as the aboveground portion of the water pipe is not a part of the grounding electrode but may be acceptable for bonding other grounding electrodes together. The exception for industrial, commercial and institutional buildings is also proposed to be relocated here. The qualifications of persons to service and maintain the installation need to be documented.

Several of the proposed changes, including putting the equipment suitable for connecting the grounding electrode conductor to in list form, are intended to be editorial. One primary purpose of the proposal is to require the connection of the supplemental grounding electrode to one of the acceptable points rather than the existing permissive language. The permissive phrase “shall be permitted to be bonded to” needs to be deleted so the connections are required to be made at one of the locations specified.

The section needs to point to 250.32(B) as the location of connection needs to comply with that section at buildings or structures supplied by a feeder or branch circuit.

Section 3.3.4 of the NEC Style Manual states that “where” should not be used to mean “when” or “if.” This proposal intends to use the word “if” where appropriate.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
If used as a grounding electrode, metal underground water pipe shall meet the requirements of 250.53(D)(1) and (D)(2).
(1) Continuity. Continuity of the grounding path or the bonding connection to interior piping shall not rely on water meters or filtering devices and similar equipment.
(2) Supplemental Electrode Required. A metal underground water pipe shall be supplemented by an additional electrode of a type specified in 250.52(A)(2) through (A)(8). If the supplemental electrode is of the rod, pipe, or plate type, it shall comply with 250.56. The supplemental electrode shall be bonded to one of the following:
(1) The grounding electrode conductor
(2) The grounded service-entrance conductor
(3) A nonflexible grounded service raceway
(4) Any grounded service enclosure
(5) As provided in 250.32(B)
Exception: The supplemental electrode shall be permitted to be bonded to the interior metal water piping at any convenient point as covered in 250.68(C)(1)53(D)(3) Exception ~~250.52(A)(1) Exception~~.
~~**(3) Limitation.** Interior metal water piping, that is directly connected to an underground metal water pipe grounding electrode, and is located more than 1.52 m (5 ft) from the point of entrance of the water pipe into the building shall not be used as a conductor to interconnect electrodes that are part of the grounding electrode system.~~
~~*Exception: In industrial, commercial, and institutional buildings or structures where documented conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a conductor to interconnect electrodes that are part of the grounding electrode system, if the entire length of the interior metal water pipe that is being used for the conductor is exposed other than short sections passing perpendicularly through walls, floors, or ceilings.*~~
Panel Statement: The panel concludes that the location recommended for the new 250.53(D)(3) is more appropriately located in new 250.68(C). See the panel actions on Proposal 5-212. Editorial revisions to the remaining part of the recommendation have been made for clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-171 Log #2883 NEC-P05 **Final Action: Reject**
(250.53(D)(2))

Submitter: William Gross, Electric Service of Clinton
Recommendation: Add after the Exception: FPN: See 250.6(A) for Objectionable Current over Grounding Electrodes.
Substantiation: Inspection authorities and utility companies are creating connection schemes for connection of supplementary grounding electrodes that can result in creating parallel paths and objectionable current flowing over grounding electrode conductors.
Panel Meeting Action: Reject
Panel Statement: The addition of a fine print note to this section does not address the concerns in the submitter’s substantiation. There is insufficient information on the utility or inspector required schemes that are being indicated as creating hazardous conditions. The information regarding objectionable current over grounding conductors and electrodes is provided in 250.6.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-172 Log #2876 NEC-P05 **Final Action: Reject**
(250.53(I))

Submitter: Mark A. Heller, Mark Heller Electric
Recommendation: Add new text to read as follows:

250.53(I) Concrete-Encased Electrode. The electrode shall be installed and constructed so that it be encased by at least 50 mm (2 in.) of concrete, located horizontally for a length of 20 ft, or vertically for a length of 20 ft, or combination thereof within that portion of a concrete foundation, footing or pier that is in direct contact with the earth, by one of the following methods:

(1) Constructed of at least 6.0 m (20 ft) of one or more bare, zinc galvanized or other electrically conductive coated steel reinforcing bars or rods of not less than 13 mm (1/2 in.) in diameter. Where multiple reinforcing bars are used they shall be permitted to be bonded together by the usual steel tie wires or other effective means. Corrosion protection shall be used for any exposed portions of steel reinforcement bars or rods in wet or damp locations. Such corrosion protection shall be hot-dipped zinc galvanized, copper clad, or approved electrically conductive permanent coating suitable for the conditions, and done prior to the pouring of concrete, and be continuous from a point at least 2 in. inside the concrete, and extend to the exposed end.
(2) Constructed of at least 6.0 m (20 ft) of bare copper conductor not smaller than 4 AWG. Where copper conductor is used as a concrete-encased electrode, exposed portions of the electrode shall comply with 250.64(B), and may be used as a grounding electrode conductor if complying with 250.64(F) and continuous within the concrete.
For purposes of 250.68(A), any exposed portion of the electrode shall be considered part of the concrete-encased electrode for its entire length, if continuous to the qualifying portion(s). Connections to any exposed portion of concrete-encased electrode (copper conductor or reinforcing rods) shall comply with 250.70. Where connection to the grounding electrode conductor is not encased, it shall be accessible.
Substantiation: Relocates specific details of, and expands on guidance for the installation, construction of, and connection to Concrete-Encased Electrodes to 250.53 where similar guidance on other electrodes is located, and serves to clarify the previously worded version of 250.52(A)(3). (See proposal from same author deleting construction details from 250.52(A)(3).

Adds guidance for corrosion protection, and installation of exposed steel reinforcement bars or rods if used as the material for the electrode.

The revised text also clarifies use, connection to, and installation of copper conductor as a concrete-encased electrode. As well as, its popular dual use of the un-encased portion as both a grounding electrode, and grounding electrode conductor. Which may be superior in that it may provide fewer (if any) points of connection failure, and lower impedance.

Current wording of 250.52(A)(3) is in direct conflict with 250.68 in many interpretive views that regard exposed portions of the concrete-encased electrode as a non-qualifying location for connection to the concrete-encased electrode. The added text clarifies this possible conflict that may otherwise place the connection to the concrete-encased electrode beyond inspection or repair unnecessarily if interpreted in this method.

Other interpretations have considered the exposed portion of copper conductor as a “grounding electrode conductor”, limiting connection to them to one of two methods, exothermic welding or irreversible compression. Methods not required for connection to any other electrode - often resulting in abandonment or considerable expense.

Clarifies that copper conductor, if used as the concrete encased electrodes, need not be continuous upon exiting concrete, and may be connected to as would be allowed in 250.68(A) and 250.70.

Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 5-155
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-173 Log #1550 NEC-P05 **Final Action: Reject**
(250.54)

Submitter: Billie Van Duyne, I.B.E.W. Electrician/Apprentice Instructor / Rep. I.B.E.W. Local #176
Recommendation: Revise text as follows:
250.54 Auxiliary Grounding Electrodes.
One or more auxiliary grounding electrodes, such as ground rods, shall be permitted to be installed. Where connected to equipment, the auxiliary grounding electrodes are not permitted to be used in lieu of the equipment grounding conductor, but they may be used to provide a local earth connection at electrical equipment locations. For example, auxiliary grounding electrodes may be used for lightning protection or to establish a reference to ground in the area of electrically operated equipment. 250.4(A)(5) and 250.4(B)(4) also specify that the earth not be used as the sole equipment grounding conductor or effective (ground) fault current path. ~~connected to the equipment grounding conductors specified in 250.118 and~~ Auxiliary grounding electrodes shall not be required to comply with the electrode bonding requirements of 250.50 or 250.53(C) or the resistance requirements of 250.56. ~~but earth shall not be used as an effective ground-fault current path as specified in 250.4(A)(5) and 250.4(B)(4).~~
The auxiliary grounding electrodes shall be connected to the premises wiring grounding system(s) as required in:
1. 250.60 Use of Air Terminals
2. 250.106 Lightning protection Systems
3. 800.100 Cable and Primary Protector Grounding.
4. 810.21 Grounding Conductors — Receiving Stations
5. 820.100 Cable Grounding
6. 830.100 Cable, Network Interface Unit, and Primary Protector Grounding
FPN: Hazardous conditions of differences of potential and grounding loops should be avoided.
Substantiation: Installers often misunderstood the function of auxiliary grounding electrode(s), probable reason may be because there is not a definition of auxiliary grounding electrode and its function is not explained well.
Panel Meeting Action: Reject
Panel Statement: The proposal would permit, and mandate, the same rule. The proposed text does not add clarity to the code. The recommendation includes examples and explanations, which are not appropriate code language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-174 Log #1400 NEC-P05 **Final Action: Accept in Principle**
(250.56)

TCC Action: The Technical Correlating Committee directs the panel to reconsider and clarify whether or not it was their intent to delete 250.56.
This action will be considered by the panel as a public comment.
Submitter: Bob Ludecke, Ludecke's Electrical Service
Recommendation: Delete text as follows:
~~250.56 Resistance of Rod, Pipe, and Plate Electrodes. A single electrode of a rod, pipe, or plate that does not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52(A)(4) through (A)(8). Where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart.~~
Substantiation: Our research has failed to turn up any substantiation for this requirement. There is no stated method for determining ground resistance or whether the testing needs to be by a 3rd party. In most soils the ground resistance changes with the seasons and moisture content of the soil. No other types of grounding electrodes are subject to this requirement (i.e., concrete encased electrode or 10' of ½ " buried metal water pipe), nor is this requirement of less than 25 ohms resistance applied to multiple electrodes which seems to imply that the requirement is unnecessary to begin with.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 5-169a.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal and the related revisions in proposals 5-176a and 5-169a.

5-175 Log #3053 NEC-P05 **Final Action: Reject**
(250.56)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
A ~~single~~ grounding electrode system consisting of only a single rod, pipe, or plate that does not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52(A)(4) through (A)(8). Where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart.
FPN: The paralleling efficiency of rods longer than 2.5 m (8 ft) is improved by spacing greater than 1.8 m (6 ft).
Substantiation: This proposal is intended to clarify that this rule only applies if the single rod, pipe or plate creates the entire grounding electrode system. A very literal reading of this rule tells us that a if a grounding electrode system consists of a metal water pipe, a concrete encased electrode and a ground rod, the ground rod would still have to comply with this rule. This does not make sense, as the ground rod would not required at all.
Panel Meeting Action: Reject
Panel Statement: The present text is clear that the requirement is applied to a single electrode consisting of a rod, a pipe, or a plate. Any two or more electrodes bonded together are a grounding electrode system and this section does not apply. A single grounding electrode does not constitute a grounding electrode system.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
BRETT, JR., M.: I believe the submitter is correct. Where there are no qualified grounding electrodes and a rod plate or pipe is installed to meet the requirements, then and only then is the 25 ohm test required.

5-176 Log #3607 NEC-P05 **Final Action: Reject**
(250.56)

Submitter: James Lund, Galvan Industries
Recommendation: Revise text to read as follows:
A single electrode consisting of a rod, pipe, concrete encased electrode, or plate that does not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52.(A)(2) through (A)(8). Where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart.
Substantiation: The electrical inspector is often unable to inspect the grounding conductor connection to the rebar which should have a listed connector for that application. Many connectors are used, some that are compliant for the rebar application and some that are not.
If the electrical inspector cannot inspect the connection, and if the contractor, for whatever reason does not have the equipment to prove that the resistance is 25 ohms or less resistance on the concrete encased electrode, the wording in this proposal allows for a means for that installation to be code compliant using the same criteria used for other grounding electrodes.
For safety, it is important that an additional electrode supplement the concrete encased electrode ("Ufer") or any other type of electrode per 250.56. U'fer's original testing was based upon "welded" rebar versus wire ties splicing.. The 2008 edition of the NEC allow wire ties, definitely a lesser quality connector than a weld and not in compliance with U'fer testing.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not provide any data to support concrete-encased grounding electrode testing to meet the requirement of 250.56.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-176a Log #3574 NEC-P05 **Final Action: Accept in Principle**
(250.56)

TCC Action: The Technical Correlating Committee directs the panel to reconsider and clarify whether or not it was their intent to delete 250.56.
This action will be considered by the panel as a public comment.
Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Delete the section in it's entirety.
Substantiation: This section has been kicked around for several cycles now, which has everyone in the field that has any interest in it puzzled. In my research, I have found that apparently it originally appeared in the NEC in 1918 in the following form: *"The combined resistances of the ground wires and connections of any grounded circuit, equipment, or lightning arrester should not exceed 3 ohms for water pipe connections nor 25 ohms for artificial grounds where these must be used. Where, because of dry or other high resistance soils it is impracticable to obtain artificial ground resistance as low as 25 ohms, two such grounds six feet apart if practicable must be installed, and no requirements shall be made as to resistance."* I will make two observations about this section, which is the ancestor of 250.56 - it was rife with vague and unenforceable terms (practicable), and was written very softly as more of a design suggestion than a law. I also noticed that that old section contained a water pipe resistance "suggestion" as strongly worded as the 25-ohm rule. I do not know why the 3-ohm water pipe suggestion became extinct, but I believe that the time has finally come for the 25-ohm rule to follow the 3-ohm rule's lead. Previous references from that era and prior that concerned 25-ohms were strictly telegraph-related sources.

250.56 has enormous potential for misinterpretation, and rampant misunderstanding the panel's intent for allowing it to remain. Some view it as a requirement for the grounding electrode system at a structure to have no more than 25 ohms resistance to earth overall, which the panel has made clear it does not intend. Quite often, inspectors who enforce this rule won't even allow its literal execution - inspectors know as well as anyone else that the resistance of a ground rod will change with the season. A ground rod driven after a nice spring rain will have a lower resistance than it would later in the year when the soil dries further. So, if a fellow drives a rod and claims it has 23 ohms to earth the inspector may disregard the results as seasonal and require the second rod anyway.

There is a fundamental lack of logic that surrounds this section, and it is readily evident. The problem is, if the panel continues to ignore this fundamental problem with this article it simply compounds the confusion and frustration users of the NEC may have when using this very important book. If one person's attention to the NEC is drawn to a very important bonding requirement in this article instead of puzzling and wasting time over this ancient oddity, then that is progress. That could be a life saved, instead of another frustrated student throwing down the book in disgust with the sentiment that the NEC is just a complicated book full of secret handshakes to keep them from passing a state test.

Two rods at 5,000,000 ohms resistance to earth are not better at directing lightning towards the earth than one ground rod at 30 ohms. There are two choices: reject this proposal, and secure the profit margin of the ground rod producing industry, or accept the proposal and be done with this requirement once and for all. I ask that in the event the panel rejects this proposal, please substantiate your response with a solid defense of this section beyond a weak: "This section has been successfully used for years." A nation of tired, panting, ground rod driving installers and a broader audience of inspectors, engineers and whoever else I left out are anxious to understand what we're not seeing that you folks are. I appreciate your time, and your efforts to clean up 250.

One more thing: The panel has effectively brought UFER to life in 2005-and it will continue to do more for us than just another rod.

Panel Meeting Action: Accept in Principle

Panel Statement: CMP-5 has received proposals related to this section over several revision cycles. The common thread that resonates in the substantiation for this proposal and some of the past proposals is that the current text of Section 250.56 is confusing and can result in misapplication of the requirement. At this point CMP-5 has concluded that the substantiation accompanying any of these proposals does not warrant complete removal of the long-standing 25 ohm requirement from the code. To that end, the panel has relocated the 25 ohm provision from Section 250.56 to an exception in a revised Section 250.53(A) covering the installation requirements for rod, pipe, and plate grounding electrodes. This relocation and revision should resolve many of the usability concerns cited in this and other proposals. See the panel action on Panel Proposal 5-169a.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRETT, JR., M.: Reference to 5-169A should be made in panel action to direct the submitter to the panel proposal where the change occurred. However, I do not believe this adds clarity. See my comment on voting in 5-175

5-177 Log #587 NEC-P05 **Final Action: Reject**
(250.56, FPN)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission, James Moore

Recommendation: Revise text to read as follows:

~~The paralleling efficiency of rods longer than 2.5 m (8 ft) is improved by spacing greater than 1.8 m (6 ft).~~

The paralleling efficiency of rods is increased by spacing adjacent rods by a distance equal to twice the length of a single rod. Where the rods are not of the same length, the spacing of the paralleled rods shall be permitted to be based at twice the length of the longer rod.

Substantiation: The sphere of influence or relative earth cylinder or earth shell of a single rod is determined by the driven depth of the rod. No other rod should occupy this shell. Therefore, where it is possible to provide this spacing, the overall resistance to ground of the paralleled rods would be approximately half that of a single rod. I have seen certain local authorities require a 6 foot spacing between rods and this is certainly a misinterpretation of this concept.

Panel Meeting Action: Reject

Panel Statement: The panel has relocated the provisions of this section to 250.53(A). The proposed FPN contains a permissive requirement that does not meet the requirements of the NEC Style Manual. The fine print note offers information on how to improve the efficiency beyond the minimum established by the requirement, but the exact separation is a design consideration.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

JOHNSTON, M.: The concepts provided in this proposal are technically accurate and should be accepted in principle and relocated to 250.53(A) as indicated in the action by CMP-5. The proposed text should be revised to address the NEC Style Manual concerns in the Panel statement.

5-178 Log #661 NEC-P05 **Final Action: Reject**
(250.58, FPN (New))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission

Recommendation: Add new text to read as follows:

FPN: See 250.188(E) for information on isolating the grounding electrode for portable or mobile high-voltage equipment.

Substantiation: This purposeful and important isolation of this specific grounding electrode is an exception to the general concept of intersystem bonding in order to reduce the effects of voltage differences among various systems.

Panel Meeting Action: Reject

Panel Statement: Section 250.200 already states that all the requirements in Article 250, Parts I to IX apply unless modified or supplemented by requirements in Part X. Section 250.188(E) provides such a modification.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-179 Log #1516 NEC-P05 **Final Action: Accept**
(250.60)

Submitter: Mark S. Harger, Harger Lightning & Grounding / Rep. BICSI

Recommendation: Revise text to read as follows:

250.60 Use of ~~Air Terminals~~ Strike Termination Devices.

~~Air terminal~~ conductors and driven pipes, rods, or plate electrodes used for grounding strike termination devices ~~air terminals~~ shall not be used in lieu of the grounding electrodes required by 250.50 for grounding wiring systems and equipment. This provision shall not prohibit the required bonding together of grounding electrodes of different systems.

FPN No. 1: See 250.106 for spacing from ~~air terminals~~ strike termination devices. See 800.100(D), 810.21(J), and 820.100(D) for bonding of electrodes.

FPN No. 2: Bonding together of all separate grounding electrodes will limit potential differences between them and between their associated wiring systems.

Substantiation: NFPA 780, Standard for the Installation of Lightning Protection Systems, 2008, Section 3.3.24 defines a strike termination device as a component of a lightning protection system that intercepts lightning flashes and connects them to a path to ground. Strike termination devices include air terminals, metal masts, permanent metal parts of structures as described in Section 4.9, and overhead ground wires installed in catenary lightning protection systems. By using this term "air terminal", one could interpret that ground electrodes used for strike termination devices other than ones used for air terminals could be used in lieu of the grounding electrodes required by 250.50, thus, creating a safety issue.

Also see my Proposal on 250.106.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-180 Log #2672 NEC-P05 **Final Action: Accept in Part**
(250.62)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

The grounding electrode conductor shall be of copper, aluminum, or copper-clad aluminum. The material selected shall be resistant to any corrosive conditions existing or likely to exist at the installation or shall be ~~suitably~~ protected against corrosion by identified means. The conductor shall be solid or stranded, insulated, covered, or bare. Insulated or covered conductors shall be identified in accordance with 250.119.

Exception No. 1: Where installed as a single isolated insulated or covered conductor 250.119 shall not apply.

Exception No. 2: Where installed in cable tray identification shall be at intervals acceptable to the authority having jurisdiction.

Substantiation: Corrosion resistance requirement should apply where the condition does not exist at time of installation but is likely to occur. "Suitably" is subjective and a term to be avoided per the Style Manual. The grounding electrode conductor may be installed in enclosures or cable tray with other conductors and should then be identified. A voltage or continuity test of such conductor run with other conductors may suggest it is a grounded circuit conductor which may be tapped. If identified with green marking it would identify the conductor as suitable for connection of an equipment grounding conductor, as permitted elsewhere.

Panel Meeting Action: Accept in Part

The panel accepts only the portion of the recommendation to delete "suitably" and rejects the remainder of the recommendation.

Panel Statement: The substantiation does not support the remainder of the technical changes contained in the recommendation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-181 Log #2676 NEC-P05 **Final Action: Accept in Part**
(250.62)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The grounding electrode conductor shall be of copper, aluminum, or copper-clad aluminum. The material selected shall be resistant to any corrosion condition existing or likely to exist at the installation or shall be ~~suitably~~ protected against corrosion by identified means (remainder unchanged).
Substantiation: Edit. Corrosion may not exist at time of installation but may be likely thereafter. "Suitably" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Accept in Part
The panel accepts only the portion of the recommendation to delete "suitably" and rejects the remainder of the recommendation.
Panel Statement: The future condition of "likely to exist" is undefined and subjective, which leads to inconsistent enforcement. No substantiation was provided on what "identified means" is when referring to corrosion protection. The panel notes that the term "corrosive" was changed to "corrosion" in the recommendation without any substantiation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-182 Log #3538 NEC-P05 **Final Action: Accept in Principle**
(250.62)

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
250.62 Grounding Electrode Conductor Material.
(A) Wire or Busbar. The grounding electrode conductor shall be of copper, aluminum, or copper-clad aluminum. The material selected shall be resistant to any corrosive condition existing at the installation or shall be suitably protected against corrosion. The conductor shall be solid or stranded, insulated, covered, or bare.
(B) Water Pipe. Interior metal water piping located within 1.52 m (5 ft) from the point of entrance to the building shall be permitted to be used as a grounding electrode conductor or as a conductor to interconnect electrodes that are part of the grounding electrode system.
Exception: If procedures, acceptable to the authority having jurisdiction, are maintained to ensure only qualified persons service and maintain the installation in industrial, commercial, and institutional buildings or structures, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a grounding electrode conductor or as a conductor to interconnect electrodes that are part of the grounding electrode system, if the entire length of the metal water pipe is exposed other than short sections passing perpendicularly through walls, floors, or ceilings.
(C) Structural Metal. The metal frame of a building or structure that is a grounding electrode or is bonded as provided in 250.104(C) shall be permitted as a grounding electrode conductor for separately derived systems or to interconnect grounding electrodes described in 250.52(A)(1), (A)(3), (A)(4), (A)(5), (A)(6), (A)(7) and (A)(8).
Substantiation: Material and concepts from 250.52(A)(1) has been relocated to create 250.62(B) as the material is more appropriate here as the water pipe located above the earth is not a grounding electrode but may act as a grounding electrode conductor and may be suitable for interconnecting other grounding electrodes.
Text is proposed to allow the metal frame of a building or structure to be used as a grounding electrode conductor and to interconnect other grounding electrodes as this is an appropriate use for the structural metal.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 5-212.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

(Note: Sequence 5-183 and 5-184 and be found on page 274)

5-185 Log #3915 NEC-P05 **Final Action: Accept in Principle**
(250.64)

Submitter: David A. Williams, Delta Township
Recommendation: Revise text as follows:
250.64 Grounding Electrode Conductor Installation.
Grounding electrode conductors at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at separately derived system shall be installed as specified in 250.64(A) through (F). The grounding electrode conductor shall not also be used for another conductor.
Substantiation: The Code does not prohibit you from using the grounding electrode conductor to also function as an equipment grounding conductor. The grounding electrode conductor serves a specific purpose and has installation requirements that would normally make this type of installation prohibited. The use of the grounding electrode conductor for equipment grounding has been attempted in the past and often leads to code violations due to the installation requirements of the GEC.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 5-259.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-186 Log #4407 NEC-P05 **Final Action: Reject**
(250.64)

Submitter: Dean Hunter, Hunter Electric
Recommendation: Add the following new text:
250.64(G) Indentification. Grounding electrode conductors that are covered or insulated shall be identified at all termination points at the time of installation with a distinctive green marking. The marking shall encircle the conductor.
Substantiation: This is identification used for equipment grounding conductors and commonly used to identify grounding electrode conductors - though it is not required. With the great work done in the 2008 cycle to "clean up" not only the language of grounding but to eliminate the inappropriate (and inadvertenet) re-grounding the neutral conductor a requirement to identify the grounding electrode conductor is necessary.
Panel Meeting Action: Reject
Panel Statement: The technical substantiation provided does not support a mandatory identification requirement for the grounding electrode conductor. The NEC does not prohibit identification in accordance with 250.119.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-187 Log #1290 NEC-P05 **Final Action: Reject**
(250.64(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of first sentence:
...or where likely to be subject to corrosive conditions.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any technical substantiation to support such a change. The future condition of "likely to be" is undefined and subjective, which leads to inconsistent enforcement.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BOWMER, T.: Agree with rejection and panel substantiation. An alternate language is offered to change the part of the sentence in question from "... where subject to corrosive conditions" to "...where corrosive conditions are possible".

5-188 Log #3054 NEC-P05 **Final Action: Accept**
(250.64(A))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(A) Aluminum or Copper-Clad Aluminum Conductors. Bare aluminum or copper-clad aluminum grounding electrode conductors shall not be used where in direct contact with masonry or the earth or where subject to corrosive conditions. Where used outside, aluminum or copper-clad aluminum grounding electrode conductors shall not be terminated within 450 mm (18 in.) of the earth.
Substantiation: The fact that this rule is found in 250.64 implies that it applies only to grounding electrode conductors. The text of the rule, however, states that it applies to any grounding conductor.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-189 Log #322 NEC-P05 **Final Action: Reject**
(250.64(B))

Submitter: Alan Chech, Alan Chech Electrical Seminars
Recommendation: Add new text to read as follows:
...grounding electrode conductors smaller than 6 AWG shall be in RMC, IMC, RNC (intended for the use), EMT, or cable armor.
Substantiation: The presently conflicts with 352.12(F) and 300.5(D)(4). Be consistent. Use PVC 80.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not support the proposed change as Section 352.12(F) relates to the use of PVC conduit in theaters, and Section 300.5 does not apply as it regulates underground installations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-190 Log #1266 NEC-P05 **Final Action: Reject**
(250.64(B))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
250.64 (B) **Securing and Protection Against Physical Damage.** Where exposed, a grounding electrode conductor or its' enclosure shall be securely fastened to the surface on which it is carried. A ~~4~~ 6 AWG or larger copper or aluminum grounding electrode conductor shall be protected where exposed to physical damage. A 6 AWG that is exposed to physical damage, or an 8 AWG grounding electrode conductor ~~that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection where it is securely fastened to the construction; other wise, it~~ shall be in rigid metal conduit, intermediate metal conduit, ~~rigid non-metallic conduit~~ PVC conduit, electrical metallic tubing, or cable armor. ~~Grounding electrodes smaller than 6 AWG shall be in rigid metal conduit, intermediate metal conduit, rigid non-metallic conduit, electrical metallic tubing, or cable armor.~~
Substantiation: We feel that 250.64 (B) as written is too repetitive and confusing. A more concise wording that meets the intent of the article is needed.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation is provided to support removing the allowance of a 6 AWG to be installed without protection only if securely fastened to the construction. The recommendation does not improve the understanding of this section. There is no technical substantiation provided to limit the use of rigid nonmetallic conduit to Type PVC only. See the panel action on Proposal 5-195.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-191 Log #2414 NEC-P05 **Final Action: Reject**
(250.64(B))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follows:
It shall be in rigid metal conduit, intermediate metal conduit, rigid ~~nonmetallic~~ PVC conduit.
Substantiation: Conforming to style manual Article 352.
Panel Meeting Action: Reject
Panel Statement: There is no technical substantiation provided to limit the use of rigid nonmetallic conduit to Type PVC only. See the panel action on Proposal 5-195.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-192 Log #2682 NEC-P05 **Final Action: Reject**
(250.64(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
INSTALLATION. Grounding electrode conductors shall be installed in identified nonflexible raceways or enclosures.
Exception No. 1: Where direct buried or encased in concrete or masonry.
Exception No. 2: Where installed as open aerial conductors or part of open wiring on insulators.
Exception No. 3: Where fished between access points through concealed spaces in finished buildings or structures.
Exception No. 4: Where installed as armored ground wire.
Exception No. 5: Flexible nonmetallic conduit shall be permitted where not likely to be subject to physical damage.
Exception No. 6: Where installed in cable trays.
Exception No. 7: As part of a messenger supported wiring system.
Exception No. 8: A 6 AWG or larger grounding electrode conductor shall be permitted without a raceway, enclosure, or armor, where not likely to be subject to physical damage. Where not fished, direct buried, encased in concrete or masonry, installed in raceways, not installed as aerial conductors or open wiring on insulators, or in cable trays, grounding electrode conductors shall be securely fastened to supports at intervals not exceeding 1.8 m (6 ft).
Substantiation: Proposal covers possible installation scenarios. Fastening and support should be specified as is done for other wiring and conductors. Where installed in conduit or tubing support is covered by the raceway article.
Panel Meeting Action: Reject
Panel Statement: The proposed revision with eight exceptions does not improve clarity or increase usability.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-193 Log #2963 NEC-P05 **Final Action: Reject**
(250.64(B))

Submitter: James A. Burch, City of Glendale, Arizona
Recommendation: Revise as follows:
(B) ~~Securing and~~ Protection Against Physical Damage.
~~Where exposed, a~~ A grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. ~~A 4 AWG or larger copper or aluminum grounding electrode conductor shall be protected where exposed to physical damage. A 6 AWG grounding electrode conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection where it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Grounding electrode conductors smaller than 6 AWG~~ A grounding electrode conductor where not concealed and protected by building construction shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor.
Substantiation: Due to the increase in theft, conductors should not be routed exposed. Theft of the grounding electrode conductors creates a significant safety issue. Numerous news articles across the country and instances within my own jurisdiction have caused us to add an amendment to require the concealing or protection of grounding electrode conductors.
Panel Meeting Action: Reject
Panel Statement: The recommended installation method is not prohibited by the code. The substantiation does not support the technical changes.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-194 Log #3539 NEC-P05 **Final Action: Accept in Principle**
(250.64(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action with respect to the provisions of this proposal that are included in the panel action on Proposal 5-195.
This action will be considered by the panel as a public comment.
Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
(B) Securing and Protection Against Physical Damage. If ~~Where~~ exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. Grounding electrode conductors shall be permitted to be installed on or through framing members. A 4 AWG or larger copper or aluminum grounding electrode conductor shall be protected if ~~where~~ exposed to physical damage. A 6 AWG grounding electrode conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection if ~~where~~ it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor. Grounding electrode conductors smaller than 6 AWG shall be protected in rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, electrical metallic tubing, or cable armor.
Substantiation: This proposal intends to clarify that it is permitted to route grounding electrode conductors through or on framing members. Without this provision being specifically stated, some enforcement authorities are prohibiting such installations.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Other changes are intended to be editorial.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 5-195.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
BRENDER, D.: It does not appear the Panel action on Proposal 5-195 included the concepts contained in this proposal as included in the Panel Statement on both proposals.
Comment on Affirmative:
HAMMEL, D.: See my comment on proposal 5-195.

5-195 Log #4740 NEC-P05 **Final Action: Accept in Principle**
(250.64(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with respect to the provisions of Proposal 5-194 that have been included.
This action will be considered by the panel as a public comment.
Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
250.64 Grounding Electrode Conductor Installation.
Grounding electrode conductors at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system shall be installed as specified in 250.64(A) through (F).
(B) Securing and Protection Against Physical Damage. Where exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. A 4 AWG or larger copper or aluminum grounding electrode conductor shall be protected where exposed to physical damage. A 6 AWG grounding electrode conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building

construction without metal covering or protection where it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid ~~nonmetallic~~ <u>polyvinyl chloride</u> conduit <u>(PVC), reinforced thermosetting resin conduit (RTRC)</u>, electrical metallic tubing, or cable armor. Grounding electrode conductors smaller than 6 AWG shall be in rigid metal conduit, intermediate metal conduit, rigid ~~nonmetallic~~ <u>polyvinyl chloride</u> conduit<u>(PVC), reinforced thermosetting resin conduit (RTRC)</u>, electrical metallic tubing, or cable armor.

Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of "nonmetallic" and add in each of the specific raceway types as acceptable for protection of grounding electrode conductor as limited by the conditions of the articles.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

250.64 Grounding Electrode Conductor Installation.

Grounding electrode conductors at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system shall be installed as specified in 250.64(A) through (F).

(B) Securing and Protection Against Physical Damage. Where exposed, a grounding electrode conductor or its enclosure shall be securely fastened to the surface on which it is carried. A 4 AWG or larger copper or aluminum grounding electrode conductor shall be protected where exposed to physical damage. A 6 AWG grounding electrode conductor that is free from exposure to physical damage shall be permitted to be run along the surface of the building construction without metal covering or protection where it is securely fastened to the construction; otherwise, it shall be in rigid metal conduit, intermediate metal conduit, rigid ~~nonmetallic~~ <u>polyvinyl chloride</u> conduit <u>(PVC), reinforced thermosetting resin conduit (RTRC)</u>, electrical metallic tubing, or cable armor. Grounding electrode conductors smaller than 6 AWG shall be in rigid metal conduit, intermediate metal conduit, rigid ~~nonmetallic~~ <u>polyvinyl chloride</u> conduit <u>(PVC), reinforced thermosetting resin conduit (RTRC)</u>, electrical metallic tubing, or cable armor.

Panel Statement: The panel accepts the recommendation and has included the provisions from the recommendation in Proposal 5-194. Additionally the panel action clarifies the acceptable types of nonmetallic conduits that can be used to meet the requirements of this provision.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

HAMMEL, D.: The Panel Statement for proposal 5-194 is: See the panel action and statement on Proposal 5-195. For some reason, the changes from proposal 5-194 were not included in the official NFPA report of the actions on proposal 5-195.

JOHNSTON, M.: Continue to accept the proposed revisions and restructure the section into a list format to improve clarity and usability.

5-196 Log #3540 NEC-P05 **Final Action: Accept in Principle**
(250.64(D))

Submitter: Phil Simmons, Olympia, WA

Recommendation: Revise text to read as follows:

(D) Service with Multiple Disconnecting Means Enclosures. <u>If</u> ~~Where~~ a service consists of more than a single enclosure as permitted in 230.71(A), grounding electrode connections shall be made in accordance with (D)(1), (D)(2), or (D)(3).

(1) <u>Common</u> Grounding Electrode Conductor <u>and</u> Taps. ~~Where the service is installed as permitted by 230.40, Exception No. 2,~~ <u>A</u> common grounding electrode conductor and grounding electrode conductor taps shall be installed. The common grounding electrode conductor shall be sized in accordance with 250.66, based on the sum of the circular mil area of the largest ungrounded service-entrance conductor(s). <u>If</u> ~~Where~~ the service-entrance conductors connect directly to a service drop or service lateral, the common grounding electrode conductor shall be sized in accordance with Table 250.66, Note 1.

A tap <u>grounding electrode</u> conductor shall extend to the inside of each service disconnecting means enclosure. The grounding electrode conductor taps shall be sized in accordance with 250.66 for the largest <u>service-entrance</u> conductor serving the individual enclosure. The tap conductors shall be connected to the common grounding electrode conductor by <u>one of the following methods</u> ~~exothermic welding or with connectors listed as grounding and bonding equipment~~ in such a manner that the common grounding electrode conductor remains without a splice or joint<u>:</u>

<u>(a) exothermic welding</u>

<u>(b) connectors listed as grounding and bonding equipment</u>

<u>(c) connections to an aluminum or copper busbar not less than 6 mm × 50 mm (¼ in. × 2 in.). The busbar shall be securely fastened and shall be installed in an accessible location. Connections shall be made by a listed connector or by the exothermic welding process. If aluminum busbars are used, the installation shall comply with 250.64(A).</u>

Substantiation: CMP-5 added a great deal of clarity by adding this subsection in the 2008 NEC. Several proposed changes are intended to be editorial. The phrase, "Where the service is installed as permitted by 230.40, Exception No. 2" is not necessary as the concept is included in the opening paragraph.

The most significant change intends to allow the busbar method of connection of the common and tap grounding electrode conductors as provided in 250.30(A)(4) and 250.64(F). This proposal also puts the options for making the connections in list form which is easier to read and thus is user-friendly.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle

Revise the first sentence of the second paragraph of the recommendation to read:

A ~~tap~~ grounding electrode conductor <u>tap</u> shall extend to the inside of each service disconnecting means enclosure.

The remainder of the recommendation is accepted as submitted.

Panel Statement: The revision provides consistency.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-183 Log #3805 NEC-P05 **Final Action: Accept in Principle**
(250.64(D)(1))

Submitter: Michal Hofkin, Middle Atlantic Inspections

Recommendation: Add language to the end of 250.62(D)(1) after the words "...conductor remains without a splice or joint." as follows: <u>The equipment grounding conductor serving a load-side panelboard, disconnect, switchboard, or similar equipment shall not be used as a grounding electrode conductor tap or to otherwise extend the grounding electrode conductor.</u>

Substantiation: Due to a long held belief and misconception that a connection to a busbar under a binding screw is not a "splice" and therefore complies with 210.65(C), many electricians and inspectors believe that a grounding electrode conductor can be run to a load-side panelboard (subpanel). Since the connection on the busbar in that panelboard is not, in their view, a splice, they consider the grounding electrode conductor to be continuous. They then permit the use of the equipment grounding conductor serving the panelboard as an extension or tap to carry the grounding electrode conductor to the system grounded conductor in the service disconnect.

The equipment grounding conductor should not serve simultaneously as a grounding electrode conductor. If this practice is permitted, then we are inviting lightning strikes and/or over voltages to travel along feeder wiring, increasing the chance of a fire and/or damage to the structure or wiring.

By adding this sentence, it would be clear that this practice is not permitted, thus leading to safer electrical installation.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action on Proposal 5-259.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-184 Log #4386 NEC-P05 **Final Action: Accept in Principle**
(250.64(D)(1))

Submitter: Michal Hofkin, Middle Atlantic Inspections

Recommendation: Add language to the end of 250.62(D)(1) after the words "…conductor remains without a splice or joint." as follows:

<u>The equipment grounding conductor serving a load-side panelboard, disconnect, switchboard, or similar equipment shall not be used as a grounding electrode conductor tap or to otherwise extend the grounding electrode conductor.</u>

Substantiation: Due to a long held belief and misconception that a connection to a busbar under a binding screw is not a "splice" and therefore complies with 210.64(C), many electricians and inspectors believe that a grounding electrode conductor can be run to a load-side panelboard (subpanel). Since the connection on the busbar in that panelboard is not, in their view, a splice, they consider the grounding electrode conductor to be continuous. They then permit the use of the equipment grounding conductor serving the panelboard as an extension or tap to carry the grounding electrode conductor to the system grounded conductor in the service disconnect.

The equipment grounding conductor should not serve simultaneously as a grounding electrode conductor. If this practice is permitted, then we are inviting lightning strikes and/or over voltages to travel along feeder wiring, increasing the chance of a fire and/or damage to the structure or wiring.

By adding this sentence, it would be clear that this practice is not permitted, thus leading to safer electrical installations.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action on Proposal 5-259.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-197 Log #1287 NEC-P05 **Final Action: Reject**
(250.64(E))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise last sentence:

Where a raceway is used ~~as protection for~~ <u>to enclose</u> a grounding electrode conductor <u>or a bonding conductor</u>, the installation shall comply with the <u>applicable provisions</u> ~~requirements~~ of the appropriate raceway article <u>including conductor fill</u>.

Substantiation: Bonding conductors should be included. Raceway conductor fill requirements are often overlooked where a grounding electrode conductor or bonding conductor is the only conductor installed in a raceway. Compliance with provisions which are not requirements, per se should be noted.
Panel Meeting Action: Reject
Panel Statement: There is no technical substantiation provided to indicate that a single grounding electrode conductor in a raceway has a heating issue to limit fill. There was no substantiation to change the word "requirements" to "applicable provisions". The requirements of Section 250.53(C) indicate that the bonding jumper shall comply with Section 250.64(E).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-198 Log #1728 NEC-P05 **Final Action: Reject**
(250.64(E))

Submitter: Michael Gregory Owen, Electrical Training & Consulting Service
Recommendation: Revise text to read as follows:
~~Ferrous~~ Metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to the cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. ~~Nonferrous metal~~ Non-metallic enclosures shall not be required to be ~~electrically~~ physically continuous. ~~Ferrous~~ Metal enclosures that are not physically continuous…". Bonding shall apply at each end to all intervening ~~ferrous~~ metal raceways, boxes, and…".
Substantiation: Whether or not the enclosures or raceways are constructed of IRON is not of significance. Any conductive metal raceway or enclosure will be affected by the AC magnetic field created by current flowing thru the GEC. An induced voltage is not dependent upon iron raceways, merely conductive raceways. Relative motion between an alternating magnetic field and any conductive material will produce an induced voltage and a resulting current flow. Such a current flow may affect the impedance of the grounding electrode conductor.
Panel Meeting Action: Reject
Panel Statement: The magnetic interaction of the conductor within ferrous raceways and enclosures is understood. There is no technical substantiation that other than ferrous metal raceways and enclosures have resulted in problems with operation of the grounding electrode conductor and that "current flow may be affected".
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-199 Log #3541 NEC-P05 **Final Action: Accept**
(250.64(E))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
(E) Enclosures for Grounding Electrode Conductors. Ferrous metal enclosures for grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. Nonferrous metal enclosures shall not be required to be electrically continuous. Ferrous metal enclosures that are not physically continuous from cabinets or equipment to the grounding electrode shall be made electrically continuous by bonding each end of the raceway or enclosure to the grounding electrode conductor. Bonding methods in compliance with 250.92(B) for installations at service equipment locations and with 250.92(B)(2) through (B)(4) for other than service equipment locations shall apply at each end and to all intervening ferrous raceways, boxes, and enclosures between the cabinets or equipment and the grounding electrode. The bonding jumper for a grounding electrode conductor raceway or cable armor shall be the same size as, or larger than, the enclosed grounding electrode conductor. If ~~Where~~ a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.
Substantiation: The reference to 250.92(B) for bonding methods ensures proper methods are used for the bonding of the ferrous metal enclosures for grounding electrode conductors.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-200 Log #4881 NEC-P05 **Final Action: Reject**
(250.64(E))

Submitter: Peter D. Novak, Jr., Philadelphia, PA
Recommendation: Revise text as follows:
~~Ferrous~~ Metal Enclosures. For grounding electrode conductors shall be electrically continuous from the point of attachment to cabinets or equipment to the grounding electrode and shall be securely fastened to the ground clamp or fitting. ~~Nonferrous metal enclosures shall not be required to be electrically continuous. Ferrous~~ Metal enclosures that are not physically continuous from cabinets or equipment to the grounding electrode shall be made electrically continuous by bonding each end of the raceway or enclosure to the grounding electrode conductor. Bonding shall apply at each end and to all intervening ~~ferrous~~ metal raceways, boxes, and enclosures between the cabinet or equipment and the grounding electrode. The bonding jumper for a grounding electrode raceway or cable armor shall be the same size, or larger than, the enclosed grounding electrode conductor. Where a raceway is used as protection for a grounding electrode conductor, the installation shall comply with the requirements of the appropriate raceway article.
Substantiation: Under certain conditions, unbonded sections of electrically conductive metal raceways, fittings, and enclosures may be subjected to arcing, resulting in a potential fire hazard.
This wold be the case whether ferrous or nonferrous metal is involved. The proposed revision to text eliminates this concern where nonferrous metal is utilized for grounding electrode conductor installations.
Panel Meeting Action: Reject
No substantiation has been provided indicating there is a problem with arcing if nonferrous enclosures for grounding electrode conductors are not bonded at both ends.
Panel Statement: See the panel action and statement on Proposal 5-198.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-201 Log #2731 NEC-P05 **Final Action: Reject**
(250.64(F)(4))

Submitter: James A. Burch, City of Glendale, Arizona
Recommendation: Add paragraph (4) as follows:
(4) Grounding electrode conductor(s) shall not be routed within the same raceway as premises wiring except within the enclosure where the connection to grounded conductor is made.
Substantiation: Routing of a grounding electrode conductor with premises wiring may subject the wiring systems to over voltages created by the utility or lightning.
The Code does not restrict the routing of the GEC. If raceways are bonded at both ends, the Code, as now written, is complied with. If raceways are ferrous, most induced lightning current and associated voltage stress is routed along the outside of the raceway and may protect any conductors inside the raceway but if PVC or aluminum raceways are used any conductors will be subject to high voltage stress possibly damaging the cable as well as any equipment served by the conductors.
Panel Meeting Action: Reject
Panel Statement: There was no documented evidence in the substantiation that a problem exists with the current requirements covering the routing of the grounding electrode conductor.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-202 Log #349 NEC-P05 **Final Action: Accept**
(250.64(F)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "per" to "in accordance with".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-203 Log #2314 NEC-P05 **Final Action: Reject**
(250.64(F)(3))

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add to end of (F)(3)... Where the busbar is not within sight of the service equipment, the location of the busbar shall be indicated by signs at each service location of the busbar shall be indicated by signs at each service location and the busbar shall be labeled 'SYSTEM GROUNDING BUS'
Substantiation: Where buildings are of sufficient size to require multiple services or where additions result in a new service or new grounding arrangements, the grounding electrode system could have connections in out-of-the-way places that may be inadvertently disconnected. This change will help prevent that possibility and make it easier to find the busbar when it's installed remote from the service location.
Panel Meeting Action: Reject
Panel Statement: No substantiation is provided to support that there is a problem, only the possibility of a problem.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-204 Log #662 NEC-P05 **Final Action: Reject**
(250.64(G))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
Grounding electrode conductors shall not be any longer than necessary and shall avoid unnecessary bends.
Substantiation: The length of the grounding electrode conductor is directly related to voltage drop and the resultant voltage rise above. Earth potential on systems and equipment, and, in order to limit the conductor impedance under lightning conditions, unnecessary and especially sharp bends must be avoided.
Panel Meeting Action: Reject
Panel Statement: The terms "longer than necessary" and "unnecessary bends" are subjective and difficult to enforce in a consistent manner.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-205 Log #472 NEC-P05 **Final Action: Reject**
(Table 250.66)

Submitter: Michael Mercer, Electrical Workers - JATC - LU26
Recommendation: Revise text to read as follows:
Table 250.66 Grounding Electrode Conductor, Grounded Conductor, and Main Bonding Jumper for Alternating-Current Systems Size of Grounding Electrode Conductor, Grounded Conductor, and Main Bonding Jumper (AWG/kcmil).
Substantiation: Clarify the use, application and purpose of Table 250.66 MBJ size referred to Table 250.66 from 250.28(D). Grounded Conductor referred to Table 250.66 from 250.24(c)(1) Routing & Sizing.
Panel Meeting Action: Reject
Panel Statement: The title of the table is appropriate based on its location in the code. There are code rules that are clear where Table 250.66 is used for sizing conductors or jumpers other than grounding electrode conductors, but these rules also have additional provisions that require sizes that exceed the parameters of Table 250.66. The proposed text does not add clarity and could easily lead to confusion resulting in undersized grounded conductors, system bonding jumpers, and main bonding jumpers.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-206 Log #1724 NEC-P05 **Final Action: Reject**
(Table 250.66)

Submitter: Ronald E. Hackett, Village of Buffalo Grove / Rep. NE Surburban IAEI
Recommendation: Add new text as follows:
Table 250.66 Minimum Size Grounding Electrode Conductor for Alternating-Current Systems.
Substantiation: Article 250 includes two important tables concerning sizing a particular grounding conductor. Table 250.122 Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment and Table 250.66 Grounding Electrode Conductors for Alternating-Current Systems. When we view the heading for Table 250.122, we know that this is the minimum size EGC. When we view the heading for Table 250.66, it does not specify minimum size GEC. Looking only at the table headings, one may ascertain that one table is the minimum size and the other is not. Therefore, is Table 250.66 the minimum or maximum GEC? There is confusion in the field. As an AHJ, I have been told repeatedly that Table 250.66 is the maximum size GEC or that a 3/0- kcmil conductor is the largest GEC ever required per NEC. Many code articles written on sizing the GEC tells the reader that the 3/0 copper conductor is the largest conductor ever required.
Please see the documentation I have provided.
Documentation No. 1.
A letter from an engineering firm indicating their position on sizing the GEC. This letter confirms the error that is made when applying Table 250.66. The letter goes on saying that Table 250.66 indicates the largest ground conductor to be 3/0. "We have done hundreds of jobs in the Chicago land area and across the country and to our knowledge this is the only community or state that has required a ground wire larger than 3/0".
Clarification of Table 250.66 is much needed. This documentation clearly shows confusion when applying Table 250.66. An engineering firm is designing the grounding electrode system based on their expertise that Table 250.66 is the maximum GEC. Their error is then translated to the electrician and inspector who will refer to the drawings during the construction of project. This has a twinkle down effect.
There is substantial documentation concerning accidents and equipment failures due to improper grounding. A function of the GEC is to provide a low-impedance connection from earth to the neutral as a return path for current. Connecting the electrical system to the earth helps to limit the voltage potential between the equipment and earth. Electrical equipment may be subjected to damage or danger from outside forces, such as lightning, line surges or inadvertent contact from high voltage to low voltage lines.
If the size of the grounding electrode conductor is taken as the maximum size required; the grounding electrode conductor may not be properly sized and, thus, may not be able to withstand the maximum current that may likely be imposed upon it. For safety, consistency, and clarification, the NEC must make it clear that Table 250.66 is the minimum size GEC and be consistent with the existing language already present in Table 250.122.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The title of the table is appropriate and is intended for grounding electrode conductors. The recommended text does not add clarity and the rules are found in Section 250.66, which requires the grounding electrode conductor to be sized not less than shown in Table 250.66. Several of the submitter's assertions on the function of the grounding electrode conductor are technically incorrect. The requirement of Section 250.66 and Table 250.66 is that 3/0 AWG copper or 250 kcmil aluminum is the largest size grounding electrode conductor required by the NEC.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
HARDING, G.: Continue to reject the proposal. The submitter has not provided any evidence of an actual problem or failure in the field. As indicated by the panel statement, the technical substantiation provided contains errors regarding the function of the grounding electrode conductor. The function of the equipment grounding conductor (Table 250.122) is not the same as the grounding electrode conductor (Table 250.66). There is no technical reason to have the language of the two tables match together.

5-207 Log #2769 NEC-P05 **Final Action: Reject**
(Table 250.66)

Submitter: Larry Cross, Local Union #98 IBEW
Recommendation: Add Notes to Table 250.66 as follows:
Note 3 250.24(C)(1) Grounded Conductor brought to service equipment routing and sizing.
Note 4 250.28(D)(1) Main bonding jumper and system bonding jumper size.
Note 5 250.30(A)(8)(a) Grounded conductor routing and sizing
Substantiation: The identification of the Grounded Conductor, the Main Bonding Jumper and the System Bonding Jumper is Non-Existent in the Table 250.66. This is a violation of the NEC Style Manual 3.3 Writing Style and 2.3 Table and Figures. The 3 Notes must be addressed and added to Table 250.66.
Panel Meeting Action: Reject
Panel Statement: The recommended notes do not provide clarity for code users. A user would have needed to review the referenced sections in order to be directed to the table. The panel concludes that the existing table is clear. The table is referenced in text conforming to Section 2.3.1 of the NEC Style Manual. There are current code rules that are clear where Table 250.66 is used for sizing conductors or jumpers other than grounding electrode conductors.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-208 Log #253 NEC-P05 **Final Action: Reject**
(Table 250.66 and Table 250.122)

Submitter: Jay L. Breneman, Netzsch Fine Particle Technology
Recommendation: Add new text as follows:
Change Table 250.66 Grounding Electrode Conductor for Alternating Current Systems to match Table 250.122 Minimum Size of Equipment Grounding Conductors for Grounding Raceway and Equipment.
Or err on the side of caution and have Table 250.122 values match Table 250.66.
Or a fine print note to explain the "why" of the different values of each table.
Substantiation: Using an example and the tables listed above will show the discrepancy in size from the Grounding Electrode Conductor and the Equipment Grounding Conductor.
A service entrance is protected with a single means of disconnect.
The service entrance conductors are copper, parallel 500 kcm per phase.
Using Table 250.66, the minimum size grounding electrode conductor should be 2/0 copper. Table 310.16 THHN, 75 deg. C column rates 2/0 copper at 175 Amps.
The service entrance disconnect rated at 800 Amps and feeds a distribution panel.
Using Table 250.122, the equipment grounding conductor for equipment protected at 800 Amps is 1/0 copper. Table 310.16 THHN, 75 deg. C column rates 1/0 copper at 150 Amps.
This is used to provide a ground path to earth ground which is the grounding electrode conductor.
Even using a larger service with a single means of disconnect to a distribution panel, the same discrepancy exists.
Using a 1800 Amp service, the service entrance conductors are 4 750 kcm per phase.
In this case, the Table 250.66 is not used, but the sum of the largest phase conductor times 12.5%.
This will equate to 3000 kcm ×.125 to equal 375 kcm. Since 375 kcm is not a standard wire size, the next highest size 400 kcm is used. Table 310.16 THHN, 75 deg. C column rates 400 kcm copper at 335 Amps.

Again, the service disconnect feeds a distribution panel, the value of the equipment grounding conductor per Table 250.122 is 250 kcm, using the value of 2000 Amps. Table 310.16 THHN, 75 deg. C column rates 250 kcm copper at 255 Amps.

The confusion is the grounding electrode conductor and service bonding jumper are larger than the equipment grounding conductor for the same size conductors feeding the service as well as feeding a distribution panel of the same amperage and conductors on the load side of the main service disconnect.

A fine print note explaining the difference in simple English may suffice. I cannot think of a logical reason for the difference in the "ground wire" sizes, as electricity will take the easiest path to ground as quick as it becomes available. If a smaller wire is sufficient in one table, why is it not sufficient to carry the same load to the grounding electrode, and be also used for the service entrance bonding jumper?

This confusion was noted at an NFPA 70 2008 Code update seminar during the discussion of Article 250. The instructors were very knowledgeable. However, the above question was posed when those in attendance were asked to do an example similar to the above examples. There was no good logical explanation for the difference in wire sizes. Those of us in the field need one.

Panel Meeting Action: Reject

Panel Statement: Tables 250.66 and 250.122 provide different sizing requirements that are related to the performance of various conductors of the grounding and bonding system depending on the location of overcurrent protective devices. Line-side conductors and jumpers are sized different than load-side because of conductor withstand capabilities and overcurrent protection clearing times. Substantiation has not been provided indicating that the minimum values in Table 250.122 are inadequate.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-209 Log #1723 NEC-P05 **Final Action: Reject**

(Table 250.66, FPNs No. 1 and 2 (New))

Submitter: Ronald E. Hackett, Village of Buffalo Grove / Rep. NE Surburban IAEI

Recommendation: Add new text as follows:

<u>FPN. No 1: 250.66 Table 250.66 is based on 100-foot runs. The National Electrical Code does not limit the length of a grounding electrode conductor. The length restrictions found in Article 800 is not applicable for a grounding electrode conductor.</u>

<u>FPN. No. 2: The grounding electrode conductor may be larger than the value found in table 250.66 due to the length of this conductor.</u>

Substantiation: Fine print notes assist the user of the NEC by providing helpful information concerning the interpretation of how to apply the NEC rules. Fine print notes also raise the level of awareness concerning a particular issue. This is evident when reading 310.10, FPN No. 2 of the 2005 NEC, 250.20(D), and FPN No. 1 and 800.100(4) FPN from 2008 NEC.

Whether it's guidance addressing the adverse effects on the conductors on rooftops where there is not enough reliable data at the time of print, or assistance on determining when an electrical system is separately derived. More specific, 800.100(4) FPN offers an awareness to why the grounding conductor for the primary protector is required to be as short as practicable. This fine print note makes an awareness and understanding to a grounding conductor's length. A precedent has been established. We need similar awareness for Table 250.66. Fact of the matter is that these fine print notes enhance or bring a higher level of awareness in applying NEC code requirements. A key point to make is, the fine print notes are not a design specification.

The purpose of the NEC per 90.1 is the practical safeguarding of persons and property from the hazards arising from the use of electricity. As one can see, the fine print notes listed above aid and assist the user of the NEC on achieving the objective of 90.1.

In order to apply Table 250.66, one should be made aware as to how the values shown are derived. This is the benchmark or foundation of this table. Confusion is present because the foundation of this table is unstable and not understood. This problem can be corrected by informing the user of the NEC that the table is based on 100-foot runs. Please note that the proposal is not asking for some kind of formula. Only making an important awareness as to the fact that this table is based on 100-foot runs.

With the tremendously important performance function of the grounding electrode conductor, additional clarification is required. In many applications per 250.52(A)(1) – (8), the only grounding electrode that is most commonly present in a building or structure is the metal underground water pipe. This includes new and existing installations. It may include a new electrical service or a separately derived system(s).

The problem that arises is that the existing metal underground water pipe may be hundreds of feet away. There is an erroneousness assumption that the grounding electrode conductor is required to be kept short in length. This assumption in part may be due to the grounding requirements found in Article 800. In this section, it is understood why the grounding conductor is required to be as short as possible.

It's not unrealistic to be confronted with a grounding electrode (metal pipe) over 400 feet away and the building steel/metal frame of the building within 25-feet of the equipment (electrical service or separately derived system(s)) that is to be grounded. Where the requirements found in 250.52(A)(2) are not met, one should not be using the metal frame of the building as a grounding electrode. Where this is proposed to be done or is already done, the only substantiation offered is that the metal frame of the building is closer. Grounding to the nearest building steel is still prevalent. The misconception is that building steel (not meeting the requirements of 250.52(A)(2) is a better grounding electrode than the metal underground pipe because it is closer. The NEC needs to make it clear that the code does not limit the length of a grounding electrode conductor.

In the NEC, Table 250.66 is used in determining the size of the GEC. For example, when you have over 1100 kcmil of conductors and the length of the GEC is over 400 ft. Table 250.66 shows a 3/0 copper conductor. The majority of the time, if not in all cases, a 3/0 -kcmil copper conductor or a 250- kcmil aluminum conductor is interpreted and communicated as to the largest GEC ever required by the NEC. As it is currently shown, some clarification is required in applying this table as intended. As an AHJ, I witness first hand the many, many misapplications of this table.

Is this 3/0 copper GEC going to provide a low impedance path in carrying out its performance function in relation to its length? Are we providing an inferior level of safety for equipment and personnel concerning the function and purpose of the grounding electrode? There is documentation concerning the safety aspect of this conductor.

Past NEC clarifications have had a positive effect on both the interpretation and the installation of the electrical system. For instance, Code Section, 250.50(A)(2) Metal Frame of Building or Structures. This section now provides guidelines for building steel concerning the grounding electrode system. With this helpful clarification, in the past or under earlier editions of the NEC the building steel was used for the grounding electrode system when it should not have been. This was a huge clarification for the purpose of safeguarding persons and property from potential hazards.

The guidelines make it clear when building steel can be used as a grounding electrode which should be differentiated from the grounding electrode conductor. The above proposal will help clarify this.

The evolution of the NEC depends on the code making process. This process involves the clarification to existing and new code requirements. The code making process is an on-going process. Clarifications found in the 2008 NEC will lead to additional clarifications in subsequent NEC editions. This all helps the usability of the code. The clarification may be in the form of a Fine print note or actual code language.

For many reasons, including safety and usability, the NEC needs to include the above mentioned proposal. The NEC should make aware that the GEC depending upon its length may be larger than the values shown in Table 250.66. If we adhere to the status quo, than Table 250.66 should read the Maximum Grounding Electrode Conductor for Alternating-Current Systems. If Table 250.66 is intended to be the minimum Grounding Electrode Conductor for Alternating-Current Systems, then it should be clearly stated on the heading of the table. In addition, the FPN should be added to address the length of the GEC in relation to the table. This would only bring awareness to an area that the NEC should not remain silent on. This proposal is not a design specification for there are different methods to install this conductor.

Please see the documentation I have provided.

<u>Document No. 1.</u>

A plan review response letter from an engineering firm (Name of firm withheld). The letter expresses their understanding of the NEC and more specifically 250.50 and 250.66. The letter explains their position on the GEC where the AHJ has increased the size of this conductor. The AHJ was requesting a larger GEC than specified due to the overall length of this conductor was shown to be 550 ft. The firm indicates in the letter that the largest size ground wire per NEC is a 3/0 copper conductor. "The sizing of these electrode conductors is based on Table 250.66 of the NEC which indicates the largest ground conductor to be 3/0."

I would ask, is this the intent of Table 250.66? At the very least, this firm indicates that they have done extensive work in the Chicago area and across the nation. This statement is an eye opener for misapplication of Table 250.66. This is a nation wide problem and not just a local issue. If the design engineers misinterpret Table 250.66, how can you expect the AHJs or electricians to understand it?

<u>Document No. 2.</u>

Soars Book on Grounding and Bonding, 9th Ed, pg. 129.

Over 100-foot Grounding Electrode Conductor.

Reading this information from Soars concerning a GEC over 100 ft, an understanding on where the sizes shown in Table 250.66 are derived. For example, looking at Table 250.66 and selecting a #8 copper wire. Applying information from the Soars, this # 8 copper conductor has a voltage drop of 30 volts. 16510 CirMils @ short time ratings of 391 amps and a dc resistance of.778 (stranded conductor) ohms for 100 ft, results in a voltage drop of 30 volts. As shown in Table 250.66, a # 8 copper conductor would be acceptable. This formula is applied for the remaining sizes shown in Table 250.66. At this time, Table 250.66 appears to be the largest GEC ever required. When using the NEC, there is a lack of awareness on the subject concerning a GEC over 100 ft.

The Soars Book has invaluable information on grounding and bonding. However, do all engineers, AHJs or electricians have access to this book? No, and this is the point. Most significantly, where a disagreement occurs in the plan review stage or in the field, our guidance must be sought through the NEC. This is the document that the installation is based on. This is the document that is accessible. When push comes to shove, an AHJ is not standing on solid ground when an attempt is made to reference the Soars Book because the NEC has no information on this topic. The NEC Handbook has no information on this.

Document No. 3.

Soars Book on Grounding and Bonding, 9th Ed, pg. 113.

Chapter 7, Grounding Electrode Conductors. The title page to this chapter indicates that GEC is not required to exceed 3/0 AWG copper or 250- kcmil aluminum. Again, this causes conflict. The person reading this sees that the GEC is not required to exceed 3/0 AWG copper. This is misleading and causes misapplication in the field where the GEC has a length longer than 100-ft.

Document No. 4.

An excerpt from an article from EC Magazine. This question was submitted during the 1999 NEC. The question concerns a GEC with a distance of 180 ft. The AHJ had requested a larger conductor then specified in Table 250.66.

The question was answered by explaining the information found in the Soars Book on the GEC over 100 ft. However, the referenced code sections shown at the bottom of the excerpt are really elusive and do not directly give you the correct code section. That is because; there is currently no code section. An AHJ has an obligation to present a code reference when called to do so.

In conclusion, in order to align the horse in front of the cart, a clarification in the form of awareness is very much needed. This question goes all the way back to the 1999 NEC. The result of this lack of information within the NEC on this topic is simple. The thinking in the field is, a 3/0 copper conductor is the largest conductor required, that's it. Think about it, this question goes all the way back to the 1999 NEC. It is time to address this subject. It has to be addressed in the NEC first and then educational materials or educational seminars can then follow. This will put the horse where it belongs, in front of the cart. At this time, the cart is in front of the horse.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-206.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-210 Log #559 NEC-P05 **Final Action: Reject**
(250.66(B))

Submitter: James W. Moore, Samaritan's Purse World Medical Mission, Gregory P. Bierals

Recommendation: Revise text to read as follows:

Where the grounding electrode conductor is connected to a concrete-encased electrode as permitted in 250.52(A)(3), that portion of the conductor that is the sole connection to the grounding electrode shall not be required to be larger than 4 AWG copper wire. This conductor shall be extended from this connection to an additional electrode(s) to protect the concrete from damage associated with ground-seeking current.

FPN: See IEEE F77-115-9.

Substantiation: Concrete footings may be damaged by lightning and other fault currents. Heat associated with these currents may cause the rapid expansion of moisture that has been absorbed by the concrete and possibly cause damage to the footing. The connection to the additional grounding electrode(s) will provide another path to the earth instead of flowing solely through the absorbed moisture.

Panel Meeting Action: Reject

Panel Statement: No substantiation has been provided to support revision or to indicate that concrete footings (concrete-encased electrodes) are being damaged by lightning events.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-211 Log #323 NEC-P05 **Final Action: Reject**
(250.66(D))

Submitter: Marc R. Hurwitz, James Posey Associates

Recommendation: Add new text to read as follows:

(D) No Larger than Ungrounded Conductors.

In no case shall the grounding electrode conductor be required to be larger than the ungrounded conductors for the AC system.

Substantiation: There is no purpose served by having the grounding electrode conductor be larger than the phase conductors. I run into this situation where I have a 9-KVA transformer providing power for a small 120/208-V load and use #10 conductors with a #8 grounding electrode conductor.

Panel Meeting Action: Reject

Panel Statement: Grounding electrode conductors are sometimes subject to stresses imposed by lightning or unintentional contact with higher voltage lines. The substantiation provided does not support that a reduced size grounding electrode conductor would be adequate when subject to those conditions warranting a change. This conductor has a different function than the circuit conductors.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-212 Log #4013 NEC-P05 **Final Action: Accept in Principle**
(250.68(C) (New))

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Add new text as follows:

(C)(C) Grounding Electrode Conductor and Bonding Jumper Connection Locations

Grounding electrode conductors and bonding jumpers shall be permitted to be connected to the following locations and be used to extend the connection to an electrode(s):

(1) Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a conductor to interconnect electrodes that are part of the grounding electrode system.

Exception: In industrial, commercial, and institutional buildings or structures where conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a conductor to interconnect electrodes that are part of the grounding electrode system, provided that the entire length, other than short sections passing perpendicularly through walls, floors, or ceilings, of the interior metal water pipe that is being used for the conductor is exposed.

(2) The structural frame of a building as follows:

(a) Connecting the structural metal frame to the reinforcing bars of a concrete-encased electrode as provided in 250.52(A)(3) or ground ring as provided in 250.52(A)(4)

(b) Bonding the structural metal frame to one or more of the grounding electrodes as defined in 250.52(A)(5) or (A)(7) that comply with 250.56

(c) Other approved means of establishing a connection to earth

Substantiation: This text is being proposed as being deleted from 250.52 and relocated here because items that are not in the earth should not be considered to be electrodes but can be used as a conductor to create a path to the electrode.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(C) Grounding Electrode Conductor and Bonding Jumper Connection Locations.

Grounding electrode conductors and bonding jumpers shall be permitted to be connected at ~~to~~ the following locations and be used to extend the connection to an electrode(s):

(1) Interior metal water piping located not more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted to ~~not~~ be used as a conductor to interconnect electrodes that are part of the grounding electrode system.

Exception: In industrial, commercial, and institutional buildings or structures ~~where~~ if conditions of maintenance and supervision ensure that only qualified persons service the installation, interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall be permitted as a bonding conductor to interconnect electrodes that are part of the grounding electrode system, or as a grounding electrode conductor, provided that the entire length, other than short sections passing perpendicularly through walls, floors, or ceilings, of the interior metal water pipe that is being used for the conductor is exposed.

(2) The structural frame of a building as follows:

(a) By connecting the structural metal frame to the reinforcing bars of a concrete-encased electrode as provided in 250.52(A)(3) or ground ring as provided in 250.52(A)(4)

(b) By bonding the structural metal frame to one or more of the grounding electrodes as defined in 250.52(A)(5) or (A)(7) that comply with 250.56

(c) By other approved means of establishing a connection to earth

Revise the first sentence of Section 250.68(C) to read:

The connection of a grounding electrode conductor at the service, at each building or structure where supplied by a feeder(s) or branch circuit(s), or at a separately derived system and associated bonding jumper(s) shall be made as specified in 250.68(A) ~~and~~ through (~~B~~C).

Panel Statement: Editorial revisions have been made for clarity. The first sentence of Section 250.68 has been revised to reflect the added subdivision. See the panel action and statement on Proposal 5-170.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-213 Log #588 NEC-P05 **Final Action: Reject**
(250.70)

Submitter: Stephen Yates, Mesa, AZ

Recommendation: Add new text as follows:

250.70 – New wording not more than one conductor shall be connected to the grounding electrode by a single clamp or fitting unless the clamp is listed for multiple conductors.

Revise – not more than one conductor shall be connected to grounding electrode by a single clamp or mechanical lug or fitting unless the clamp or fitting is listed for multiple conductors.

Substantiation: Just because a mechanical lug is rated for example #6 thru 250 mcm, that is the size of wire it can accommodate not how may wires you can install in the same lug but not going over the total circular mills.

Panel Meeting Action: Reject

Panel Statement: The current requirement already specifies what is being recommended in the proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-214 Log #166 NEC-P05 **Final Action: Accept**
(250.70(3))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "telecommunications" to "communications".
Substantiation: Changing "telecommunications" to "communications" will correlate with Article 800, Communications Circuits.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-215 Log #2660 NEC-P05 **Final Action: Reject**
(250.71 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:

<u>250.XX IDENTIFICATION. Insulated or covered grounding electrode conductors installed in a cable tray and not in a raceway or cable armor, or installed in a raceway or other enclosure with other circuit conductors shall be identified by tagging or other effective means acceptable to the authority having jurisdiction at every point where the conductor is accessible. Where installed as part of an open wiring on insulators installation or open overhead spans other means of identification acceptable to the authority having jurisdiction shall be provided.</u>
<u>Exception: Identification shall not be required in conduit bodies that have no unused hubs.</u>

Substantiation: The Code does not prohibit installation in cable trays, raceways or enclosures with other conductors. Without identification a simple test can indicate it is a grounded circuit conductor and tapped as such.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation or field evidence of a problem was provided to require identification.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-216 Log #3400 NEC-P05 **Final Action: Reject**
(250.80)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

250.80 Service Raceways and Enclosures. Metal enclosures and raceways for service<u>-entrance</u> conductors and equipment shall be connected to the grounded system conductor if the electrical system is grounded or to the grounding electrode conductor for electrical systems that are not grounded.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-217 Log #4741 NEC-P05 **Final Action: Accept**
(250.80 Exception)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:

250.80 Service Raceways and Enclosures.
Exception: A metal elbow that is installed in an underground installation of rigid ~~nonmetallic~~ <u>polyvinyl chloride</u> conduit <u>(PVC) or reinforced thermosetting resin conduit (RTRC)</u> and is isolated from possible contact by a minimum cover of 450 mm (18 in.) to any part of the elbow shall not be required to be connected to the grounded system conductor or grounding electrode conductor.

Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of "nonmetallic" and add in each of the specific raceway types as acceptable for service raceways as limited by the conditions of the articles.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-218 Log #3430 NEC-P05 **Final Action: Reject**
(250.86)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

250.86 Other Conductor Enclosures and Raceways. Except as permitted by 250.112(I), metal enclosures and raceways for other than service<u>-entrance</u> conductors shall be connected to the equipment grounding system conductor.
(The Exceptions to remain unchanged.)

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-219 Log #1288 NEC-P05 **Final Action: Accept in Part**
(250.86, Exceptions No. 2 and No. 3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add to *Exception No. 2:*
Raceway conductor fill requirements (shall) (shall not) apply.
Revise *Exception No. 3:*
... where installed in a run of nonmetallic raceway.
Substantiation: Proposal is intended to clarify whether fill requirements are intended to apply. Metal elbows are not generally installed IN a nonmetallic raceway.
Panel Meeting Action: Accept in Part
The panel accepts the recommended text for Exception No. 3 and rejects the remainder of the recommendation.
Panel Statement: The first portion of the recommendation for Exception No. 2 is not accepted because conductor fill requirements are not within the scope of this article.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-220 Log #2574 NEC-P05 **Final Action: Reject**
(250.86 Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Except as required elsewhere in this Code short sections of metal enclosures or raceways used to...(remainder unchanged)
Substantiation: Edit to correlate with 334.115(C) which requires grounding for short sections of raceways.
Panel Meeting Action: Reject
Panel Statement: The panel assumes the submitter meant to refer to Section 334.15(C) in the substantiation. Section 334.15(C) is a specific grounding and bonding requirement that is addressed within the prescriptive language of that section. The proposed revision does not add clarity or improve the usability of the current wording of this exception.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-221 Log #3409 NEC-P05 **Final Action: Reject**
(250.92(A))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
250.92(A) Bonding of Services. The non-current-carrying metal parts of equipment indicated in 250.92(A)(1) and (A)(2) shall be bonded together.
(1) The service raceways, cable trays, cablebus framework, auxiliary gutters, or service-entrance cable armor or sheath except as permitted in 250.84
(2) All service enclosures containing service-entrance conductors, including metal fittings, boxes, or the like, interposed in the service raceway or armor.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-222 Log #3542 NEC-P05 **Final Action: Accept**
(250.92(A))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
(A) Bonding of Equipment for Services. The normally non–current-carrying metal parts of equipment indicated in ~~250.92~~(A)(1) and (A)(2) shall be bonded together.
(1) All ~~The~~ ~~service~~ raceways, cable trays, cablebus framework, auxiliary gutters, or service cable armor or sheath that enclose, contain or support service conductors except as permitted in 250.80 ~~250.84~~
(2) All ~~service~~ enclosures containing service conductors, including meter fittings, boxes, or the like, interposed in the service raceway or armor
Substantiation: The title is changed to recognize it is not the "service" that is required to be bonded but equipment for services. The word "normally" is proposed in (A) as the metal parts of equipment required to be bonded do not normally carry current but only during a ground-fault. Editorial changes are proposed for (A)(1) and (A)(2) and the reference is corrected to 250.80. The word "service" is proposed to be deleted in (A)(2) as it is not needed and is incorrect as self-contained meter fittings included in the list are not considered service equipment. See 230.66.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-223 Log #695 NEC-P05 **Final Action: Accept in Part**
(250.92(B))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
250.92 Services.
(A) Bonding of Services. *[unchanged by this Proposal]*
(B) Method of Bonding at the Service. Electrical continuity at service equipment, service raceways, and service conductor enclosures shall be ensured by one of the following methods:
(1) Bonding equipment to the grounded service conductor in a manner provided in 250.8
(2) Connections utilizing threaded couplings or threaded bosses on enclosures where made up wrenchtight
(3) Threadless couplings and connectors where made up tight for metal raceways and metal-clad cables
(4) Other listed devices, such as bonding-type locknuts, bushings, or bushings with bonding jumpers
Bonding jumpers meeting the other requirements of this article shall be used around oversized, concentric, or eccentric knockouts that are punched or otherwise formed so as to impair the electrical connection to ground. Standard locknuts or bushings shall not be the sole means for the bonding required by this section.
FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.
Substantiation: As reflected in 250.97 Exception, 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C), oversized knockouts can also impair the electrical connection to ground, as can concentric and eccentric knockouts. Inclusion of oversized knockouts here provides consistency with these other requirements.
The FPN is added [as I am proposing separately for 250.97 Exception, 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C)] because "oversized knockouts" are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.
Panel Meeting Action: Accept in Part
The panel accepts the addition of the word "oversized" in Section 250.92(B). The panel does not accept the recommended fine print note.

Panel Statement: The fine print note cites only one example of an oversized knockout, and other conditions exist under which an oversized knockout may occur.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-224 Log #3429 NEC-P05 **Final Action: Reject**
(250.92(B))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
250.92(B) Method of Bonding at the Service. Electrical continuity at service equipment, service raceways, and service-entrance conductor enclosures shall be ensured by one of the following methods:
(1) Bonding equipment to the grounded service-entrance conductor in a manner provided in 250.8 (The remainder of the text of 250.92(B) to remain unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-225 Log #3533 NEC-P05 **Final Action: Accept in Principle**
(250.92(B))

Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise the existing text of the 2008 NEC as follows:
(B) Method of Bonding at the Service. Bonding jumpers meeting the requirements of this article shall be used around impaired connections such as reducing washers or concentric or eccentric knockouts. Standard locknuts or bushings shall not be the only means for the bonding required by this section but are permitted to be installed to make a mechanical connection of the raceway(s).
Electrical continuity at service equipment, service raceways, and service conductor enclosures shall be ensured by one of the following methods:
(1) Bonding equipment to the grounded service conductor in a manner provided in 250.8
(2) Connections utilizing threaded couplings or threaded hubs ~~bosses~~ on enclosures if ~~where~~ made up wrenchtight
(3) Threadless couplings and connectors if ~~where~~ made up tight for metal raceways and metal-clad cables
(4) Other listed devices, such as bonding-type locknuts, bushings, or bushings with bonding jumpers
~~Bonding jumpers meeting the other requirements of this article shall be used around concentric or eccentric knockouts that are punched or otherwise formed so as to impair the electrical connection to ground. Standard locknuts or bushings shall not be the sole means for the bonding required by this section.~~
Substantiation: It is proposed to reorganize this section to improve the syntax. The proposal also intends to simplify the requirements. Finally, the proposal intends to prevent reducing washers from being used at these connections of circular raceways containing service-entrance conductors without a positive bonding connection. Keep in mind, the conductors contained in these raceways do not have overcurrent protection and positive bonding is essential for safety. Electricians who have installed reducing washers recognize that they rarely make a reliable connection that is capable of carrying the fault current. No regulations exist in the NEC for installing reducing washers. For example, nothing in the NEC prevents them from being installed on top of concentric or eccentric knockouts or on top of painted surfaces. Section 250.12 does deal with connection surfaces as does 250.96(A).
It is proposed that the sentences on bonding jumpers and on standard locknuts be relocated for improved organization and readability.
Finally, the word “where” is being replaced with “if” where appropriate to comply with Section 3.3.4 of the NEC Style Manual.
Panel Meeting Action: Accept in Principle
Revise the first paragraph of the recommendation to read:
(B) Method of Bonding at the Service. Bonding jumpers meeting the requirements of this article shall be used around impaired connections such as reducing washers or oversized, concentric, or eccentric knockouts. Standard locknuts or bushings shall not be the only means for the bonding required by this section but shall be permitted ~~are~~ to be installed to make a mechanical connection of the raceway(s).
Accept the remainder of the recommendation.
Panel Statement: The panel action incorporates the action on Proposal 5-223. Editorial revisions have been made to comply with the NEC Style Manual.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-225a Log #CP507 NEC-P05 **Final Action: Accept**
(250.94)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
An intersystem bonding termination for connecting intersystem bonding and grounding electrode conductors required for other systems shall be provided external to enclosures at the service equipment and at the disconnecting means for any additional buildings or structures. The intersystem bonding termination shall be accessible for connection and inspection. The intersystem bonding termination shall have the capacity for connection of not less than three intersystem bonding conductors. The intersystem bonding termination device shall not interfere with opening a service or metering equipment enclosure. The intersystem bonding termination shall be one of the following:
Substantiation: The revision has been made to correlate with the deletion of the term “Grounding Conductor” in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term “grounding conductor” from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman’s report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term “grounding conductor.”

5-226 Log #2239 NEC-P05 **Final Action: Accept**
(250.94)

Submitter: Gregory J. Steinman, Thomas & Betts Corporation
Recommendation: Revise 250.94 as follows:
250.94 Bonding for Other Systems. An intersystem bonding termination for connecting intersystem bonding and grounding conductors required for other systems shall be provided external to enclosures at the service equipment or metering equipment enclosure and at the disconnecting means for any additional buildings or structures. The intersystem bonding termination shall be accessible for connection and inspection. The intersystem bonding termination shall have the capacity for connection of not less than three intersystem bonding conductors. The intersystem bonding termination device shall not interfere with opening a service or metering equipment enclosure. The intersystem bonding termination shall be one of the following:
(the remainder of article unchanged).

Substantiation: There has been some confusion that the intersystem bonding termination cannot be applied to a metering equipment enclosure since 230.66 states that individual meter socket enclosures shall not be considered service equipment.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DOBROWSKY, P.: Adding metering equipment enclosure is appropriate. The panel should make 250.142 Ex. match this language related to the use of the term "metering".

5-227 Log #3055 NEC-P05 **Final Action: Reject**
(250.94)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
250.94 Bonding for Other Systems.
An intersystem bonding termination for connecting intersystem bonding and grounding conductors required for other systems shall be provided external to enclosures <u>near</u> ~~at~~ the service equipment and at or <u>near</u> the disconnecting means for any additional buildings or structures.
<u>Exception: An intersystem bonding termination shall not be required for buildings or structures that do not require a grounding electrode system.</u>
The intersystem bonding termination shall be accessible for connection and inspection. The intersystem bonding termination shall have the capacity for connection of not less than three intersystem bonding conductors. The intersystem bonding termination device shall not interfere with opening a service or metering equipment enclosure. The intersystem bonding termination shall be one of the following:
(1) A set of terminals securely mounted <u>and electrically connected</u>, to the ~~to the meter enclosure and electrically connected to the~~ meter enclosure or <u>service equipment</u>. The terminals shall be listed as grounding and bonding equipment.
(2) A bonding bar near the service equipment enclosure, meter enclosure, or raceway for service conductors. The bonding bar shall be connected with a minimum 6 AWG copper conductor to an equipment grounding conductor(s) in the service equipment enclosure, meter enclosure, or exposed nonflexible metallic raceway.
(3) A bonding bar near the grounding electrode conductor. The bonding bar shall be connected to the grounding electrode conductor with a minimum 6 AWG copper conductor.
Exception: In existing buildings or structures where any of the intersystem bonding and grounding conductors required by 770.93, 800.100(B), 810.21(F), 820.100(B), 830.100(B) exist, installation of the intersystem bonding termination is not required. An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be permitted at the service equipment and at the disconnecting means for any additional buildings or structures by at least one of the following means:
(1) Exposed nonflexible metallic raceways
(2) An exposed grounding electrode conductor
(3) Approved means for the external connection of a copper or other corrosion-resistant bonding or grounding conductor to the grounded raceway or equipment
FPN No. 1: Text to remain unchanged.
FPN No. 2: Text to remain unchanged.
Substantiation: CMP-5 did the industry a great service in revising 250.94 for the last code cycle. A few questions that come up, however, are:
1) Does every building need the termination, and
2) Can the termination be at the meter or at the disconnect (refer to Article 100 for the confusion).
This proposal is intended to answer these questions. A correlating proposal to the Article 100 definition of the Intersystem Bonding Termination will be made to address the meter vs. disconnect issue.
Panel Meeting Action: Reject
Panel Statement: The word "near" is identified as a word that should not be used based on the NEC Style Manual. It is subjective and leads to inconsistent enforcement. The proposed exception should not be accepted because the exception in 250.32 could be modified by the requirements in Chapter 8 to install an electrode where one does not exist for use with limited energy systems in or on the separate building or structure. This could happen even if only one branch circuit is supplying the building or structure. See the panel action on Proposal 5-226.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-228 Log #3621 NEC-P05 **Final Action: Reject**
(250.94)

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
The intersystem bonding termination shall be <u>on the exterior side of the building and be</u> one of the following:
Substantiation: The termination of the intersystem bonding needs to be on the outside of the building because most communication companies, cable TV companies, and dish installers do not go into the home. Their point of demarcation ends outside of the building. If a provision for this termination is not on the outside of the building. it may not get connected.
Panel Meeting Action: Reject
Panel Statement: There are many installations where the telephone and cable service demarcation points are inside the building or structure served. There is no technical substantiation to require the intersystem bonding terminal to always be installed outside.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-229 Log #3861 NEC-P05 **Final Action: Reject**
(250.94)

Submitter: Mike Theisen, Midwestern Electrical Seminars
Recommendation: Revise text as follows:
250.94 Bonding for Other System. An intersystem bonding termination for connecting intersystem bonding and grounding conductors required for other systems shall be provided external to enclosures at the service equipment <u>in a building</u> and at the disconnecting means for any additional buildings ~~or structures~~. The intersystem bonding termination shall be accessible for connection and inspection. The intersystem bonding termination shall have the capacity for connection of not less than three intersystem bonding conductors. The intersystem bonding termination device shall not interfere with opening a service or metering equipment enclosure. The intersystem bonding termination shall be one of the following:
Substantiation: The addition of 'in a building' adds a condition to when a service installation requires the intersystem bonding termination. A free standing outdoor service is a structure that has no need for CATV etc. By deleting the term 'structure', the intersystem bonding termination will not be required at a structure. A roadside billboard is a structure, a grain bin is a structure, and a backboard for an RV service is a structure. Buildings are the most likely locations to be served by CATV, telephone, or fire alarm systems and should be the only locations requiring the intersystem bonding termination.
Panel Meeting Action: Reject
Panel Statement: There are many structures that have multiple services of power and communications equipment. The intersystem bonding terminal does not need to always be in the building.
Structures such as billboards may well have multiple systems feeding them such as electric power for display, telephone, or optical fiber telecommunications lines to communicate and change message, antenna systems for wireless communications, CCTV surveillance, and security systems. For such systems appropriate intersystem bonding is required. See the panel action and statement on Proposal 5-228.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-230 Log #1115 NEC-P05 **Final Action: Accept in Principle**
(250.94 FPN No. 2)

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
FPN No. 2: See 800.100, 810.21, ~~and~~ 820.100<u>, and 830.100</u> for <u>intersystem</u> bonding and grounding requirements for communications circuits, radio and television equipment, ~~and~~ CATV circuits<u>, and network-powered broadband communications systems</u>.
Substantiation: The reference to 830 should be added as it is part of the communications articles of Chapter 8. It apparently was not picked up when 830 was added a number of revision cycles ago. The addition of the term "intersystem" is appropriate as it is intersystem bonding and grounding that is the subject of 250.94.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-232 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-230a Log #CP508 NEC-P05 **Final Action: Accept**
(250.94 Exception)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
Exception: In existing buildings or structures where any of the intersystem bonding and grounding <u>electrode</u> conductors required by 770.93, 800.100(B), 810.21(F), 820.100(B), 830.100(B) exist, installation of the intersystem bonding termination is not required. An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be permitted at the service equipment and at the disconnecting means for any additional buildings or structures by at least one of the following means:
(1) Exposed nonflexible metallic raceways
(2) An exposed grounding electrode conductor
(3) Approved means for the external connection of a copper or other corrosion-resistant bonding or grounding <u>electrode</u> conductor to the grounded raceway or equipment.

Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-231 Log #1114 NEC-P05 **Final Action: Accept in Principle**
(250.94 Exception)

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
"*Exception: In existing buildings or structures where any of the intersystem bonding and grounding ~~conductors~~ means required by ~~770.93~~ 770.100(B)(2), 800.100(B)(2), 810.21(F)(2), 820.100(B)(2), 830.100(B)(2) exist, installation of the intersystem bonding termination is not required. An accessible means external …*".
Substantiation: The term "bonding and grounding 'means'" is appropriate in this context to correlate with the title of 770.100(B)(2), 800.100(B)(2), 810.21(F)(2), 820.100(B)(2) and 830.100(B)(2). Certain of the items contained in these sections, e.g., structure grounding electrode system, metallic service raceway, are not 'conductors', i.e., in the sense of a wire, but a conductive means to achieve intersystem bonding and grounding. The revised references reflect revisions made to 770, 800.100, 810.21(F), 820.100 and 830.100 during the 2008 revision cycle.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-232 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-232 Log #185 NEC-P05 **Final Action: Accept in Principle**
(250.94 Exception and FPN No 2)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
Exception: In existing buildings or structures where any of the intersystem bonding and grounding conductors required by 770.100(B)~~770.93~~, 800.100(B), 810.21(F), 820.100(B), 830.100(B) exist, installation of the intersystem bonding termination is not required. An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be permitted at the service equipment and at the disconnecting means for any additional buildings or structures by at least one of the following means:
(1) Exposed nonflexible metallic raceways
(2) An exposed grounding electrode conductor
(3) Approved means for the external connection of a copper or other corrosion-resistant bonding or grounding conductor to the grounded raceway or equipment.
FPN No. 1: A 6 AWG copper conductor with one end bonded to the grounded nonflexible metallic raceway or equipment and with 150 mm (6 in.) or more of the other end made accessible on the outside wall is an example of the approved means covered in 250.94, Exception item (3).
FPN No. 2: See 770.100, 800.100, 810.21, ~~and~~ 820.100 and 830.100 for bonding and grounding requirements for conductive optical fiber cables, communications circuits, radio and television equipment, and CATV circuits.
Substantiation: In the 2008 NEC, CMP 16 established grounding requirements for Article 770 in new section 770.100(B). 770.100(B) has the same requirements as 800.100(B), 820.100(B) and 830.100(B).
Panel Meeting Action: Accept in Principle
Revise 250.94 Exception and FPN No. 2 as follows:
Exception: In existing buildings or structures where any of the intersystem bonding and grounding ~~conductors~~ means required by ~~770.93~~ 770.100(B)(2), 800.100(B)(2), 810.21(F)(2), 820.100(B)(2), 830.100(B)(2) exist, installation of the intersystem bonding termination is not required. An accessible means external to enclosures for connecting intersystem bonding and grounding electrode conductors shall be permitted at the service equipment and at the disconnecting means for any additional buildings or structures by at least one of the following means:
(1) Exposed nonflexible metallic raceways
(2) An exposed grounding electrode conductor
(3) Approved means for the external connection of a copper or other corrosion-resistant bonding or grounding conductor to the grounded raceway or equipment
FPN No. 1: Text to remain unchanged.
FPN No. 2: See 770.100, 800.100, 810.21, ~~and~~ 820.100 and 830.100 for intersystem bonding and grounding requirements for conductive optical fiber cables, network-powered broadband communications systems communications circuits, radio and television equipment, and CATV circuits.
Panel Statement: The panel accepts the recommendation and has incorporated the recommendations from Proposals 5-230 and 5-231. This action also revises code references to be more precise.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-233 Log #2759 NEC-P05 **Final Action: Accept in Principle**
(250.94(1))

Submitter: Rich Wolfe, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
(1) A set of terminals securely mounted and bonded to the meter ~~enclosure~~ or service equipment enclosure ~~and electrically connected to the meter enclosure.~~ The terminals shall be listed as grounding and bonding equipment.
Substantiation: This proposal would allow the grounding bar or listed equipment to be used on both meter and service equipment enclosures. Changing electrically connected to bonded, eliminates the interpretation that an additional connection would have to be made to meet this requirement. The listed set screw type of bar that is being used on meter enclosures is not electrically connected, but actually bonded.
Panel Meeting Action: Accept in Principle
Revise the Section 250.94(1) to read:
(1) A set of terminals securely mounted and electrically connected to the meter enclosure or service equipment enclosure. The terminals shall be listed as grounding and bonding equipment.
Panel Statement: The panel action clarifies the point of connection for the intersystem bonding termination.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-234 Log #3399 NEC-P05 **Final Action: Reject**
(250.94(2))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
250.94.
(2) A bonding bar near the service equipment enclosure, meter enclosure, or raceway for service-entrance conductors. (The remainder of the text to remain unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-234a Log #CP509 NEC-P05 **Final Action: Accept**
(250.96(A))

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
(A) General. Metal raceways, cable trays, cable armor, cable sheath, enclosures, frames, fittings, and other metal non–current-carrying parts that are to serve as <u>equipment</u> grounding conductors, with or without the use of supplementary equipment grounding conductors, shall be bonded where necessary to ensure electrical continuity and the capacity to conduct safely any fault current likely to be imposed on them. Any nonconductive paint, enamel, or similar coating shall be removed at threads, contact points, and contact surfaces or be connected by means of fittings designed so as to make such removal unnecessary.
Substantiation: The revision has been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-235 Log #2010 NEC-P05 **Final Action: Reject**
(250.97)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: For circuits over 250 volts, the electrical continuity of metal raceways, metal enclosures, and cables with metal coverings that contain conductors other than service conductors shall be provided by one or more of the methods specified for services in 250.92(B) except for (B)(1). Exception: Where oversized, concentric, or eccentric knockouts are not encountered, or where all segments of a knockout are removed and reducing washers are not used, the following methods shall be permitted:
(1) Couplings and connectors identified for the use.
(2) Two locknuts for metal raceways or metal covered cable connectors, one inside and one outside of boxes, cabinets, and other enclosures.
Substantiation: "To ground" is superfluous; since the definition of voltage to ground includes grounded and ungrounded systems. The provision should include enclosures which are not raceways or cables. "Sheath" implies other types of metal coverings are not included. Listed fittings and bonding are already covered in this article; this provision is an exception to such.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided for deleting the provision for listed boxes where the concentric or eccentric knockouts are listed for grounding and bonding over and under 250 volts. The intent of this section is to cover systems operating over 250 volts to ground.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-236 Log #3428 NEC-P05 **Final Action: Reject**
(250.97)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
250.97 Bonding for Over 250 Volts. For circuits of over 250 volts to ground, the electrical continuity of metal raceways and cables with metal sheaths that contain any conductor other than service<u>-entrance</u> conductors shall be ensured by one or more of the methods specified for services in 250.92(B), except for (B)(1).
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-237 Log #696 NEC-P05 **Final Action: Reject**
(250.97 Exception)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
250.97 Bonding for Over 250 Volts.
For circuits of over 250 volts to ground, the electrical continuity of metal raceways and cables with metal sheaths that contain any conductor other than service conductors shall be ensured by one or more of the methods specified for services in 250.92(B), except for (B)(1).
Exception: Where oversized, concentric, or eccentric knockouts are not encountered, or where a box or enclosure with concentric or eccentric knockouts is listed to provide a reliable bonding connection, the following methods shall be permitted:
(1) Threadless couplings and connectors for cables with metal sheaths
(2) Two locknuts, on rigid metal conduit or intermediate metal conduit, one inside and one outside of boxes and cabinets
(3) Fittings with shoulders that seat firmly against the box or cabinet, such as electrical metallic tubing connectors, flexible metal conduit connectors, and cable connectors, with one locknut on the inside of boxes and cabinets
(4) Listed fittings
<u>FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.</u>
Substantiation: Requirements in existing 250.97 Exception and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the knockout opening is oversized or not. "Oversized knockouts", however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-223.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-238 Log #1301 NEC-P05 **Final Action: Reject**
(250.98)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Insert "identified" between "other" and "means".
Substantiation: Edit. The means should be recognized as suitable for the use.
Panel Meeting Action: Reject
Panel Statement: There is no technical substantiation provided indicating that there is a problem with the current wording of this section. The term "other means" includes other listed or identified means as well as those methods or fittings that might not be listed or identified specifically for this use.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-239 Log #1312 NEC-P05 **Final Action: Reject**
(250.98)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"identified" between "other" and "means".
Substantiation: Edit. The means should be suitable for the use.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-238.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-240 Log #3530 NEC-P05 **Final Action: Accept in Principle**
(250.102)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal in accordance with 3.2.3 of the NEC Style Manual related to the use of acronyms.
This action will be considered by the panel as a public comment.
Submitter: Phil Simmons, Olympia, WA
Recommendation: Revise text to read as follows:
250.102 ~~Equipment~~ Bonding Jumpers.
(A) Material. ~~Equipment~~ Bonding jumpers shall be of copper or other corrosion-resistant material. A bonding jumper shall be a wire, bus, screw, or similar suitable conductor.
(B) Attachment. ~~Equipment~~ Bonding jumpers shall be attached in the manner specified by the applicable provisions of 250.8 for circuits and equipment and by 250.70 for grounding electrodes.
(C) Size — ~~Equipment~~ Bonding Jumper on Supply Side of Service. The bonding jumper shall not be smaller than the sizes shown in Table 250.66 for grounding electrode conductors. If ~~Where~~ the service-entrance phase conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area not less than 12½ percent of the area of the largest set of phase conductors except that, if ~~where~~ the phase conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of phase conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors. If ~~Where~~ the service-entrance conductors are paralleled in two or more raceways or cables, the equipment bonding jumper, where routed with the raceways or cables, shall be installed ~~run~~ in parallel. The size of the bonding jumper for each raceway or cable shall be based on the size of the service-entrance conductors in each raceway or cable.
(D) Size — Equipment Bonding Jumper on Load Side of Service. The equipment bonding jumper on the load side of the service overcurrent devices shall be sized, as a minimum, in accordance with the sizes listed in Table 250.122, but shall not be required to be larger than the largest ungrounded circuit conductors supplying the equipment and shall not be smaller than 14 AWG.
A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables if ~~where~~ the bonding jumper is sized in accordance with Table 250.122 for the largest overcurrent device supplying circuits therein.
(E) Installation. ~~The equipment~~ Bonding jumpers or conductors and equipment bonding jumpers shall be permitted to be installed inside or outside of a raceway or enclosure.
(1) Inside a Raceway or Enclosure. If installed inside a raceway, equipment bonding jumpers and bonding jumpers or conductors shall comply with the requirements of 250.119 and 250.148.
(2) Outside a Raceway or Enclosure. If ~~Where~~ installed on the outside, the length of the bonding jumper or conductor or equipment bonding jumper shall not exceed 1.8 m (6 ft) and shall be routed with the raceway or enclosure. ~~Where installed inside a raceway, the equipment bonding jumper shall comply with the requirements of 250.119 and 250.148.~~
Exception: An equipment bonding jumper longer than 1.8 m (6 ft) shall be permitted at outside pole locations for the purpose of bonding or grounding isolated sections of metal raceways or elbows installed in exposed risers of metal conduit or other metal raceway and for bonding grounding electrodes and shall not be required to be routed with a raceway or enclosure.
(3) Protection. Bonding jumpers or conductors and equipment bonding jumpers shall be installed in accordance with 250.64(A) and (B).
Substantiation: The requirements are proposed to be converted to list format for user friendliness. They are being re-organized to allow the exception to modify the portion of the rules it relates to.
The word "equipment" is proposed to be deleted as needed to comply with the definition of "Bonding Jumper" and "Equipment Bonding Jumper" in Article 100. Essentially, bonding jumpers or conductors are installed on the line or supply side of an overcurrent device and are sized on the basis of 250.102(C). Equipment bonding jumpers complete the equipment grounding conductor path and are installed on the load side of the overcurrent device and are sized on the basis of Table 250.122 and 250.102(D).
Bonding jumpers or conductors are also installed for the purpose of bonding grounding electrode conductors as required in 250.50 and covered in 250.53(C). These conductors may easily be longer than 6 ft. Articles 800, 810, 820, and 830 provide for the installation of a grounding electrode remote from the grounding electrode(s) for the power and lighting service. Should this be done, these Articles require that the communications system grounding electrode be bonded to the grounding electrode system for the electrical service. These bonding conductors are typically 20 ft or more in length. Bonding conductors installed outside the protection of a raceway or enclosure must be protected identically to the grounding electrode conductors as provided in 250.64(B).
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
(A) Material. ~~Equipment~~ Bonding jumpers shall be of copper or other corrosion-resistant material. A bonding jumper shall be a wire, bus, screw, or similar suitable conductor.
(B) Attachment. ~~Equipment~~ Bonding jumpers shall be attached in the manner specified by the applicable provisions of 250.8 for circuits and equipment and by 250.70 for grounding electrodes.
(C) Size — ~~Equipment~~ SSBJ ~~Bonding Jumper~~ on Supply Side of an Overcurrent Device ~~Service~~. The SSBJ ~~bonding jumper~~ shall not be smaller than the sizes shown in Table 250.66 for GEC ~~grounding electrode conductors~~. If ~~Where~~ the ungrounded supply ~~service-entrance phase~~ conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the SSBJ ~~bonding jumper~~ shall have an area not less than 12½ percent of the area of the largest set of ungrounded supply ~~phase~~ conductors. ~~except that,~~ If ~~where~~ the ungrounded ~~phase~~ supply conductors and the SSBJ ~~bonding jumper~~ are of different materials (copper or aluminum), the minimum size of the SSBJ ~~bonding jumper~~ shall be based on the assumed use of ungrounded ~~phase~~ conductors of the same material as the SSBJ ~~bonding jumper~~ and with an ampacity equivalent to that of the installed ungrounded supply ~~phase~~ conductors. If ~~Where~~ the ungrounded supply ~~service-entrance~~ conductors are paralleled in two or more raceways or cables, the SSBJ ~~equipment bonding jumper~~, if ~~where~~ routed with the raceways or cables, shall be installed ~~run~~ in parallel. The size of the SSBJ ~~bonding jumper~~ for each raceway or cable shall be based on the size of the ungrounded supply ~~service-entrance~~ conductors in each raceway or cable.
(D) Size — Equipment Bonding Jumper on Load Side of an Overcurrent Device ~~Service~~. The equipment bonding jumper on the load side of an ~~the service~~ overcurrent device(s) shall be sized ~~as a minimum,~~ in accordance with ~~the sizes listed in Table~~ 250.122. ~~but shall not be required to be larger than the largest ungrounded circuit conductors supplying the equipment and shall not be smaller than 14 AWG.~~
A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables if ~~where~~ the bonding jumper is sized in accordance with ~~Table~~ 250.122 for the largest overcurrent device supplying circuits therein.
(E) Installation. ~~The equipment~~ Bonding jumpers or conductors and equipment bonding jumpers shall be permitted to be installed inside or outside of a raceway or enclosure.
(1) Inside a Raceway or Enclosure. If installed inside a raceway, equipment bonding jumpers and bonding jumpers or conductors shall comply with the requirements of 250.119 and 250.148.
(2) Outside a Raceway or Enclosure. If ~~Where~~ installed on the outside, the length of the bonding jumper or conductor or equipment bonding jumper shall not exceed 1.8 m (6 ft) and shall be routed with the raceway or enclosure. ~~Where installed inside a raceway, the equipment bonding jumper shall comply with the requirements of 250.119 and 250.148.~~
Exception: An equipment bonding jumper or SBBJ longer than 1.8 m (6 ft) shall be permitted at outside pole locations for the purpose of bonding or grounding isolated sections of metal raceways or elbows installed in exposed risers of metal conduit or other metal raceway and for bonding grounding electrodes and shall not be required to be routed with a raceway or enclosure.
(3) Protection. Bonding jumpers or conductors and equipment bonding jumpers shall be installed in accordance with 250.64(A) and (B).
Panel Statement: The revisions to the recommendation have been made to incorporate the new terminology introduced by the panel action on Proposal 5-5. Other editorial revisions have been made to improve clarity. The recommendation of Proposal 5-245 has been incorporated into the panel action on Section 250.102(D) in this proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
MOHLA, D.: The title as proposed is misleading and should read "Bonding Jumper on Supply side of Overcurrent device"
As amended, the new title reads "SSBJ on Supply Side of an Overcurrent Device". and, it will be read as " *Supply Side* Bonding Jumper on the *Supply side* of Overcurrent Protection device.
It implies that SSBJ can also be used on the load side of an overcurrent device. "Section 250.102(C) also uses the acronym "SSBJ" which is defined only once in 250.30(A)(2). Use of the acronym is a new practice and will confuse the readers and reduce usability until the acronym is in general use by the industry. This may take several Code cycles. Until then, the acronym as well as the full name should be included the first time it is used at each and every new place."

5-241 Log #1273 NEC-P05 **Final Action: Reject**
(250.102(C))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
250.102(C) Add FPN following 250.102(C)
FPN: For sizing of the equipment bonding jumper for metallic raceways that enclose the grounding electrode conductor this section may need to be modified by 250.64(E).
Substantiation: When the grounding electrode conductor (GEC) is run with the service conductors between for example a meter base and the service disconnect means, a metallic raceway shall be bonded to the GEC on both ends of the raceway per 250.64(E). I have made this error and I am sure others have as well. It may not be caught every time, but this reminder may help the journeyman and authority having jurisdiction.
Panel Meeting Action: Reject
Panel Statement: The panel concludes that the recommended text does not improve understanding of this requirement.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-242 Log #3056 NEC-P05 **Final Action: Accept in Principle in Part**
(250.102(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Size — Equipment Bonding Jumper on Supply Side of Service. The bonding jumper shall not be smaller than the sizes shown in Table 250.66 for grounding electrode conductors. Where the service-entrance ~~phase~~ ungrounded conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area not less than 12½ percent of the area of the largest ~~phase~~ ungrounded conductor except that, where the ~~phase~~ ungrounded conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of ~~phase~~ ungrounded conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed ~~phase~~ ungrounded conductors.
Where the service-entrance conductors are paralleled in two or more raceways or cables, the equipment bonding jumper, where routed with the raceways or cables, shall be permitted to be run in parallel. The size of the bonding jumper for each raceway or cable shall be based on the size of the ungrounded service-entrance conductors in each raceway or cable. A single common continuous equipment bonding jumper shall also be permitted to connect two or more raceways or cables.
Substantiation: This proposal is intended to allow the very common violation of using a single bonding jumper to bond multiple raceways on the supply side of the service. It borrows language from 250.102(D), where this practice is already permitted. The proposal also changes the word "phase conductors" in a few locations to the term "ungrounded conductors", so that the defined terms of Article 100 are used in this code rule. This proposal also breaks the text up into two paragraphs for ease of reading.
Panel Meeting Action: Accept in Principle in Part
The recommendation to replace "phase" with "ungrounded" is accepted and occurs through the panel action on Proposal 5-240. The remainder of the recommendation is rejected.
Panel Statement: The provision recommended as the last sentence of this section is not prohibited by the current requirement.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-243 Log #3752 NEC-P05 **Final Action: Accept in Principle**
(250.102(C))

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise 250.102(C) as shown:
(C) Size — Equipment Bonding Jumper on Supply Side of Service or Separately Derived System. The bonding jumper shall not be smaller than the sizes shown in Table 250.66 for grounding electrode conductors. Where the ~~service-entrance~~ phase conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area not less than 12½ percent of the area of the largest phase conductor except that, where the phase conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of phase conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors. Where the ~~service-entrance~~ conductors are paralleled in two or more raceways or cables, the equipment bonding jumper, where routed with the raceways or cables, shall be run in parallel. The size of the bonding jumper for each raceway or cable shall be based on the size of the ~~service-entrance~~ largest phase conductor~~s~~ in each raceway or cable.
Substantiation: This proposal is to clean up some wording in 250.102(C) and remove the confusion created by referencing "service entrance conductors" throughout the text. 250.30(A)(2) sends the user to 250.102(C) for sizing of the equipment bonding jumper that may be installed between the separately derived system source and the first disconnecting means. However, the current text of 250.102(C) discusses only service entrance conductors in its text.
The recommended revisions will add separately derived systems to the title. In addition, the deletion of "service entrance" in three places in the text will make the text applicable to "phase conductors" which will cover both the service application and the separately derived system application.
Lastly, it is recommended that the last sentence reference the "largest phase" conductor with respect to sizing. This will cover a situation where there may be more feeder in the conduit.
Panel Meeting Action: Accept in Principle
The panel action on Proposal 5-240 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-244 Log #4014 NEC-P05 **Final Action: Accept in Principle**
(250.102(C))

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:
(C) Size — Equipment Bonding Jumper on Supply Side of ~~Service~~ an Overcurrent Device. The bonding jumper shall not be smaller than the sizes shown in Table 250.66 for grounding electrode conductors. Where the ~~service-entrance~~ supply phase conductors are larger than 1100 kcmil copper or 1750 kcmil aluminum, the bonding jumper shall have an area not less than 12½ percent of the area of the largest phase conductor except that, where the phase conductors and the bonding jumper are of different materials (copper or aluminum), the minimum size of the bonding jumper shall be based on the assumed use of phase conductors of the same material as the bonding jumper and with an ampacity equivalent to that of the installed phase conductors. Where the ~~service entrance~~ supply conductors are paralleled in two or more raceways or cables, the equipment bonding jumper, where routed with the raceways or cables, shall be run in parallel. The size of the bonding jumper for each raceway or cable shall be based on the size of the service-entrance conductors in each raceway or cable.
Substantiation: This section is referenced in other parts of the NEC that are not for service conductors such as 250.30(A)(2). The language has been modified to improve usability and add clarity. The sizing criteria is the same for services which are on the line side of the overcurrent device as they are for separately derived system secondary conductors.
Panel Meeting Action: Accept in Principle
The panel action on Proposal 5-240 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-245 Log #3057 NEC-P05 **Final Action: Accept in Principle**
(250.102(D))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(D) Size — Equipment Bonding Jumper on Load Side of Service. The equipment bonding jumper on the load side of the service overcurrent devices shall be sized~~, as a minimum,~~ in accordance with ~~the sizes listed in Table~~ 250.122.~~, but shall not be required to be larger than the largest ungrounded circuit conductors supplying the equipment and shall not be smaller than 14 AWG.~~
A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables where the bonding jumper is sized in accordance with ~~Table~~ 250.122 for the largest overcurrent device supplying circuits therein.
Substantiation: Referring the code user to *Table* 250.122 inadvertently prohibits the allowances (or requirements) of *section* 250.122. The sentence that the proposal deletes appears to have been included in this section to address this concern, but the concern is easier addressed by not referring directly to the code table.
Panel Meeting Action: Accept in Principle
Panel Statement: The recommended text has been incorporated into the panel action on Section 250.102(D) in Proposal 5-240.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-246 Log #4015 NEC-P05 **Final Action: Accept in Principle**
(250.102(D))

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:
(D) Size — Equipment Bonding Jumper on the Load Side of ~~Service~~ an Overcurrent Device. The equipment bonding jumper on the load side of ~~the service~~ an overcurrent devices shall be sized, as a minimum, in accordance with the sizes listed in Table 250.122, but shall not be required to be larger than the largest ungrounded circuit conductors supplying the equipment and shall not be smaller than 14 AWG. A single common continuous equipment bonding jumper shall be permitted to connect two or more raceways or cables where the bonding jumper is sized in accordance with Table 250.122 for the largest overcurrent device supplying circuits therein.

Substantiation: This section is referenced in other parts of the NEC that are not for service conductors. The language has been modified to improve usability and add clarity.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-240 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-247 Log #3338 NEC-P05 **Final Action: Reject**
(250.102(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Where flexibility is frequently or regularly required, after installation equipment bonding jumpers shall be stranded tight conductors and installed in a manner to avoid strain on the terminations.
Substantiation: Where frequently or regularly flexed after installation conductors should be stranded and secured to avoid strain on terminations.
Panel Meeting Action: Reject
Panel Statement: The terms “frequently or regularly” are not defined in the code or the context being used, making the requirement vague, subjective, and unenforceable and are discouraged by the NEC Style Manual. No evidence has been provided to suggest that the existing requirements are insufficient to address the concerns of the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-248 Log #3336 NEC-P05 **Final Action: Reject**
(250.103 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
250.XX Bonding jumpers shall comply with applicable provisions of Part VI of Article 250.
Substantiation: Applicable provisions of Article 250 should apply to bonding jumpers, such as 250.118, 250.119, 250120, 250.122, 250.124, etc.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation to impose all these requirements on bonding jumpers in general. The applicable requirements cited are already incorporated into the requirements for bonding jumpers.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-249 Log #3058 NEC-P05 **Final Action: Reject**
(250.104)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
250.104 Bonding of Piping Systems and Exposed Structural Steel.
(A) Metal Water Piping. The metal water piping system shall be bonded as required in (A)(1), (A)(2), or (A)(3) of this section. The bonding jumper(s) shall be installed in accordance with 250.64(A) and~~,~~ (B)~~, and (E)~~. The points of attachment of the bonding jumper(s) shall be accessible.
(1) General. Metal water piping system(s) installed in or attached to a building or structure shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with ~~Table 250.66~~ 250.122 based on the largest overcurrent device serving the building or structure, except as permitted in 250.104(A)(2) and (A)(3).
(2) Text remains unchanged
(3) Multiple Buildings or Structures Supplied by a Feeder(s) or Branch Circuit(s). The metal water piping system(s) installed in or attached to a building or structure shall be bonded to the building or structure disconnecting means enclosure where located at the building or structure, to the equipment grounding conductor run with the supply conductors, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with ~~250.66~~, 250.122 based on the largest overcurrent device serving the building or structure. ~~size of the feeder or branch circuit conductors that supply the building. The bonding jumper shall not be required to be larger than the largest ungrounded feeder or branch circuit conductor supplying the building.~~
(B) Text remains unchanged.
FPN: Text remains unchanged.
(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and is not intentionally grounded and is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with ~~Table 250.66~~ 250.122 based on the largest overcurrent device serving the building or structure. The bonding jumper shall be ~~and~~ installed in accordance with 250.64(A)~~,~~ and (B)~~, and (E)~~. The points of attachment of the bonding jumper(s) shall be accessible.
(D) Separately Derived Systems. Metal water piping systems and structural metal that is interconnected to form a building frame shall be bonded to separately derived systems in accordance with (D)(1) through (D)(3).
(1) Metal Water Piping System(s). The grounded conductor of each separately derived system shall be bonded to the nearest available point of the metal water piping system(s) in the area served by each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with ~~Table 250.66~~ 250.122 based on the largest overcurrent device installed on the separately derived system. ~~ungrounded conductor of the separately derived system.~~
Exception No. 1: Text remains unchanged. Exception No. 2: Text remains unchanged.
(2) Structural Metal. Where exposed structural metal that is interconnected to form the building frame exists in the area served by the separately derived system, it shall be bonded to the grounded conductor of each separately derived system. This connection shall be made at the same point on the separately derived system where the grounding electrode conductor is connected. Each bonding jumper shall be sized in accordance with ~~Table 250.66~~ 250.122 based on the largest overcurrent device installed on the separately derived system. ~~ungrounded conductor of the separately derived system.~~
Exception No. 1: Text remains unchanged.
Exception No. 2: Text remains unchanged.
(3) Text remains unchanged.
Exception: Text remains unchanged.
Substantiation: Throughout the code, grounding conductors that are intended to establish a connection to earth are sized in accordance with 250.66. Bonding conductors (or equipment grounding conductors) that are intended to create an effective ground fault current path are sized to 250.122. If the water and/or structural metal is not being used as a grounding electrode (which is the case in 250.104), the conductor that connects to them should be sized per 250.122, not 250.66, because this conductor is intended to create an effective ground fault current path, it is not intended to create a connection to earth. It seems that this section already realizes this concept in 250.104(A)(2) for multiple occupancy buildings, but it then disagrees with itself in the rest of the section’s text.
Lastly, this proposal deletes the requirement to comply with 250.64(E). The requirement of 250.64(E) is intended to apply to conductors that make a connection to earth. The conductor discussed in this section does not establish such a connection.
Panel Meeting Action: Reject
Panel Statement: The sizing requirements in 250.104(A) and (C) provide adequate sizing should the building or structure be supplied by a utility service at a later date. This requirement correlates with the requirements for building disconnects to be suitable for use as service equipment even when supplied by a feeder or branch circuit as specified in Article 225. The substantiation for this significant change is inadequate. By this change water piping and structure metal would require a 750 kcmil copper conductor where the largest overcurrent device in the building is 4000 Amps. There was no evidence provided that present code sizing is inadequate to provide an equalizing voltage path between the water pipe and structural metal conductive surfaces to the electrical system.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-250 Log #3576 NEC-P05 **Final Action: Reject**
(250.104(A))

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Add new text as follows:
For the purposes of this section, a metal water piping system shall be any metal piping containing water for domestic, fire suppression or other use that is 25 ft or more in length, which is accessible without disturbing the building finish.
Substantiation: The main objective of this proposal is clarity, and an attempt to spur the panel into providing us with some definition of what they consider a “metal water piping system.” How much pipe must be in place for us to worry about bonding it? An isolated manifold in a PEX system? Half of a house separated from the service by a PVC coupling repair? Enforcement of this section is wildly sporadic, due to the different views left open by the lack of a definition. A definition is needed to provide more uniform enforcement and understanding of these requirements in the NEC.
Panel Meeting Action: Reject
Panel Statement: The 25 ft parameter in the recommendation is not technically substantiated.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-251 Log #3740 NEC-P05 **Final Action: Reject**
(250.104(B))

Submitter: Robert Torbin, Cutting Edge Solutions, LLC
Recommendation: Revise text as follows:
250.104 Bonding of Piping Systems and Exposed Structural Steel
B) Other Metal Piping. Where installed in or attached to a building or structure, a metal piping system(s), including gas piping, that is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of

sufficient size, or the one or more grounding electrodes used. ~~The bonding jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is likely to energize the piping shall be permitted to serve as the bonding means.~~ The points of attachment of the bonding jumper(s) shall be accessible.

(1) Other than Corrugated Stainless Steel Tubing (CSST). The bonding jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is likely to energize the piping shall be permitted to serve as the bonding means.

(2) CSST. Corrugated stainless steel tubing gas piping systems shall be bonded by connection to a metallic piping segment or fitting, either outside or inside the building, between the individual gas meter and the first CSST fitting. The bonding jumper shall be sized in accordance with Table 250.66 based on the size of the service-entrance conductor or feeder supplying each occupancy and as permitted in 250.66(A), (B) and (C) but not smaller than 6 AWG copper (or equivalent).

Substantiation: Statement of Problem:

There have been numerous accounts of damage to corrugated stainless steel tubing (CSST) from both direct and indirect lightning strikes on or near residential structures containing this type of gas piping system. The damage is consistent: an arc-induced perforation is created through the tubing wall from a voltage imbalance between the CSST and another electrically conductive system in close proximity. Fires are often associated with this type of damage, and have resulted in partial or total losses of property.

All CSST manufacturers have subsequently revised their installation requirements to mandate the direct bonding of all CSST systems. CSST is a listed fuel gas system and is certified by CSA in accordance with a nationally recognized standard: ANSI LC-1-2005. Thus, the manufacturer’s Design and Installation Guide is considered part of the listed system. Recently, a new bonding requirement for CSST systems was added to the 2009 edition of the National Fuel Gas Code (NFPA 54).

These related changes could create potential conflicts with the NEC because it does not require this additional bonding for gas piping systems. The CSST manufacturers recognize the fact that the bonding of CSST will be installed by electrical contractors and enforced through the electrical inspectors rather than the plumbing/mechanical contractors and inspectors. However, the NEC currently does not require this additional bond to be installed, and electrical inspectors have indicated a reluctance to enforce this requirement. At the same time, mechanical/plumbing contractors and inspectors are trying to follow the manufacturer’s mandatory bonding instructions and the requirements of the National Fuel Gas Code (NFPA 54). Approval of this proposal to the National Electrical Code would clearly indicate the acceptability of such a bond connection, and clarify the responsibility of the contractors and inspectors regarding the installation of the bonding conductor.

Substantiation:

It is well known that direct bonding of metallic systems to the grounding electrode system will reduce the chances of arcing between electrically conductive pathways when energized by a high voltage source. The term “direct” bonding is intended to mean the use of a dedicated conductor and appropriately listed clamps to make an electrical connection between the piping and the grounding electrode system in the shortest and most straightforward path practical. In addition, NFPA 780 recommends “equipotential” bonding of all metallic systems to reduce the potential for damage when energized by lightning. Although Section 250.104(B) of the NEC allows the use of the equipment grounding conductor as the bonding means for a gas piping system (for personal safety purposes), it is not intended to preclude the direct bonding of the piping system. The 2008 NEC Handbook commentary supports this interpretation.

Laboratory testing and engineering analysis on the effectiveness of direct bonding have been performed. The data verify that bonding will result in a significant reduction in the potential for arc-induced damage to CSST when it is energized by any source of external energy. All CSST manufacturers now recommend the direct bonding of CSST to the grounding electrode system of the premise in which it is installed utilizing at least a 6 AWG copper wire or equivalent. The point of bonding attachment must be near the point where the gas piping enters the premise using a standard bonding clamp installed in accordance with its listing to the UL 467 standard. Generic installation instructions for residential CSST bonding have been written to insure consistent field practices among installers, and to provide guidance to local code enforcement officials. In addition, the ANSI standard for CSST systems is being updated to include a requirement for bonding instructions and performance requirements to verify the electrical properties.

The NFPA 54/National Fuel Gas Code Technical Committee considered published reports of damage to the CSST from lightning strikes and recommended new coverage for the bonding of CSST systems in the 2009 edition. The 2009 edition was approved by ANSI on September 5, 2008. That language (in part) includes the following requirement:

7.13.2 CSST. CSST gas piping systems shall be bonded to the electrical service grounding electrode system at the point where the gas service enters the building. The bonding jumper shall not be smaller than 6 AWG copper wire or equivalent.

Direct bonding of all metallic piping systems entering a building is an important, but often overlooked, approach when considering protection of a building and its contents during an electrical storm. The Fine Print Note in Section 250.104(B) of the NEC supports the claim that this type of bonding is beneficial. Direct bonding (using a 6 AWG copper wire) of piping systems to the building grounding electrode system allows these systems to be energized at (or near) the same rate as the electrical system and in unison with the voltage wave caused or induced by a direct or indirect lightning strike.

The National Electrical Code contains many requirements for bonding of electrically conductive materials including wiring, piping, ducts, communications cable and structural steel. These requirements are specified throughout the NEC and all have the common goal of protecting the public safety from electrical faults within the premise wiring system by establishing an effective, low-impedance ground fault current path. The use of a 6 AWG copper bond wire is a well established approach for other, similar conductive metallic systems and a 6 AWG copper wire will be an effective means for diverting (to earth) the energy associated with a lightning strike.

The use of the equipment grounding conductor (EGC) as the bonding means will not achieve the same effect. The EGC associated with residential gas equipment (typically a 12 or 14 AWG copper wire) does not allow the mechanical equipment and piping to be energized at (or near) the same rate as the electrical system following a lightning strike. The path to ground through the EGC is typically much longer (and with greater impedance) than the direct bonding distance (near the service entrance) between the piping system and the grounding electrode system. When energized by lightning, this situation permits the electrical potential in the many conductive pathways to become unbalanced, and thus arcing is more likely to occur.

Panel Meeting Action: Reject

Panel Statement: CMP-5 is not convinced that bonding to or around portions of CSST will solve the problem. No test records were provided to substantiate the adequacy of the minimum 6 AWG conductor. The problem could be directly related to the design and wall thickness of CSST. CMP 5 was made aware of at least one manufacturer’s product that does not require bonding beyond the requirements of Section 250.104 contrary to the information provided in the substantiation. The mitigation of the effects of lightning is a design option. The purpose of the NEC is the practical safeguarding of persons and property from hazards arising from the use of electricity. The recommendation is not currently prohibited by the NEC and should be covered by product standards. NFPA 54 contains bonding requirements specific to this product, and those requirements do not conflict with the NEC requirements in Section 250.104(B).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER, D.: See my statement on vote on Proposal 5-252.

Comment on Affirmative:

HARDING, G.: Continue to reject the proposal. Though a difficult problem exists, not enough information was provided to indicate that the proposed revisions would eliminate this problem.

JOHNSTON, M.: I support CMP-5’s action on this proposal. While I am mindful of some unfortunate failures and events related to CSST piping, revising a long standing adequate NEC rule does not appear to be the solution for these problems. The proposal appears to be an effort to include NEC requirements that would solve or reduce a specific product problem related to lightning. These claims are not fully and technically substantiated, which would be difficult to do with any protective technique for lightning. The instructions and information from CSST manufacturers relative to bonding are inconsistent and not all CSST products require any additional bonding beyond what the NEC-2008 currently requires. I believe that revising this section based on the substantiation provided would set the wrong precedent relative to the NEC addressing problems or concerns of protection from lightning.

5-252 Log #3529 NEC-P05 **Final Action: Accept in Principle in Part**
(250.104(B), (C), and (D))

Submitter: Phil Simmons, Olympia, WA

Recommendation: Revise the existing text of the 2008 NEC as follows:

(B) Metal Gas Piping. Metal gas piping installed in or attached to a building or structure shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor if of sufficient size, or to the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 except as permitted in 250.104(A)(2) and (A)(3). The bonding conductor or jumper shall be connected in an accessible location to a non-flexible and non-corrugated portion of the gas piping between the downstream side of the utility meter and the point of entrance into the building or structure. Bonding conductors or jumpers shall be installed in accordance with 250.64(A), (B), and (E).

(C) Other Metal Piping. If ~~Where~~ installed in or attached to a building or structure, a metal piping system(s)~~, including gas piping,~~ that is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor if ~~where~~ of sufficient size, ~~or the~~ to one or more grounding electrodes used. The bonding conductor(s) or jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is likely to energize the piping shall be permitted to serve as the bonding means. The points of

attachment of the bonding jumper(s) shall be accessible. Bonding conductors or jumpers shall be installed in accordance with 250.64(A), (B), and (E).
FPN: Bonding all piping and metal air ducts within the premises will provide additional safety.

Renumber existing 250.104(C) as (D) and 250.104(D) as (E).

Substantiation: Metal gas piping systems, including corrugated stainless steel tubing, should be bonded similar to the requirements for bonding metal water piping and exposed structural metal and for the same reasons. The metal gas piping is an excellent conductor and thus needs to be bonded for safety. The utility gas piping to a dwelling or small commercial building may be nonmetallic. This is similar to the water pipe supply to smaller buildings or structures. Yet, metal water piping in these buildings or structures is required to be bonded with a "full size" conductor even though not connected to a water pipe grounding electrode. Likewise, exposed metal structural frames that are not installed or connected as a grounding electrode or grounding electrode conductor are required to be bonded with a "full size" conductor. Gas piping presents an identical safety hazard and should be bonded in the same manner.

This proposal intends to include bonding requirements for CSST as required in the *National Fuel Gas Code*, NFPA-54.

Other changes are intended to be editorial or for uniformity or consistency with similar requirements for bonding metal water piping or metal structural frames.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle in Part

Revise the 2008 text of Section 250.104(B) to read:

(B) Other Metal Piping. If ~~Where~~ installed in or attached to a building or structure, a metal piping system(s) - including gas piping that is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor if ~~where~~ of sufficient size, or ~~the~~ to one or more grounding electrodes used. The bonding conductor(s) or jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is likely to energize the piping shall be permitted to serve as the bonding means. The points of attachment of the bonding jumper(s) shall be accessible.

Panel Statement: The panel agrees with the recommended revisions to comply with the NEC Manual of Style. The panel concludes that the current requirements covering the bonding of gas piping system provides the practical safeguarding required and rejects the recommended text for a new section (B). The substantiation provided does not technically support the significant changes recommended by the submitter. There is no evidence to support that using the equipment grounding conductor of the circuit that is likely to energize the piping has been an unsafe practice.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

BRENDER, D.: The proposal should have been accepted based upon the language of the proposal as well as the substantiation. Many commercial and industrial occupancies contain as much or more metallic gas piping as metal water piping that is not being used as a grounding electrode. It is just as conductive and poses identical risk of electric shock as metal water pipe. Section 250.104(A)(1) requires the bonding of metal water piping with a conductor sized according to Table 250.66 even though the metal piping is not a grounding electrode. It is inconsistent of the Panel to not apply the same requirement to metal gas piping.

The action on this proposal is also inconsistent with the Panel's action on Proposal 5-254 for bonding of structural metal that is not a grounding electrode.

WILLIAMS, D.: The submitter is correct that the bonding of the metal gas piping systems needs to be increased to be sized in accordance with Table 250.66. The gas piping system needs to be properly bonded for safety. The gas piping system in many buildings often ends up being hundreds of feet of piping. An equipment grounding conductor of a 12 AWG will not properly bond this system to safely de-energize the system in a ground fault condition. The gas piping includes additional hazards with the volatile mixture that could explode. Bonding the gas piping with a larger conductor may also provide additional protection for the problems with CSST.

Comment on Affirmative:

JOHNSTON, M.: Continue to accept the revisions as proposed to ensure consistency with the use of defined words and terms related to grounding and bonding.

5-253 Log #3059 NEC-P05 **Final Action: Accept in Principle**
(250.104(C))

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and is not intentionally grounded and is likely to become energized shall be bonded to the service equipment enclosure, the disconnecting means for building or structures supplied by a feeder or branch circuit, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 and installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible.

Substantiation: The existing code language does not seem to address the need for bonding at buildings/structures supplied by a feeder or branch circuit.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel has made revisions to the recommendation to improve clarity. The panel action on this proposal has been incorporated into the panel action on Proposal 5-254. See the panel action on Proposal 5-254.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-254 Log #3527 NEC-P05 **Final Action: Accept in Principle in Part**
(250.104(C))

Submitter: Phil Simmons, Olympia, WA

Recommendation: Revise the existing text of the 2008 NEC as follows:

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and is not intentionally grounded or bonded ~~and is likely to become energized~~ shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor if ~~where~~ of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 except as permitted in 250.104(A)(2) and (A)(3) and installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible unless installed in compliance with 250.68 Exception No. 2.

Substantiation: The phrase "likely to become energized" is proposed for deletion as most often, electrical inspectors enforce bonding of structural metal if the building or structure has exposed metal members and the building or structure is supplied with a service, feeder or branch circuit.

The reference to 250.104(A)(2) and (A)(3) will allow adjustment in the size of bonding conductors and jumpers if the building s supplied by a feeder.

The reference to 250.68 Exception No. 2 permits the connection of bonding conductors or jumpers to be fireproofed and not be accessible if appropriate.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Principle in Part

Revise text to read as follows:

(C) Structural Metal. Exposed structural metal that is interconnected to form a metal building frame and is not intentionally grounded or bonded and is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the disconnecting means for buildings or structures supplied by a feeder or branch circuit, the grounding electrode conductor ~~where~~ if of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with Table 250.66 and installed in accordance with 250.64(A), (B), and (E). The points of attachment of the bonding jumper(s) shall be accessible unless installed in compliance with 250.68(A) Exception No. 2.

Panel Statement: The panel does not accept the deletion of "likely to become energized". If the AHJ believes the structural metal is likely to become energized then bonding is required. There is no reason to eliminate the flexibility provided when situations occur involving structural metal that is unlikely to become energized. The panel does not accept the recommendation to refer to Sections 250.104(A)(2) and (A)(3) because these sections cover bonding of metal water piping. The panel action on Proposal 5-253 has been incorporated into the panel action on this proposal.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-255 Log #3228 NEC-P05 **Final Action: Accept**
(250.104(D)(3))

Submitter: Mark R. Hilbert, State of New Hampshire

Recommendation: Revise as follows:

(3) Common Grounding Electrode Conductor. Where a common grounding electrode conductor is installed for multiple separately derived systems as permitted by 250.30(A)~~(4)~~(6), and exposed structural metal that is interconnected to form the building frame or interior metal piping exists in the area served by the separately derived system, the metal piping and the structural metal member shall be bonded to the common grounding electrode conductor.

Substantiation: This proposal is being submitted as part of series of proposals addressing a revision of 250.30. The subsection referencing common grounding electrode conductors will be changed to 250.30(A)(6) as part of this revision.

Panel Meeting Action: Accept

Panel Statement: See the panel action on Proposal 5-102 in which Section 250.30 was revised.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-256 Log #4601 NEC-P05 **Final Action: Accept in Principle**
(250.104(D)(3))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Where separately derived systems serve different areas of a building and utilize a common grounding electrode conductor, these connections shall be made for each such area at the same point on the common grounding electrode conductor as the connection(s) to the bonding jumper from the local separately derived system(s).
Delete the exception that follows.
Substantiation: This proposal makes this provision consistent with the wording in (D)(1), for the same reason. The current literal text of the NEC can be read to allow, in a 50-story building with a common grounding electrode conductor throughout, one connection from building steel and a metallic water piping system in the basement, and no local connections to any of the separately derived systems on upper floors. Such a connection does bond "the metal piping and the structural metal member" to "the common grounding electrode conductor" but not in a way that would meet the objectives of this part of the Code. These interconnections must be in each area served by a derived system to be of benefit.
This wording also addresses the topic of the exception. The existing exception is actually a Style Manual problem because it does not take exception to any provision of the rule it follows. Nothing in the rule requires bonding jumpers directly from a system to piping and structural metal, and therefore an exception relieving such a connection requirement is an exception to nothing. The rule requires common connections to the common grounding electrode conductor, and therefore anticipates the exception to the point of making it superfluous.
Panel Meeting Action: Accept in Principle
Revise the current text of Section 250.104(D)(3) to read:
Common Grounding Electrode Conductor. Where a common grounding electrode conductor is installed for multiple separately derived systems as permitted by 250.30(A)(4), and exposed structural metal that is interconnected to form the building frame or interior metal piping exists in the area served by the separately derived system, the metal piping and the structural metal member shall be bonded to the common grounding electrode conductor in the area served by the separately derived system.
Exception: A separate bonding jumper from each derived system to metal water piping and to structural metal members shall not be required where the metal water piping and the structural metal members in the area served by the separately derived system are bonded to the common grounding electrode conductor.
Panel Statement: The panel action meets the intent of the recommendation. It is necessary to retain the exception to eliminate multiple connections from metallic water pipe and structural metal to several separately derived systems that may be in close proximity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-257 Log #4096 NEC-P05 **Final Action: Reject**
(250.106)

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add exception (1) as follows:
Exception (1). In cases where galvanic corrosion is a concern or where a direct bond is not allowed per local code, the use of an isolating spark gap is permitted to serve as the bonding connection between the grounding electrode system and the ground loop conductor (when a ground loop conductor is required per NFPA 780, section 4.20.1.2).
Substantiation: In the latest edition of NFPA 780, a requirement was added to the code requiring a "ground loop conductor" for buildings "whose height is over 60 ft" (Article 4.20.1.2). In the past, for many of our buildings, we've utilized the building steel as the down conductor for a lightning protection system and utilized the concrete encased rebar in the building footings for the grounding electrode (as allowed in NEC® 250.52(A)(3)). Now, with the revisions to NFPA 780, it appears we are now requiring the "ground loop conductor" for buildings over 60 ft in height in addition to the required concrete encased "rebar" in the footings (NEC® 250.50). The problem arises because we are required to interconnect the ground loop conductor (which is copper in compliance with Article 4.13.4 as referenced in the Annex to 780) with the building grounding system (required by both NFPA 780 Article 4.14.1 and NEC® 250.106) which at a bare minimum includes the concrete encased rebar in the footings. As noted in the IEEE PCIC paper PCIC 2007-25, depending on soil conditions, galvanic action may result from interconnecting the systems as prescribed in Article 4.14.1. The fact is apparently recognized by the authors of NFPA 780 as they include a note in the Appendix A.4.14.1 indicating that "Isolating Spark Gaps can be used to provide the required bond in those cases where galvanic corrosion is a concern or where a direct bond is not allowed by local code." I don't see any corresponding language, however, in the NEC® to confirm that the NEC® code panel so agrees that such a connection will satisfy the requirements of Article 250.106.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: While the concept may be applicable, the proposed text does not provide adequate requirements as to the locations permitted or locations not permitted for the spark gap to be installed. The spark gap should also be listed for the application and the environment where it is to be installed. There are listed spark gaps available. See the panel statement on Proposal 5-139 relating to galvanic corrosion.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
DOBROWSKY, P.: The panel should have recognized the isolating spark gaps and allowed their use.

5-258 Log #1517 NEC-P05 **Final Action: Accept**
(250.106, FPN 1)

Submitter: Mark S. Harger, Harger Lightning & Grounding / Rep. BICSI
Recommendation: Revise text to read as follows:
FPN No. 1: See 250.60 for use of strike termination devices ~~air terminals~~. For further information, see NFPA 780-2008, Standard for the Installation of Lightning Protection Systems, which contains detailed information on grounding, bonding, and sideflash distance from lightning protection systems.
Substantiation: NFPA 780, Standard for the Installation of Lightning Protection Systems, 2008, Section 3.3.24 defines a strike termination device as a component of a lightning protection system that intercepts lightning flashes and connects them to a path to ground. Strike termination devices include air terminals, metal masts, permanent metal parts of structures as described in Section 4.9, and overhead ground wires installed in catenary lightning protection systems. By using this term "air terminal", one could interpret that ground electrodes used for strike termination devices other than ones used for air terminals could be used in lieu of the grounding electrodes required by 250.50, thus, creating a safety issue.
Also see my Proposal on 250.60.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-259 Log #4526 NEC-P05 **Final Action: Accept**
(250.108 (New))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Create a new Section 250.108 as follows:
250.108 Use of Equipment Grounding Conductors.
An equipment grounding conductor shall not be used as a grounding electrode conductor.
Substantiation: This new section will clarify that grounding electrode conductors and equipment grounding conductors serve a different purpose in the electrical safety system, are sized differently and have different installation requirements. Equipment grounding conductors do not normally carry current while a grounding electrode conductor may normally carry current since it is often in parallel with the neutral conductor.
Panel Meeting Action: Accept
Panel Statement: The panel notes that this new section is to be located in Part VI and suggests it be numbered as Section 250.121.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-260 Log #4527 NEC-P05 **Final Action: Reject**
(250.110)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised text as follows:
250.110 Equipment Fastened in Place (Fixed) or Connected by Permanent Wiring Methods ~~(Fixed)~~.
Exposed, normally non–current-carrying metal parts of fixed equipment supplied by or enclosing conductors or components operating at more than 50 volts ~~likely to become energized~~ shall be connected to an ~~the~~ equipment grounding conductor under any of the following conditions:
(1) If ~~Where~~ within 2.5 m (8 ft) vertically or 1.5 m (5 ft) horizontally of ground or grounded metal objects and subject to contact by persons
(2) If ~~Where~~ located in a wet or damp location and not isolated
(3) If ~~Where~~ in electrical contact with metal
(4) If ~~Where~~ in a hazardous (classified) location as covered by Articles 500 through 517
(5) If ~~Where~~ supplied by a ~~metal-clad, metal-sheathed, metal-raceway, or other~~ wiring method that provides an equipment grounding conductor ~~ground~~, except as permitted by 250.86, Exception No. 2, for short sections of metal enclosures
~~(6) Where equipment operates with any terminal at over 150 volts to ground~~
Exception No. 1: Metal frames of electrically heated appliances, ~~exempted by special permission,~~ that have ~~in which case~~ the frames ~~shall be~~ permanently and effectively insulated from ground shall not be required to be grounded if exempted by special permission.
Exception No. 2: Distribution apparatus, such as transformer and capacitor cases, mounted on wooden poles, at a height exceeding 2.5 m (8 ft) above ground or grade level shall not be required to be grounded.

Exception No. 3: Listed equipment protected by a system of double insulation, ~~or its equivalent~~, shall not be required to be connected to the equipment grounding conductor. If ~~Where~~ such a system is employed, the equipment shall be distinctively marked.

Substantiation: The word "fixed" is proposed to be relocated to more clearly support the portion of the title it describes.

The word "normally" is proposed to be added to the beginning of the first sentence as the metallic parts of equipment governed by this section are not intended to carry current on a normal basis but only when a line-to-ground fault occurs.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Section 3.1.4.1 of the NEC Style Manual requires exceptions to be complete sentences. Changes are proposed to Exceptions No. 1 and 2 to bring these exceptions into compliance.

The electric shock threshold of 50 volts is introduced in this section to bring this rule into harmony with the OSHA. NFPA 70E also uses 50 volts as the threshold above which shock protection techniques are required to be employed when working on or about electrical equipment that is energized.

Other proposed changes are intended to be editorial in nature.

Panel Meeting Action: Reject

Panel Statement: The substantiation does not support changing the voltage level from 150 volts to 50 volts. There are a number of products that operate above 50 volts that are not required to be equipped with an equipment grounding conductor that are deemed safe. Additionally the substantiation does not support removing the condition "likely to become energized".

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER, D.: Replacing the phrase "likely to become energized" with the 50-volt threshold would make this section more logical and more easily enforced.

The 50-volt threshold is used in many locations throughout the NEC to indicate a voltage above which equipment is required to be guarded or systems grounded. It makes sense to include that concept in this section.

In addition, several editorial improvements were included that were discarded by this action.

5-261 Log #1311 NEC-P05 **Final Action: Reject**
(250.110 Exception No. 3)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add:

This exception shall not apply to electrically operated hand-held drill motors, hedge clippers, lawn trimmers, hammers, and the like.

Substantiation: Double-insulated equipment does not protect against shock where such equipment drills or cuts into concealed or buried energized conductors or its own supply cord, or where the supply cord ungrounded conductor short-circuits to the metal enclosure of the equipment.

Panel Meeting Action: Reject

Panel Statement: The substantiation does not support the recommendation. No incidences have been cited involving accidents where double insulated tools are used.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-262 Log #1478 NEC-P05 **Final Action: Reject**
(250.112)

Submitter: Richard A. Janoski, Finleyville, PA

Recommendation: Revise text to read as follows:

Fastened in Place or Connected by Permanent Wiring Methods (Fixed) - Specific. Exposed, non-current-carrying metal parts of the kinds of equipment described in 250.112(A) through (K), and non-current-carrying metal parts of equipment and enclosures described in 250.112(L) and (M), shall be grounded regardless of voltage. Unless otherwise stated.

Substantiation: The phrase "shall be grounded regardless of voltage" is a statement that is "Mandatory" and "Specifically Requires" 250.112(A) through (K) and (L) through (M) to be grounded regardless of voltage. This phrase is contradictory to it's proceeding subsections since 250.112(F), and 250.112(I) contain voltage restrictions. To eliminate any confusion, the phrase "Unless otherwise stated" should be added.

Panel Meeting Action: Reject

Panel Statement: The recommended text is unclear as to how it is to be applied and what it refers to.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-263 Log #4528 NEC-P05 **Final Action: Accept**
(250.112)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revised text as follows:

250.112 Specific Equipment Fastened in Place (Fixed) or Connected by Permanent Wiring Methods ~~(Fixed) — Specific~~.

Except as permitted in 250.112(I), exposed, normally non–current-carrying metal parts of ~~the kinds of~~ equipment described in 250.112(A) through (K), and normally non–current-carrying metal parts of equipment and enclosures described in 250.112(L) and (M), shall be connected to the equipment grounding conductor regardless of voltage.

Substantiation: The word "normally" is proposed to be added to the beginning of the first sentence as the metallic parts of equipment governed by this section are not intended to carry current on a normal basis but only when a line-to-ground fault occurs.

The title of the section is proposed to be revised for clarity.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-264 Log #4529 NEC-P05 **Final Action: Reject**
(250.112(J))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing text of the 2008 NEC as follows:

(J) Luminaires. Luminaires shall be connected to an equipment grounding conductor as follows: ~~as provided in Part V of Article 410~~.

(1) Exposed Conductive Parts. Luminaires having exposed metal parts shall be connected to an equipment grounding conductor.

Exception: Small metal parts that are isolated by nonconductive parts shall be permitted to be ungrounded if inaccessible to unqualified personnel. Lamp tie wires, mounting screws, clips, and decorative bands on glass spaced at least 38 mm (1½ in.) from lamp terminals shall not be required to be grounded.

(2) Methods of Grounding. Luminaires and equipment shall be mechanically connected to an equipment grounding conductor sized in accordance with 250.122.

(3) Replacement Luminaires. Replacement luminaires having exposed conductive parts at an outlet without an equipment grounding conductor present shall be permitted to be connected to an equipment grounding conductor in compliance with 250.130(C).

Exception: Luminaires directly wired or attached to outlets supplied by a wiring method that does not provide an equipment grounding conductor shall be made of insulating material, shall have no exposed conductive parts, and shall be permitted to be installed without connection to an equipment grounding conductor.

Substantiation: This proposal relocates the appropriate portions of Part V of Article 410 to Article 250 under the jurisdiction of CMP-5.

Changes are proposed to ensure that luminaires with exposed conductive parts are provided with an effective ground-fault return path for safety. The GFCI equivalency to an equipment grounding conductor as provided in existing Part V of Article 410 is not included in this Proposal. In essence, the practice of installing a GFCI without an equipment grounding conductor connected creates a "trap" of sorts. Since a ground-fault return path is not provided, a ground-fault in a luminaire will simply energize the metal frame of the luminaire waiting for the unsuspecting user (often a homeowner) to complete the fault return path by contacting the faulted luminaire and a grounded appliance or ground-fault return path such as a sink. The owner provides the fault-current path for testing the GFCI device! This hardly seems appropriate!

If that isn't bad enough, recent published data from UL indicates nearly 10 percent of the existing GFCI devices tested as a part of the Aging Wiring Study would not operate properly. IAEI published an article several years ago that showed a significant number of GFCI devices tested by home inspectors would not function properly. Hardly the sort of reports needed to instill confidence in the technology and to allow a GFCI to replace an equipment grounding conductor!

Panel Meeting Action: Reject

Panel Statement: The substantiation supporting this recommendation is based on GFCIs manufactured in accordance with former editions of UL 943. GFCIs manufactured in accordance with the current edition of UL 943 address the substantiation for this recommendation. There has been no evidence submitted supporting that the current allowance in Section 410.42 Exception No. 2 has been an unsafe practice.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

BRENDER, D.: The Panel failed to address the substantiation for the proposal. It is difficult to argue that a GFCI device offers safety equivalent to an equipment grounding conductor.

5-265 Log #1603 NEC-P05 **Final Action: Reject**
(250.112(N) (New))

Submitter: Bruce Wagner, Avery Electric, Inc.

Recommendation: Add new text to read as follows:

250.112(N) All sheet metal and metallic panning associated with residential forced air heating systems shall be bonded together and to the furnace. The grounding conductor associated with the dedicated branch circuit feeders will serve as the grounding means for this system.

Substantiation: In that supply and return air ducting are sometimes made electrically non-continuous by means of a rubber sleeve or boot to allow positioning of the furnace, the then remote trunk lines may become energized with no effective grounding.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation to require remote trunk lines for ductwork to be connected to an equipment grounding conductor. Note that there is a FPN in 250.104(B) permitting the practice but not requiring it.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-266 Log #1972 NEC-P05 **Final Action: Reject**
(250.114 Exception No. 1 for (2) and Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Exception No. 1: Motors, where guarded and isolated from conductive material shall not be required to be connected to an equipment grounding conductor.

Exception No. 2: Metal frames of ~~electrically heated~~ listed portable electrical heating appliances ~~exempted by special permission in which case the frames shall permanently and effectively be insulated from ground.~~

Substantiation: Edit. A guarded motor will not provide safety if in contact with metal piping or other metal structures or material. Exception No. 2 should apply to portable heating appliances not fixed appliances such as built-in bathroom heaters or heat lamp fixtures.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided regarding the “isolation” requirements, therefore leaving this requirement as subjective and unenforceable in a consistent manner. No technical substantiation provided to change “electrical heating appliances” to “portable electric heating appliances”. No substantiation is provided on why the existing Exception No. 2 should not apply to fixed equipment.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-267 Log #3678 NEC-P05 **Final Action: Accept**
(250.114(3)(b))

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Revise text as follows:

b. Clothes-washing, clothes drying, dishwashing machines; ranges

Substantiation: With the four conductor cords required for dryers and ranges, the equipment grounding conductor rule must be extended to plug and cord connected ranges also.
Panel Meeting Action: Accept
Panel Statement: The panel notes that this action just adds “ranges” to the current list of appliances in this section in the 2008 NEC.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-267a Log #3339 NEC-P05 **Final Action: Reject**
(250.116, FPN)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete “extensive”.
Substantiation: Edit. “Extensive” is not defined and is subjective.
Panel Meeting Action: Reject
Panel Statement: The fine print note is not enforceable and is not a requirement. The term “extensive” used in the fine print note is related to judgment that can be applied to large quantities of metallic or interconnected metallic materials that could be bonded for additional safety.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-268 Log #3060 NEC-P05 **Final Action: Accept**
(250.118)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
250.118 Types of Equipment Grounding Conductors.

The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:

FPN: Text remains unchanged
(1) Text remains unchanged
(2) Text remains unchanged
(3) Text remains unchanged
(4) Text remains unchanged
(5) Listed flexible metal conduit meeting all the following conditions:
a. Text remains unchanged
b. Text remains unchanged
c. The combined length of flexible metal conduit and flexible metallic tubing and liquidtight flexible metal conduit in the same ~~ground return~~ ground-fault current path does not exceed 1.8 m (6 ft).
d. Text remains unchanged
(6) Listed liquidtight flexible metal conduit meeting all the following conditions:
a. Text remains unchanged
b. Text remains unchanged
c. For metric designators 21 through 35 (trade sizes ¾ through 1¼), the circuit conductors contained in the conduit are protected by overcurrent devices rated not more than 60 amperes and there is no flexible metal conduit, flexible metallic tubing, or liquidtight flexible metal conduit in trade sizes metric designators 12 through 16 (trade sizes 3/8 through ½) in the ~~grounding~~ ground-fault current path.
d. The combined length of flexible metal conduit and flexible metallic tubing and liquidtight flexible metal conduit in the same ~~ground return~~ ground-fault current path does not exceed 1.8 m (6 ft).
e. Text remains unchanged
(7) Flexible metallic tubing where the tubing is terminated in listed fittings and meeting the following conditions:
a. Text remains unchanged
b. The combined length of flexible metal conduit and flexible metallic tubing and liquidtight flexible metal conduit in the same ~~ground return~~ ground-fault current path does not exceed 1.8 m (6 ft).
(8) Text remains unchanged
(9) Text remains unchanged
(10) Text remains unchanged
(11) Text remains unchanged
(12) Text remains unchanged
(13) Text remains unchanged
(14) Text remains unchanged

Substantiation: This proposal simply replaces undefined terms with a term that is defined in 250.2.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-269 Log #4184 NEC-P05 **Final Action: Reject**
(250.118)

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Revise text to read as follows:

Types of Equipment Grounding Conductors and Equipment Bonding Jumpers. The equipment grounding conductor or equipment bonding jumper run with or enclosing the circuit conductors shall be one or more or a combination of the following:

Substantiation: The items in the list are also used as equipment bonding jumpers.
Panel Meeting Action: Reject
Panel Statement: The list is an all-inclusive list of acceptable equipment grounding conductors and potential equipment bonding jumpers. However the only practical equipment bonding jumper are those contained in Item 1. Adding the proposed new wording would not add clarity to the existing text.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:

DOBROWSKY, P.: The items listed in Item 1 can be used as bonding conductors. Why are the others only suitable for use as equipment grounding conductors. The panel should also consider using the methods included in the supply side bonding jumper allowances.

5-270 Log #456 NEC-P05 **Final Action: Reject**
(250.118(10)c. (New))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Add new item letter “c” to Section 250.118(10):

c. The metallic sheath and grounding/bonding conductor of interlocked metal tape–Type MC cable.

Substantiation: Add new item “c” to cover the newer Type MC cable that includes a grounding/bonding conductor. This Type MC cable does not require the use of the combined metallic sheath and grounding conductor for equipment grounding purpose. Due to the internal grounding/bonding conductor, the cable sheath serves as the equipment grounding conductor for termination purposes. As such, there is no need to terminate the grounding/bonding conductor as there is with the combined metallic sheath and grounding conductor Type MC cable. The grounding/bonding conductor can be cut clean at the termination point of the cable — similar to Type AC cable. This change will help to differentiate between the differing types of MC cables and will also help to correlate with the requirements of Section 250.148. Section 250.148 requires that “any equipment grounding conductor(s) associated with those circuit conductors shall be connected within the box or to the box...” The termination of this newer type MC cable would be similar to that of smooth or corrugated tube type MC cable. It should also be noted that this change is in order to correlate with the product standard as UL Standard 1569 was revised to address this newer Type MC cable. As an additional note, the construction specifications noted in Section 330.108 states “Where Type MC cable is used to provide an equipment grounding conductor, it shall comply with 250.118(10) and 250.122. ” Section 330.108 specifically references Sections 250.18(10) and 250.122. In contrast, the construction specifications noted in Section 320.108, Equipment Grounding Conductor for Type AC cable, simply references Sections 250.4(A)(5) or (B)(4).

Panel Meeting Action: Reject

Panel Statement: The panel concludes that there is no need for item "c" or that there are any correlation issues. Section 250.118(10)(a) was specifically modified during the 2002 NEC cycle to effectively cover the aforementioned MC cable construction. The components that form the ground fault current path (EGC) for interlocked armor MC cable are the combined interlocked armor and the bare conductor. The language in item "a" covers the option of constructing the cable to allow the interlocked armor to serve as the ground and may be listed as such. The armor and the bare conductor of this cable are constructed to insure that the two components are in intimate contact throughout the entire cable length, thereby enabling the interlocked armor to serve as the equipment grounding conductor.

Section 250.148 requires equipment grounding conductor(s) associated with the circuit conductors be connected within the box or "to the box" with devices suitable for use. With an interlocked armor ground MC cable, the interlocked armor, and the bare conductor in intimate contact with the armor, may be connected "to the box" using MC cable fittings listed for grounding per Section 250.148(C). The reference to Section 250.122 in Section 330.108 assures that the ground path performance requirement for the armor is equivalent in performance to that of a conventional wire type equipment grounding conductor listed in Table 250.122.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-271 Log #4602 NEC-P05 **Final Action: Reject**
(250.118(10)(c) (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Add the following:

c. The combined metallic sheath and bonding conductor of interlocked metal-tape-type MC cable where the armor and bonding conductor are qualified as an effective fault current path without the necessity of making a separate termination for the bonding conductor.

Substantiation: This is another attempt to constructively legitimize the new interlocking-armor metal clad cable product. The existing text of "a." does not quite cover this product because the grounding conductor specified is one that must terminate within enclosures along with the circuit conductors. The NEC should address this construction in a straightforward manner and without regard to whether or not a listing has been obtained.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-270.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-269a Log #CP510 NEC-P05 **Final Action: Accept**
(250.118(10) a & b)

Submitter: Code-Making Panel 5,

Recommendation: Revise text to read as follows:

(10) Type MC cable where listed and identified for grounding in accordance with the following:

a. The combined metallic sheath and <u>equipment</u> grounding conductor of interlocked metal tape–type MC cable

b. The metallic sheath or the combined metallic sheath and <u>equipment</u> grounding conductors of the smooth or corrugated tube-type MC cable.

Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-272 Log #237 NEC-P05 **Final Action: Reject**
(250.118(4))

Submitter: Sprague Owings, Nassau County, Florida

Recommendation: Delete as follows:

~~250.110(4) Electrical metallic tubing.~~

Substantiation: As concern grows for having a reliable grounding path (the return of a separate equipment ground to dryers and ranges, etc.) it would seem to follow that it may be time to delete the use of EMT without an equipment ground simply because this use depends on many mechanical connections (each and every connector and coupling). One run of EMT could easily have 10 or more couplings in the run and just one loose screw or compression fitting could jeopardize the ability of the conduit to carry a short back to source. This is not so much a problem with flex or cables where there are only 2 mechanical connections in the path (at the beginning and end of the run.)

I have also submitted a companion proposal to Code-Making Panel 8 to revise section 358.60.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided technical substantiation supporting his recommendation to remove EMT as an acceptable equipment grounding conductor. EMT does provide a reliable and safe ground fault return path. When metal raceways are installed in accordance with the National Electrical Code they provide a low impedance ground-fault current path.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

MOHLA, D.: It is regrettable that, after many years of proposals indicating that there is a real problem on roof tops, Code Panel 5 continues to use the same answer of "no technical substantiation". There is evidence of real world issues of fittings coming apart or loose and leaving equipment ungrounded. EMT can be installed easily without adequate tightening of fittings or loose fittings. As a result, the raceway is adequate for installing conductors but inadequate as an equipment grounding conductor. This issue will not go away as evidenced by the proposal at every Code cycle.

5-273 Log #2343 NEC-P05 **Final Action: Accept in Principle**
(250.118(5)(d))

Submitter: David Mercier, Southwire Company

Recommendation: Revise the first sentence of 250.118(5)(d):

"Where used to connect equipment where flexibility is required <u>to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement</u> after installation, an equipment grounding conductor shall be installed."

Substantiation: The purpose of this change is to clarify the use of the term "flexibility" with respect to using an equipment grounding conductor in flexible metal conduit, to ensure the integrity of the ground path. Installed flexible conduit which is connected to equipment which may be moved or subject to vibration can compromise continuity of the ground path. A companion proposal has been submitted to Panel 8 for 348.60.

Panel Meeting Action: Accept in Principle

Revise the recommendation to read:

~~Where~~ <u>If</u> used to connect equipment where flexibility is ~~required~~ <u>necessary</u> to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed.

Panel Statement: The panel action restores terminology used in the 2008 NEC and makes an editorial correction for clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal except the text should be revised to remove one instance of the word "flexibility" because it is redundant. This will be proposed in a comment on this proposal.

5-274 Log #2344 NEC-P05 **Final Action: Accept in Principle**
(250.118(6)(e))

Submitter: David Mercier, Southwire Company

Recommendation: Revise the first sentence of 250.118(6)(e):

"Where used to connect equipment where flexibility is required <u>to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement</u> after installation, an equipment grounding conductor shall be installed."

Substantiation: The purpose of this change is to clarify the use of the term "flexibility" with respect to using an equipment grounding conductor in liquidtight flexible metal conduit, to ensure the integrity of the ground path. Installed liquidtight flexible conduit which is connected to equipment which may be moved or subject to vibration can compromise continuity of the ground path. A companion proposal has been submitted to panel 8 for 350.60.

Panel Meeting Action: Accept in Principle

Revise the recommendation to read:

~~Where~~ <u>If</u> used to connect equipment where flexibility is ~~required~~ <u>necessary</u> to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed.

Panel Statement: The panel action restores terminology used in the 2008 NEC and makes an editorial correction for clarity.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-275 Log #115 NEC-P05 **Final Action: Accept in Principle in Part**
(250.119)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
Power-limited, class 2 ~~or~~ and class 3 ~~circuit~~ cables, (Article 725), power-limited fire alarm cables (Article 760), communications cables (Article 800) and network-powered broadband communications cables (Article 830) ~~containing only circuits operating at less than 50 volts~~ shall be permitted to use a conductor with green insulation for other than equipment grounding purposes.
Substantiation: Green wires are an integral part of the color code for the wires in communications cables. Article 725 permits communications cables to be substitute for class 2 and class 3 cables. See 725.154(G). A typical data cable is listed communications cable that is installed in accordance with Article 725 provisions for class 2 and class 3 cables. Article 760 permits communications cables to substitute for power-limited fire alarm cables. See 760.154(D). Ungrounded green wires are routinely used in these applications. The exception to 250.119 needs to be modified to reflect industry practice.
Panel Meeting Action: Accept in Principle in Part
Revise 2008 NEC 250.119 Exception as follows:
Power-limited, Class 2 or Class 3 ~~circuit~~ cables, power-limited fire alarm cables, communications cables, ~~and~~ or network-powered broadband communications cables containing only circuits operating at less than 50 volts where connected to equipment not required to be grounded in accordance with 250.112(I) shall be permitted to use a conductor with green insulation or green with one or more yellow stripes for other than equipment grounding purposes.
Panel Statement: The panel does not accept the recommendation to remove the 50-volt limitation of the exception to restrict application to only specific types of circuits. Editorial revisions for clarity have been made and the action incorporates the recommendation of Proposal 5-278.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-276 Log #1557 NEC-P05 **Final Action: Reject**
(250.119)

Submitter: Joseph E. Rossi, Township of Clinton
Recommendation: Revise text as follows:
Individually covered or insulated equipment grounding conductors shall have a continuous manufactures outer finish that is either green or green with one or more yellow stripes except as permitted in this section.
Substantiation: There is a lot of confusion about this section of the code. I have failed contractors many times because they will take the two ends of a black wire and tape them green. When I cite this section to them, they tell me about section 250.199(A). That is for larger than #6 wire. Therefore, by putting the word "manufactures" before the word "green" it would be a clearer definition of what needs to be done.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the code. The present code language addresses the submitter's concern as the conductors in sizes 6 AWG and smaller are required to have an outer finish that is either green or green with one or more yellow stripes.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-277 Log #3325 NEC-P05 **Final Action: Reject**
(250.119)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
IDENTIFICATION of EQUIPMENT GROUNDING and BONDING CONDUCTORS. Unless ~~required~~ otherwise provided elsewhere in this Code equipment grounding and bonding conductors shall be permitted to be bare, covered, or insulated. Individually covered or insulated equipment grounding and bonding conductors shall have a continuous outer finish that is green, green with one or more yellow stripes except as otherwise permitted in this section. Conductors ~~with insulation or individual covering that is green, green with one or more yellow stripes or otherwise~~ identified ~~as permitted by~~ in accordance with this section shall not be used for ungrounded or grounded circuit conductors.
Exception: No change.
(A) CONDUCTOR LARGER THAN 6 AWG. Equipment grounding and bonding conductors larger than 6 AWG shall comply with 250.119(A)(1) and (A)(2).
(1) An insulated or covered conductor larger than 6 AWG shall be permitted ~~at the time of installation~~ to be permanently identified as an equipment grounding or bonding conductor at each end and at every point where the conductor is accessible.
Exception No. 1: Conductors larger than 6 AWG shall not be required to be marked in conduit bodies that contain no splices or unused hubs.
Exception No. 2: Conductors larger than 6 AWG installed as overhead aerial spans shall be permitted to be marked at each end and intermediate points of support.
Exception No. 3: Conductors larger than 6 AWG and part of open wiring on insulator, concealed knob and tube wiring, or as permitted in the exception for 590.4(C) shall only be required to be identified at termination and splice points.
Exception No. 4: Identification shall be permitted at terminations and at intervals acceptable to the authority having jurisdiction where conductors larger than 6 AWG are installed in cable trays, wireways, or auxiliary gutters and not in a raceway or cable armor.
Substantiation: Edit. The proposal attempts to cover other types of installations. Present wording in (A) (1) "where the conductor is accessible" requires continuous identification of conductors in overhead aerial spans, in wireways, in auxiliary gutters, cable trays, in cable bus, knob and tube and open wiring on insulators installations, and as permitted in 590.4(C) exception.
Panel Meeting Action: Reject
Panel Statement: The proposed text lessens the requirement for identifying equipment grounding conductors. The submitter has not provided technical substantiation to support such a change. The panel concludes that it is permitted to identify bonding conductors.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-278 Log #4603 NEC-P05 **Final Action: Accept in Principle**
(250.119 Exception)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Revise to read as follows:
Exception: Where equipment is connected by a multiconductor cable and is not required to be grounded in accordance with 250.112(1), the color green shall be permitted to be used for other than grounding conductors.
Substantiation: The wording of this exception creates a direct conflict with the orderly implementation of 250.20(A) and 250.112(I) in numerous cases. It allows green wire in control cables to be used as an ordinary circuit conductor if the system operates at 50 volts or less. However, 250.20(A) requires (and has required for over seventy years) that circuits operating under 50 volts, but supplied from outdoor overhead wiring, or from transformers supplied from primary systems that are either ungrounded or operating over 150 volts to ground, be grounded. If a circuit is required to be grounded, 250.112(I) requires the use of an equipment grounding conductor, and 250.119 requires a certain color code for such conductors. The new allowance in this section is generally sound since the majority of power-limited control circuits originate from transformers with 120V primaries, but the permission must not conflict with 250.112(I).
CMP 5 accepted this text in principle for the 2008 cycle, but worked from a different comment and reached an outcome that is incorrect when the secondary is required to be grounded for other reasons, even if the voltage does not exceed 50 volts. There are many practical applications where these control circuits become subject to 250.112(I) requirements, such as 277V duct heaters incorporating Class 2 transformers and lighting circuits using power-limited energy management controls.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-275 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-279 Log #3327 NEC-P05 **Final Action: Reject**
(250.120(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Where not run with circuit conductors, as permitted in 250.130(C) and Exception No. 2 for 250.134(B) equipment grounding conductors smaller than 6 AWG shall be protected from physical damage by an identified raceway or cable armor except where run in hollow spaces of buildings or structures and not likely to be subject to physical damage.
Substantiation: This section appears intended to apply to equipment grounding conductors permitted in 250.130(C) and 250.134(B) Exception No. 2. However, literal wording includes equipment grounding conductors in nonmetallic-sheathed cable and Type UF cable. "Walls or partitions" may be inferred as excluding ceiling and floor spaces. Structures which are not deemed "buildings" should be included.
Panel Meeting Action: Reject
Panel Statement: Equipment grounding conductors are generally required to be run with the circuit conductors and therefore have the physical protection afforded by that installation. There was no technical substantiation provided to support that these new requirements are necessary in the few cases where equipment grounding conductors are not run with circuit conductors.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-280 Log #990 NEC-P05 **Final Action: Accept**
(Table 250.122)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete the 30 ampere and 40 ampere figures (3rd and 4th lines).
Substantiation: Edit. The heading above the ampere column states "not exceeding" (amperes) which indicates an overcurrent device not exceeding 30 amperes requires a 10 AWG or 8 AWG equipment grounding conductor. However, the 40 and 60 ampere overcurrent devices which do exceed 30 amperes require a 10 AWG or 8 AWG equipment grounding conductor. The 30 and 40 ampere figures are superfluous.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-281 Log #2206 NEC-P05 **Final Action: Reject**
(Table 250.122)

Submitter: Paul Guidry, Fluor Enterprises, Inc
Recommendation: Delete existing Table 250.122. Replace Table 250.122 with new Table 250.122.

Table 250.122 Minimum Size Equipment Grounding Conductors For Grounding Raceway and Equipment

Equivalent Size of Ungrounded Conductors (AWG or kcmil)	Equivalent Size of Equipment Grounding Conductor (AWG or kcmil)
14	14
12	12
10	10
8	10
6	8
4	8
2	6
1	6
1/0	6
2/0	6
3/0	4
4/0	4
250	4
300	4
350	3
400	3
500	2
750	1
1000	1/0

For parallel conductors, the equivalent size of the multiple ungrounded conductors shall be used to calculate the equivalent minimum size of equipment grounding conductor(s).

Substantiation: This proposal will change equipment grounding conductor (EGC) sizes to be based on ungrounded conductor sizes instead of overcurrent protective device (OCPD) sizes. Currently, manufacturers of multiconductor cable assemblies install a standard size of EGC with a given size of ungrounded conductor. If the conductors are increased due to voltage drop, you lose the curve that is built in to Table 250.122 for reducing the size of EGCs due to 250.122(B). For example, a 50A OCPD on a circuit requires an 8 AWG, type XHHW, CU conductor. It is increased to a 2 AWG due to voltage drop. Utilizing 250.122(B), the proportion is 2 AWG to 8 AWG = 66,360cm / 16,510cm = 4.02. For a 50A OCPD, according to existing Table 250.122. A 10 AWG was originally able to be used for an EGC. So, multiply (10AWG) 10,380cm X 4.02 = 41,721cm. So, now the EGC would have to be a 4 AWG.

This typically isn't a problem when installing raceways with single conductor wire. However, with multi-conductor cables, the standard EGC that is manufactured with a 2 AWG cable is a 6 AWG. This is a fairly typical problem in industrial plants today. The proportion calculation specified in 250.122 isn't being adhered to since it requires special cables to be ordered, or possibly the use of a four conductor cable with the EGC sized equivalent to the ungrounded conductors. When four insulated conductors are required plus the EGC, then special cable has to be ordered. This isn't a cost issue as much as it's a waste of copper or aluminum.

Table 250.122 as it stands today allows a reduction for the EGC. Utilizing the new table would allow the reduction to be utilized in multiconductor cables.

This a companion proposal to one for 250.122(B).
Panel Meeting Action: Reject
Panel Statement: The table leaves standard conductor sizes such as 3 AWG, 600, 700, 900, 1250, 1500, and 1750 kcmil out. There was no direction provided on how to size the equipment grounding conductor for these conductors when used as ungrounded conductors. It was also noted that in several cases the size of the equipment grounding conductor was increased one size without technical substantiation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:

MOHLA, D.: I agree the proposal is not complete and requires adding sizes missing from the proposal based on standard size equipment grounding conductor used in UL listed multiconductor cable.

250.122(F) requires each paralleled EGC be sized on the basis of ampere rating of overcurrent device protecting the circuit conductors in the raceway or cable in accordance with table 250.122. Phase conductors are protected are protected by overcurrent protective device based on total ampacity of all circuit conductors (current is shared between all circuit conductors) but EGC is required to be provided in each raceway based on overcurrent protective device without the benefit of other EGC in other paralleled raceways.The submitter is correct with the substantiation that 250.122 (F) limits the ability to parallel multiconductor cables with equipment grounding conductors.EGC in UL listed multiconductor cables is a standard size based on the ungrounded conductors.

Utilizing 250.122(F) as written when utilizing parallel conductor either requires utilizing an unlisted special cable with EGC in each cable sized based on table 250.122 or order special cables that require separate listing. AHJ's normally do not allow use of non listed cable and getting special listing requires a cost prohibitive option of either requiring large quantities of able than needed and/or cost of listing.

250.24 (C)(2) and 250.30(A)(8)(b) for services supplied or separately derived alternating current systems respectively allow grounded conductors in parallel cables to be sized based on ungrounded conductor in each raceway not total. The grounded conductor(s) on the supply side of overcurrent protective devices provides the same function on short circuit or ground fault as provided by EGC during ground fault conditions on the load side of the overcurrent protective devices. If it is safe to parallel grounded conductor on the supply side, why it is not safe to parallel EGC on the load side? If we can depend on multiple grounded conductors in parallel to share short circuit and ground fault currents in the event of a fault, we should allow EGC to do the same.

CMP 5 should consider rewriting last paragraph to allow sharing of EGC on the load side of overcurrent protective devices to permit use of listed cables with EGC be used. One suggested rewrite of the last paragraph of 250.122 (F) is give below for panel consideration:
Conductors in parallel: If the ungrounded conductors are installed in parallel in two or more raceways or cables as permitted in 310.4, the equipment grounding conductors shall also be installed in parallel in each raceway or cable. The size of the equipment grounding conductor in each raceway or cable shall be based on the total circular mil area of the parallel ungrounded conductors in the raceway or cable. The equipment grounding conductor shall not be smaller than grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the ungrounded circuit conductors in each raceway or cable. Where supply conductors are larger than 1100 kcmil copper, or 1750 kcmil aluminum, the equipment grounding conductor shall have an area not less 12-1/2 percent of the area of the ungrounded conductors in each raceway or cable.

I agree the proposal is not complete and requires adding sizes missing from the proposal based on standard size equipment grounding conductor used in UL listed multiconductor cable.
250.122(F) requires each paralleled EGC be sized on the basis of ampere rating of overcurrent device protecting the circuit conductors in the raceway or cable in accordance with table 250.122. Phase conductors are protected are protected by overcurrent protective device based on total ampacity of all circuit conductors (current is shared between all circuit conductors) but EGC is required to be provided in each raceway based on overcurrent protective device without the benefit of other EGC in other paralleled raceways.

The submitter is correct with the substantiation that 250.122 (F) limits the ability to parallel multiconductor cables with equipment grounding conductors. EGC in UL listed multiconductor cables is a standard size based on the ungrounded conductors.

Utilizing 250.122(F) as written when utilizing parallel conductor either requires utilizing an unlisted special cable with EGC in each cable sized based on table 250.122 or order special cables that require separate listing. AHJ's normally do not allow use of non listed cable and getting special listing requires a cost prohibitive option of either requiring large quantities of able than needed and/or cost of listing.

250.24 (C)(2) and 250.30(A)(8)(b) for services supplied or separately derived alternating current systems respectively allow grounded conductors in parallel cables to be sized based on ungrounded conductor in each raceway not total. The grounded conductor(s) on the supply side of overcurrent protective devices provides the same function on short circuit or ground fault as provided by EGC during ground fault conditions on the load side of the overcurrent protective devices. If it is safe to parallel grounded conductor on the supply side, why it is not safe to parallel EGC on the load side? If we can depend on multiple grounded conductors in parallel to share short circuit and ground fault currents in the event of a fault, we should allow EGC to do the same.

CMP 5 should consider rewriting last paragraph to allow sharing of EGC on the load side of overcurrent protective devices to permit use of listed cables

with EGC be used. One suggested rewrite of the last paragraph of 250.122 (F) is give below for panel consideration:
Conductors in parallel: If the ungrounded conductors are installed in parallel in two or more raceways or cables as permitted in 310.4, the equipment grounding conductors shall also be installed in parallel in each raceway or cable. The size of the equipment grounding conductor in each raceway or cable shall be based on the total circular mil area of the parallel ungrounded conductors in the raceway or cable. The equipment grounding conductor shall not be smaller than grounding electrode conductor specified in Table 250.66 but shall not be required to be larger than the ungrounded circuit conductors in each raceway or cable. Where supply conductors are larger than 1100 kcmil copper, or 1750 kcmil aluminum, the equipment grounding conductor shall have an area not less 12-1/2 percent of the area of the ungrounded conductors in each raceway or cable.

5-282 Log #3679 NEC-P05 **Final Action: Reject**
(Table 250.122)

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Revise text:
Copper
70 10 or 8?
80 10 or 8?
90 10 or 8?
Substantiation: It is not clear to interpreter whether the values between 60 and 100 should be 10 copper or 8 copper.
Panel Meeting Action: Reject
Panel Statement: The heading of the table states “Rating or Setting of Automatic Overcurrent Device in Circuit Ahead of Equipment, Conduit, etc., Not Exceeding (Amperes)” indicating that an 8 AWG copper conductor is required for the stated ratings or settings in the proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-283 Log #3814 NEC-P05 **Final Action: Accept**
(Table 250.122)

Submitter: Christel K. Hunter, Alcan Cable
Recommendation: Revise text to read as follows:

Table 250.122 Minimum Size Equipment Grounding

Conductors for Grounding Raceway and Equipment

3000	400	600
4000	500	~~800~~750
5000	700	1200

Substantiation: The size of the aluminum EGC specified in Table 250.122 for a 4000 amp OCD is incorrectly sized. According to ICEA Standard #P-32-382-1999, the equivalent size aluminum EGC required to carry the same amount of fault current for the same amount of time for equivalent insulation types as a 500 kcmil copper conductor would be a 750 kcmil aluminum conductor. This size aluminum EGC is also the most generally chosen substitution size for a 500 kcmil copper conductor since it carries more current according to Table 310.16. In addition, 750 kcmil aluminum conductors are an industry standard size, whereas 800 kcmil is not.
When this table was expanded in the 1968 NEC to assist in choosing equipment grounding conductors for larger installations, there was no substantiation given for the sizes of the conductors included in the new version. The graph provided shows that a 500 kcmil copper and a 750 kcmil aluminum conductor with equivalent insulation are equally capable of carrying the same fault current.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-284 Log #997 NEC-P05 **Final Action: Reject**
(250.122(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Copper, aluminum, or copper-clad aluminum equipment grounding conductors of the wire type shall not be smaller than shown in Table 250.122, ~~but in no case shall they~~ shall not be required to be larger than the circuit conductors supplying the equipment where made of the same material.
Substantiation: Table 310.21 permits an ampacity of 98 amperes for 8 AWG copper conductors, which may be protected at 100 amperes. Table 250.122 requires an an EGC of aluminum to be 6 AWG for a 100 ampere circuit. Present wording indicates a conflict with Table 250.122.
Panel Meeting Action: Reject
Panel Statement: There is no conflict and the existing wording of this section is clear. The recommendation does not improve understanding of the requirement.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-285 Log #1645 NEC-P05 **Final Action: Accept**
(250.122(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a second paragraph:
“Equipment grounding conductors shall be permitted to be sectioned within a multiconductor cable, provided the combined circular mil area complies with Table 250.122.”
Substantiation: Addition of this additional paragraph will correlate with 310.13 and the multiconductor cable product standards and is more appropriately located in 250.122. A single equipment grounding conductor frequently will not fit in the interstice between the insulated conductors in a multiconductor cable and is required to be sectioned for manufacturing purposes. The product standards already permit sectioned conductors.
The use of a positive code rule rather than an exception is in accordance with 3.1.4 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-286 Log #3343 NEC-P05 **Final Action: Reject**
(250.122(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Copper, aluminum, copper-clad aluminum equipment grounding conductors and bonding conductors of the wire type shall not be smaller than shown in Table 250.122, but in no case shall they be required to be larger than the circuit conductors supplying the equipment, where made of the same material.
Substantiation: Edit. Bonding conductors should be included. Aluminum equipment grounding conductors and bonding conductors used with copper circuit conductors may be required to be larger.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided for deleting the last sentence of the existing code text. There was no technical substantiation provided for adding bonding conductor and further confusing the applications of the equipment grounding conductor and bonding-type conductors.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-287 Log #3816 NEC-P05 **Final Action: Reject**
(250.122(A))

Submitter: Christel K. Hunter, Alcan Cable
Recommendation: Add new text to read as follows:
250.122 Size of Equipment Grounding Conductors.
(A) General. Copper, aluminum, or copper-clad aluminum equipment grounding conductors of the wire type shall not be smaller than shown in Table 250.122, but in no case shall they be required to be larger than the circuit conductors supplying the equipment, including in parallel circuits. Where a cable tray, a raceway, or a cable armor or sheath is used as the equipment grounding conductor, as provided in 250.118 and 250.134(A), it shall comply with 250.4(A)(5) or (B)(4).
Substantiation: Until the reorganization of the Code in 1999, the EGCs in parallel circuits were not required to be larger than the circuit conductors. When 250.122 was reorganized, the exception that clarified this case was moved into (A). Until recently, AHJs have agreed that the language in (A) applies to (F), parallel circuits. However, there has been a change in enforcement in the last few years after the publication of articles interpreting this code language. Even with the addition of the language “in no case” in the 2008 NEC, there are still AHJs requiring that the EGCs be larger than the ungrounded conductors in some parallel circuits.
The language proposed would clarify that the EGCs need not be larger than the ungrounded conductors in parallel circuits. This was clearly the case until the 1999 NEC, and no proposal was made nor substantiation provided to change the application of the code. It appears that the intent of the changes made at that time were simply to clean up the language and use positive language. However, the editorial changes have resulted in an unintended technical change that was never proposed nor discussed by the CMP.
Panel Meeting Action: Reject
Panel Statement: The substantiation provided does not support reducing the current sizing requirement. The panel concludes that the rating of the overcurrent device is the determining feature for sizing all equipment grounding conductors, including those installed in parallel circuits.
Number Eligible to Vote: 16

Ballot Results: Affirmative: 13 Negative: 3
Explanation of Negative:
DOBROWSKY, P.: Accepting this change would match the requirements for supply side bonding jumpers installed in parallel.
MOHLA, D.: This propsal should have been either accepted or as a minimum required a clear statement by the panel that that parallel circuits conductors are also circuit conductors and included. The submitter is correct in stating the requirement that "in no case the equipment grounding conductors are required to be larger than the circuit conductors" apply also to parallel circuits.Identical requirements exist in 250.24 (C) (1) for grounded conductor brought to Service Equipment and in 250.30 (A) (8) (a) for grounded conductor for separately derived systems. Grounded conductor on the supply side of overcurrent protective device performs the same function as EGC on the load side of the overcurrent protective device i.e. provides a path for ground fault currents. Sizing requirements for supply side grounded conductors and load side EGC should be same as they perform the same function during ground fault conditions.
TEMBLADOR, R.: One primary factor that limits the current that flows during a ground fault is the impedance of the circuit or circuits. Within a specific circuit, the weakest link (highest impedance) in the chain of devices connected together limits the current.
There are multiple circuit paths that are formed during a ground-fault condition which are primarily comprised of the ungrounded circuit conductor, equipment grounding conductors (EGC) and bonded metal enclosing the circuit conductors. During a phase-to-ground fault in a circuit with paralleled conductors, ground fault current will travel down all available paths to return to the source. The current that flows divides at the point of the fault and travels back to the source through both ends at which the ungrounded conductor, and the bonded metal enclosing the circuit conductors or EGC's are paralleled, or both. Current flowing down the EGC's and bonded metal enclosing circuit conductors does not only flow down one path. It too will travel down all available paths to return to the source. Consider a ground fault scenario where the EGC's are larger than the phase conductors. In this instance, the weakest link in the circuit is the paralleled ungrounded phase conductor and it will limit the fault current.
The equipment grounding conductors should not be required to be larger than the ungrounded phase conductors where conductors are paralleled in multiple raceways or cable.

5-288 Log #3866 NEC-P05 **Final Action: Reject**
(250.122(A))

Submitter: Mike Weitzel, Bechtel
Recommendation: Revise text as follows:
250.122(A) General, Copper, aluminum...
Add one sentence to the end of the paragraph:
<u>Where a metallic raceway meets the requirements to serve as an equipment grounding conductor in accordance with 250.118 and a wire type equipment grounding conductor is installed in the metal raceway, the equipment grounding conductor shall meet the minimum sizing requirements for the feeder or circuit EGC in accordance with 250.122.</u>
Substantiation: Wire type equipment grounding conductors have been added to raceways that at one time qualified as an equipment grounding conductor in accordance with 250.118, and later did not meet the requirements. Examples are as the circuit or feeder installation was damaged, and unanticipated deterioration of the metal raceway system occurred. The circuit then has undersized equipment grounding conductor fault current path, which may remain undiscovered, but could be ineffective to pass enough current to clear a fault in accordance with 250.4(A).
The point is that the wire type equipment grounding conductor was not required by the NEC in this case, and that if installed it should be full-sized per 250.122.
Panel Meeting Action: Reject
Panel Statement: The recommendation simply repeats what is stated in the opening text of Section 250.122. Additionally, Section 250.120(A) requires wire type equipment grounding conductors to comply with the applicable provisions of the code.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-289 Log #4095 NEC-P05 **Final Action: Reject**
(250.122(A))

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add exception (1) as follows:
Exception (1). In cases where a High-Resistance Grounded Neutral System is employed, in accordance with 250.36, the Equipment Grounding Conductor shall be permitted to be sized in accordance with the Equipment Bonding Jumper per 250.36(G).
Substantiation: Existing language in 250.122(A) requires equipment grounding conductors (EGC) to be sized in accordance with Table 250.122. 250.36(E), however, defines the "Equipment Bonding Jumper" as "the connection between the equipment grounding conductors and the grounding impedance" and 250.36(G) further defines how to size the "Equipment Bonding Jumper". As currently written, Table 250.122 typically results in an equipment grounding conductor being sized larger than the "Equipment Bonding Jumper", even though as previously discussed, the "Equipment Bonding Jumper" is placed in series between the "EGC" and the grounding impedance. Clarifying in 250.122(A) that "EGC" Sizing should be in accordance with 250.36(G) when an HRG system is employed would correct this problem without impacting the safety of the installation, as the grounding resistor limits the current in the EGC in an HRG system.
Panel Meeting Action: Reject
Panel Statement: The equipment grounding conductor has to carry full short-circuit current when a second ground-fault occurs. The equipment bonding jumper and the neutral conductor currents are limited by the ground impedance inserted into that part of the circuit for the first ground-fault, but not in the event of a second ground-fault.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to reject this proposal for the reasons indicated in the panel statement.

5-290 Log #1511 NEC-P05 **Final Action: Reject**
(250.122(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action to Reject this proposal while also providing revised text.
This action will be considered by the panel as a public comment.
Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Revise text to read as follows:
(B) Increased in Size. Where ungrounded conductors are increased in size <u>from the minimum size that has sufficient ampacity for the intended installation</u>, grounding conductors, where installed, shall be increased in size proportionally according to the circular mil area of the ungrounded conductors.
Substantiation: NOTE: This is the first of two similar proposals that I am submitting. Each is intended to resolve the same concern, but the two accomplish this resolution in different ways. The following substantiation paragraph is identical for both.
This proposal would correct an error in the use of the English language. The phrase "increased in size" is incomplete, without there being some reference point from which to determine whether the size had been increased. The phrase begs the question, "Increased from what?" Absent an answer to that question, the paragraph is unenforceable.
An absurd example would be if a mechanical engineer decides to use a larger pump than had appeared on the preliminary plans. As a result, the electrical engineer's final plans must show #10 wire, instead of the #12 shown in the preliminary plans. Is that an "increase in size"? Certainly not, because the #12 does not have sufficient ampacity for the new, larger motor. A more practical example would be if a project's ambient temperature forces the use of a larger wire, because of the correction factors of Table 310.16. Use of the smaller size wire would not have been legal, because its ampacity, under the conditions of use, was insufficient. Use of the next size larger wire was required, in order to obtain the minimum ampacity for the application. Is that an "increase in size"? It should not be, but the present wording of 250.122(B) does not make a clear distinction on this point.
The wording of this article needs to clearly establish whether it is intended to mean "an increase in size from a size that could have been legally used in this application," as opposed to "an increase in size from the value shown in the ampacity tables, before the application of any adjustment or correction factors."
Panel Meeting Action: Reject
Revise text to read as follows:
(B) Increased in Size. Where ungrounded conductors are increased in size from the minimum size that has sufficient ampacity for the intended installation, grounding conductors, where installed, shall be increased in size proportionally according to the circular mil area of the ungrounded conductors.
Panel Statement: The recommended text does not improve the understanding of the provision of Section 250.122(B). The panel concludes there are numerous reasons for increasing the size of the ungrounded conductors in addition to ampacity adjustment and correction factors such as considerations for voltage drop, overcurrent device performance, and other engineering factors. The NEC is a minimum requirement and this section is addressing any increase over the minimum required by code.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
BRENDER, D.: This proposal has merit and should have been accepted in principle. Establishing the threshold from which conductors are increased would add clarity to the existing rule. The reported Panel vote of Reject is inconsistent with the panel action as a revised Panel action is reported.

5-291 Log #2205 NEC-P05 **Final Action: Reject**
(250.122(B))

Submitter: Paul Guidry, Fluor Enterprises, Inc
Recommendation: Delete 250.122(B). This is a companion proposal to one to revise Table 250.122.
~~(B) Increased in Size. Where ungrounded conductors are increased in size, equipment grounding conductors, where installed, shall be increased in size proportionately according to the circular mil area of the ungrounded conductors.~~
Substantiation: This section will not be required if the equipment grounding conductor is based upon the size of the ungrounded conductors, much like 250.66 is presently. See example on companion proposal. The calculation required today doesn't take into account reduced sizes of equipment grounding conductors.
Panel Meeting Action: Reject
Panel Statement: The panel action on Proposal 5-281 was to reject, thus this companion proposal is also rejected.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-292 Log #2335 NEC-P05 **Final Action: Reject**
(250.122(B))

Submitter: Paul Guidry, Fluor Enterprises, Inc
Recommendation: Delete 250.122(B). This is a companion proposal to one to revise Table 250.122.
~~(B) Increased in Size. Where ungrounded conductors are increased in size, equipment grounding conductors, where installed, shall be increased in size proportionately according to the circular mil area of the ungrounded conductors.~~
Substantiation: 250.122(B) will not be required if the equipment grounding conductor is based upon the size of the ungrounded conductors, much like 250.66 is presently. See example on companion proposal. The calculation required today doesn't take into account reduced sizes of equipment grounding conductors found in normal multiconductor cable construction.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-291.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-293 Log #4604 NEC-P05 **Final Action: Reject**
(250.122(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the words "for reasons other than the application of ampacity adjustment factors" after "Where ungrounded conductors are increased in size".
Substantiation: This is a resubmittal of Proposal 5-276 in the previous code cycle, which was accepted and then reversed in the comment period. It should have remained accepted. Since this submitter cannot improve on the original substantiation, it is repeated below:

"Where ampacity correction factors are applied, the conductor is required to be protected at its ampacity after the adjustments, or it can be increased in size. Conductors are often increased in size when ampacity correction factors are necessary rather than reducing the size of the overcurrent protective device. The feeder or branch circuit equipment grounding in these cases is not impacted from a performance standpoint and the Code should not require more than the minimum sizes provided in Table 250.122 in these specific cases."

What can be done, however, is respond to the substantiation that came with the comment that resulted in rejection. The historical context for 250.122(B) addressed instances where increases to lower voltage drop implied a similar benefit for a long equipment grounding conductor. The substantiation for the subsequent change (from voltage drop to any increase) pointed to instances where designers would ignore the rule by simply stating that the increase was for design reasons unrelated to voltage drop. None of that had anything to do with an increase to meet minimum NEC requirements, even on a feeder that is only 10 ft long. Example D3(a) does not make this increase, but the issue will be reviewed in the 2011 edition of the Code.

In the prior comment period, the panel rejected this wording based on reasoning that derating reflected increased heating and the resistance of wire increases with increasing temperatures, which was comparable to the traditional voltage drop problem. This ignores the simple fact that the reason to apply derating factors is to prevent additional heating. The only way to make the comment substantiation correct is to violate the Code and not apply the derating factors.

For example, suppose a feeder is being designed to carry 100 A (noncontinuous), and is initially sized at 3 AWG THHN with an 8 AWG equipment grounding conductor. Then it is discovered that there is harmonic loading (derating factor = 0.8) and that the ambient temperature will be 50°C, resulting in an adjustment factor of 0.82. The smallest wire that can be used under these conditions is 1/0 AWG THHN, with an adjusted ampacity of 112 A. At 30°C (the usual design constraint in Table 310.16) and no 310.15(B)(2)(a) derating the resistance of 3 AWG is 0.209 Ù/1000 ft and that of 8 AWG is 0.653 Ù/1000 ft; (average out and back, out on the ungrounded conductor to the fault, and back over the equipment grounding conductor, being 0.431 Ù/1000 ft). At 50°C the resistance of 1/0 AWG is 0.112 Ù/1000 ft and that of 8 AWG is 0.702 Ù/1000 ft (average out and back being 0.407 Ù/1000 ft), about a 6 percent decrease. The total impedance of the faulted circuit decreased 6 percent over the conditions for which everyone agrees the values in Table 250.122 give acceptable performance. Of course, if the equipment grounding conductor were proportionately increased (to 4 AWG) the impedance would decline further, but a result that only improves on the NEC minimum requirement does not justify a still further improvement.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-290.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-294 Log #1512 NEC-P05 **Final Action: Reject**
(250.122(B), FPN (New))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Revise text to read as follows:

(B) Increased in Size. Where ungrounded conductors are increased in size, grounding conductors, where installed, shall be increased in size proportionally according to the circular mil area of the ungrounded conductors.

<u>FPN: A conductor that is larger than the minimum size that has sufficient ampacity for the intended installation, after any applicable adjustment factors and correction factors have been applied, is considered to have been increased in size.</u>
Substantiation: NOTE: This is the first of two similar proposals that I am submitting. Each is intended to resolve the same concern, but the two accomplish this resolution in different ways. The following substantiation paragraph is identical for both.

This proposal would correct an error in the use of the English language. The phrase "increased in size" is incomplete, without there being some reference point from which to determine whether the size had been increased. The phrase begs the question, "Increased from what?" Absent an answer to that question, the paragraph is unenforceable.

An absurd example would be if a mechanical engineer decides to use a larger pump than had appeared on the preliminary plans. As a result, the electrical engineer's final plans must show #10 wire, instead of the #12 shown in the preliminary plans. Is that an "increase in size"? Certainly not, because the #12 does not have sufficient ampacity for the new, larger motor. A more practical example would be if a project's ambient temperature forces the use of a larger wire, because of the correction factors of Table 310.16. Use of the smaller size wire would not have been legal, because its ampacity, under the conditions of use, was insufficient. Use of the next size larger wire was required, in order to obtain the minimum ampacity for the application. Is that an "increase in size"? It should not be, but the present wording of 250.122(B) does not make a clear distinction on this point.

The wording of this article needs to clearly establish whether it is intended to mean "an increase in size from a size that could have been legally used in this application," as opposed to "an increase in size from the value shown in the ampacity tables, before the application of any adjustment or correction factors."
Panel Meeting Action: Reject
Panel Statement: The recommended fine print note does not improve the understanding of the provision of 250.122(B).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-295 Log #1479 NEC-P05 **Final Action: Accept**
(250.122(F))

Submitter: Richard A. Janoski, Finleyville, PA
Recommendation: Revise text to read as follows:

250.122(F) Conductors inParallel. Where conductors are run in parallel in multiple raceways or cables as permitted in 310.4, the equipment grounding conductors, where used, shall be run in parallel in each raceway or cable. <u>Where conductors are run in parallel in the same raceway, cable, or cable tray as permitted in 310.4, a single equipment grounding conductor shall be permitted. Equipment grounding conductors installed in cable tray shall meet the minimum requirements of 392.3(B)(1)(c).</u>

Each ~~parallel~~ equipment grounding conductor shall be sized on the basis of the ampere rating of the overcurrent device protecting the circuit conductors in the raceway, cable <u>or cable tray</u> in accordance with Table 250.122.
Substantiation: When ungrounded conductors are installed in parallel in the same raceway, cable, or cable tray, only one equipment grounding conductor needs to be installed for the entire parallel set. The existing code section does not address parallel installations in a single raceway, or cable tray. Without this language, this code is often misinterpreted as there is a need to install one equipment grounding conductor for each ungrounded parallel set in a cable tray. The ungrounded conductors are being paralleled to create a combined current carrying capacity. There is no need for the equipment grounding conductor to be paralleled when installed in the single raceway, cable, or cable tray. The conductor would be sized per Table 250.122 and would be at sufficient size to serve as the grounding means for equipment and to also serve as the ground fault current path for the installation. The proposed text should

add clarity to how an equipment grounding conductor should be installed in parallel.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-296 Log #2865 NEC-P05 **Final Action: Reject**

(250.122(F))

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

250.122 Size of Equipment Grounding Conductors.

(F) Conductors in Parallel. Where conductors are run in parallel in multiple raceways or cables as permitted in 310.4, the equipment grounding conductors, where used, shall be run in parallel in each raceway or attached to each cable.

Substantiation: As written equipment ground conductors shall be connected in parallel "in" each raceway or cable. It has been interpreted that a cable equipment grounding conductor has to be included within the jacketed cable. Unless cables are special ordered for paralleling equipment grounding conductors, this can be a long lead item. Additionally, I do not believe the intent was to be restrictive that alternate methods could not be applied when a cable is installed in a raceway. Yes it is possible to include an appropriately size equipment grounding conductor with a cable in a raceway (where allowed by manufacturer's allowances or code references), it is not so clear when type MC, TC, or possibly other cable types are run in the open. This appropriately sized could be attached by a method (cable ties, tape, or any other acceptable method) along its entire length.

Panel Meeting Action: Reject

Panel Statement: The installation proposed by the submitter is a violation of Sections 300.3 and 250.134(B).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-297 Log #589 NEC-P05 **Final Action: Reject**

(250.126)

Submitter: Dennis J. Cox, Elkhart County Building Dept.

Recommendation: Add new text as follows:

Heading: 250.126 Identification of Wiring Device Terminals (and Splices)

Text: The Terminal (and splice connections) of the equipment grounding conductor shall be identified by one of the following:

(4) (A approved bare copper krimp connector).

Substantiation: This change would include wire nuts in device boxes to be identified as green or bare, for equipment grounding conductors. 250.126 is unclear, and this change would help people to better understand this section.

Panel Meeting Action: Reject

Panel Statement: This section is for device terminals only. The recommended text is overly restrictive, and there is no technical substantiation provided on why the present requirements are inadequate. The proposed text expands the requirement for identifying terminals to splices. The panel concludes that this section should apply to identification of wiring device terminals only.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-298 Log #4171 NEC-P05 **Final Action: Reject**

(250.128)

Submitter: Robert E. Johnson, ITE Safety

Recommendation: Add new text as follows:

250.128 Ground Access Point. A listed Ground Access Point shall be provided within three feet of and external to the service disconnect enclosure. this ground access point shall consist of a 1/4 in. square bar, minimum 6 in. long, suitable for ground connections. Provision of ground access points at other locations such as service panels is permitted. It shall be bonded to the grounded service conductor with minimum 6 AWG. Space for wiring or attachment devices of two inches on either side, one inch behind and one inch in front shall be provided. It shall be labeled or marked with the symbol shown in figure 250.126.

The ground access point shall be provided with two additional terminals for attachment of up to 6 AWG conductors and four terminal points for connections of up to 12 AWG conductors. The use of additional terminals or devices intended for ground access points is expected.

Substantiation: A host of points may need grounding in a typical home. These include

- Telephone systems
- CATV
- TV and similar antennas
- Heating ducts
- Aluminum siding
- Structural steel
- Metal greenhouse frames
- Other metallic structures or appliances likely to become energized.
- Plumbing for water, gas, air, etc.
- Portable generators

Installation of these systems is done by phone or cable techs, homeowners, plumbers, carpenters and many others who have no business getting into an electrical panel in order to make a secure ground. It is also not advisable to drill into an enclosure to drive ground screws into electrical boxes or wrap wires around mounting screws just to get a ground. They need a safe, dependable and accessible point to make ground connections. Thus provides a simple standardized mounting for use by manufacturers for lightning arrestors, terminals and other items needing to be grounded by a non-electrician.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The requirements proposed by the submitter are included in existing code language in Section 250.94 for the intersystem bonding termination. The product prescriptive text is unnecessary and overly restrictive as there are already several methods and listed products to provide the bonding termination desired. There is no technical substantiation to provide an access point for other than those systems covered in Section 250.94. The intersystem bonding termination is not limited to only three termination points.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-299 Log #3402 NEC-P05 **Final Action: Reject**

(250.130(A))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force

Recommendation: Revise text to read as follows:

250.130(A) For Grounded Systems. The connection shall be made by bonding the equipment grounding conductor to the grounded service-entrance conductor and the grounding electrode conductor.

Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:

Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.

Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 5-88.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

WHITE, C.: See My Affirmative with Comment on 5-88.

5-300 Log #3404 NEC-P05 **Final Action: Reject**
(250.130(C)(4))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
250.130(C)
(4) For grounded systems, the grounded service-entrance conductor within the service equipment enclosure.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-301 Log #1310 NEC-P05 **Final Action: Reject**
(250.132)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Isolated sections of metal raceways or cable armor, ~~where required~~ to be grounded shall be connected to an equipment grounding conductor or bonding conductor connected to ground. ~~In accordance with 250.134.~~
Substantiation: The provision should also apply where grounding is done by choice and not required. Bonding jumpers should be permitted. 250.134 already applies.
Panel Meeting Action: Reject
Panel Statement: The technical substantiation does not support having to only bond the raceway to ground (earth) and not ensure a low impedance path back to the source per Sections 250.4(A)(5) and 250.4(B)(4).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-302 Log #2315 NEC-P05 **Final Action: Reject**
(250.134)

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add a last sentence to the first paragraph to read...
Equipment grounding conductors shall be connected to a fixed metal part of the equipment.
Substantiation: It's never a good idea to loose a grounding connection especially when servicing equipment involves removing covers that are used for grounding continuity. Similar language already exists in Article 680 and should be required for all equipment.
Panel Meeting Action: Reject
Panel Statement: The term "fixed" does not provide any guidance on the proper location of the connection.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-303 Log #2316 NEC-P05 **Final Action: Reject**
(250.140)

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add a last sentence to the first paragraph to read...
Equipment grounding conductors shall be connected to a fixed metal part of the equipment.
Substantiation: It's never a good idea to loose a grounding connection especially when servicing equipment involves removing covers that are used for grounding continuity. Similar language already exists in Article 690 and should be required for all equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-302.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-304 Log #3061 NEC-P05 **Final Action: Accept**
(250.142(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(B) Load-Side Equipment. Except as permitted in 250.30(A)(1) and 250.32(B) exception, a grounded circuit conductor shall not be used for grounding non–current-carrying metal parts of equipment on the load side of the service disconnecting means or on the load side of a separately derived system disconnecting means or the overcurrent devices for a separately derived system not having a main disconnecting means.
Exceptions to remain unchanged.
Substantiation: This is simply correcting the code reference after the 2008 change to 250.32(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-305 Log #1314 NEC-P05 **Final Action: Reject**
(250.146(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Where the box is mounted on the surface or extends past the surface direct metal-to-metal...(remainder unchanged).
Substantiation: Edit. The provision should include semi-recessed boxes.
Panel Meeting Action: Reject
Panel Statement: The recommended text does not add clarity to the current requirement. The current requirement ensures that there will always be direct metal-to-metal contact between the surface-mounted box and the device. A partially recessed box does not provide the same assurance.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-306 Log #4605 NEC-P05 **Final Action: Accept**
(250.146(A))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the words "or nut" after "thread locking or screw" and before "locking means and".
Substantiation: This addition will clarify that the knurled nut surfaces now commonly provided with raised covers meet this requirement. Otherwise the terminology can be read to insist on something that actually engages the screw, such as a lock washer under the screw head ("screw locking"), or something which actually engages the threads ("thread locking"), such as a jam nut.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-307 Log #1313 NEC-P05 **Final Action: Reject**
(250.148)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Metal enclosures (boxes) are already required to be grounded by 250.86 and provided with grounding means (314.40(D)). Whether circuit conductors are spliced or terminated in equipment is irrelevant; if they pass through unspliced or not terminated the provision doesn't apply. Connection to a nonmetallic box where nothing is to be grounded serves no purpose. This provision doesn't cover enclosures other than boxes, such as cabinets, wireways, or auxiliary gutters. Connection of grounding conductors is covered

elsewhere in the Code such as 250.148(A) and (C). The exception is covered by 250.146(D).
Panel Meeting Action: Reject
Panel Statement: The panel concludes that there are necessary rules in 250.148 that cover grounding continuity and attachment of grounding equipment to the box. Additionally, the panel does not follow the circular logic provided in the substantiation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-308 Log #4530 NEC-P05 **Final Action: Reject**
(250.150 (New))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
250.150 Snap Switches . Snap switches, including dimmer and similar control switches, shall be connected to an equipment grounding conductor. Snap switches shall be considered to be part of an effective ground-fault current path if either of the following conditions is met:
(1) The switch is mounted with metal screws to a metal box or metal cover that is connected to an equipment grounding conductor or to a nonmetallic box with integral means for connecting to an equipment grounding conductor.
(2) An equipment grounding conductor or equipment bonding jumper is connected to an equipment grounding termination of the snap switch.
Exception: If an equipment grounding conductor does not exist within the enclosure for snap-switches or similar equipment, a snap switch without a connection to an equipment grounding conductor shall be permitted for replacement purposes only. A snap switch wired under the provisions of this exception and located within reach of earth, grade, conducting floors, or other conducting surfaces shall be provided with a faceplate of nonconducting, noncombustible material.
Substantiation: This proposal intends to relocate rules on connections of equipment grounding conductor to snap switches from 404.9(B) to Article 250 under the jurisdiction of CMP-5. The concept in 404.9(B) of allowing a GFCI device to serve as a substitute for an equipment grounding conductor is not included to ensure an effective ground-fault circuit path.
In essence, the practice of installing a GFCI as a substitute for an equipment grounding conductor connected creates a “trap” of sorts. Since a ground-fault return path is not provided, a ground-fault in a switch box can energize a metal cover waiting for the unsuspecting user person to complete the fault return path by contacting the energized switch plate and a grounded surface. The person provides the test path for the GFCI device! This hardly seems appropriate!
If that isn’t bad enough, recent published data from UL indicates nearly 10 percent of the existing GFCI devices tested as a part of the Aging Wiring Study would not operate properly. IAEI published an article several years ago that showed a significant number of GFCI devices tested by home inspectors would not function properly. Hardly the sort of reports needed to instill confidence in the technology!
Section 3.3.4 of the NEC Style Manual states that “where” should not be used to mean “when” or “if.” This proposal intends to use the word “if” where appropriate.
Panel Meeting Action: Reject
Panel Statement: The recommended text is already covered by the requirements in Section 404.9(B). Additionally, see the panel statement on Proposal 5-264 relative to the GFCI allowance for limited applications where equipment grounding conductors are not present.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-309 Log #856 NEC-P05 **Final Action: Reject**
(250.162(A) Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Exception No. 2: A rectifier-derived dc system supplied from ~~an~~ a separately derived ac system shall not be required to be grounded.
Substantiation: Some rectifier systems do not provide isolation from the ac supply.
Panel Meeting Action: Reject
Panel Statement: The substantiation is only a statement with no unsafe condition described. The substantiation does not support the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-310 Log #984 NEC-P05 **Final Action: Reject**
(250.166(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of (A) and (B);
(A) “...the grounding electrode conductor shall not be smaller than the neutral conductor if made of the same material or if made of different material shall have an ampacity not less than that of the neutral conductor and not smaller than 8 AWG if copper and not smaller than 6 AWG if aluminum or copper-clad aluminum.”
(B) “...the grounding electrode conductor shall not be smaller than the largest conductor supplied by the system if made of the same material or if made of different material shall have an ampacity not less than the largest conductor supplied by the system and not smaller than 8 AWG if copper or 6 AWG if aluminum or copper-clad aluminum.
Substantiation: Edit. Different material for grounding electrode conductors should be covered in the provision.
Panel Meeting Action: Reject
Panel Statement: The proposal is not editorial. The added text for the copper or aluminum does not add clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-310a Log #CP511 NEC-P05 **Final Action: Accept**
(250.178)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
250.178 Instrument Equipment Grounding Conductor.
Substantiation: The revision has been made to correlate with the deletion of the term “Grounding Conductor” in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term “grounding conductor” from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman’s report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term “grounding conductor.”

5-311 Log #4366 NEC-P05 **Final Action: Reject**
(250.184(A)(1) and 250.184(A)(3))

Submitter: Donald W. Zipse, Electrical Forensics, LLC
Recommendation: Delete Section 250.184 (A) (1) and Section 250.184 (A) (3) and renumber
Substantiation: It is important to re-state the purpose of the NEC: “It is the safeguarding of persons from hazards arising from the use of electricity.
By continuing to allow the “grounded circuit conductors”, commonly referred to as the neutral to be installed bare allows the neutral current to flow uncontrolled over the earth. This uncontrolled flow of “stray current” results in the potential to harm not only humans but to cows and pigs but has resulted in severely injuring two teenagers and killing another during this past code cycle. (New information)
“In order to have and maintain an electrical installation safe from electrical shocks and to prevent electrocution from stray current: All continuously, flowing man made electric current shall be contained within a conductor, insulated from earth, except at one place within the system and only one place can the neutral be connected to earth.”
This is accomplished within industrial facilities since they do not make the bastardized electrical transformer connection between the primary neutral and the secondary neutral, which allows the continuous flow of dangerous and hazardous high voltage neutral current over the earth and ground conductors. The industrial facilities keep the neutral insulated and carry the ground conductor with the phase conductors. (See IEEE Standard 141, “Electrical Power Distribution”, The Red Book.)
Within the past three years 4 young people were injured due to the uncontrolled flow of neutral current in the earth. Two suffered permanent brain damage and another was declared dead due to electrocution from neutral current (Bryan K. Fitzpatrick (“Bryan”) and Diana J. Fitzpatrick (“Diana”), individually, and Timothy Sean Fitzpatrick (“Timothy”), a minor, by and through his Next Friend Bryan K. Fitzpatrick).
Over thirty years ago the Code Making Panel charged with trailers realized persons were being killed by neutral current flowing uncontrolled on the trailers and the over the earth. That panel required an insulated neutral conductor run to all trailers. The next code cycle the panel responsible for marinas adopted the same requirement for insulated neutrals. For 21 years code proposals were submitted to a third panel to make the neutral insulated, which after seven (7) code cycles they did.
Proposals have been submitted to other sections of the code to eliminate bare neutral conductors.
Panel Meeting Action: Reject
Panel Statement: The submitter’s substantiation does not apply to the recommendation. Deleting Section 250.184(A)(1) eliminates all of the insulation requirements for installing neutrals for systems and circuits of 1 kV or over. Section 250.184(A)(3) does not exist.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-312 Log #4365 NEC-P05 **Final Action: Reject**
(250.184(C))

Submitter: Donald W. Zipse, Electrical Forensics, LLC
Recommendation: Delete Section 250.184 (C)
Substantiation: I am trying to save paper by asking the panel to re-read my NEC 2008 cycle proposal for the elimination of the dangerous and hazardous multigrounded neutral distribution system.

However, new information detailing how dangerous multigrounded neutral distribution system have come to light during the past three years. Within the past three years 4 young people were injured due to the uncontrolled flow of neutral current in the earth from a multigrounded neutral distribution system.. Two suffered permanent brain damage and another was declared dead due to electrocution from neutral current (Bryan K. Fitzpatrick ("Bryan") and Diana J. Fitzpatrick ("Diana"), individually, and Timothy Sean Fitzpatrick ("Timothy"), a minor, by and through his Next Friend Bryan K. Fitzpatrick).

The solution is to require a transformer at the interface with the utilities dangerous and hazardous multigrounded neutral distribution system. I have installed such a transformer at my summer home in Rehoboth Beach, DE. The New York PUC required the local utility to install a test transformer several years ago. The documentation appeared as an IEEE technical paper.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided documented substantiation for the recommendation to delete Section 250.184(C). Deletion of this section would eliminate an important and safe option for neutral installation on systems and circuits of 1 kV and over.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:

MOHLA, D.: The Panel Statement is not correct. This proposal has been presented many times in the past for each Code cycle. Each time the Proposer presents additional substantiation of the hazards of the multigrounded system without repeating the previous substantiation. New Panel members are remiss if they do not seek out the previous substantiation which is pertinent to deciding how to address this issue. The Panel Statement is not correct in stating that the multigrounded neutral system is safe. This section was added in a previous Code cycle without substantiation except to state that it was permitted in the National Electric Safety Code used by the Utilities. Use by the Utilities is for the purpose of protecting the linemen and does not address the issue of ground currents that are hazardous to the public.

5-312a Log #CP512 NEC-P05 **Final Action: Accept**
(250.186(A))

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:

(A) Location. The grounding impedance shall be inserted in the grounding <u>electrode</u> conductor between the grounding electrode of the supply system and the neutral point of the supply transformer or generator.
Substantiation: The revision has been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-313 Log #615 NEC-P05 **Final Action: Accept in Principle**
(250.190)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel's 6 and 10 for comment.
Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new text to existing 250.190, second paragraph and FPN No. 1 to read:

Equipment grounding conductors not an integral part of a cable assembly shall not be smaller than 6 AWG copper or 4 AWG aluminum. <u>Equipment grounding conductors shall be sized in accordance with Table 250.122 based on the time phase overcurrent setting of the protection device.</u>
<u>FPN No. 1: The protection device may be a breaker, fuse, or protection relay.</u>
<u>FPN No. 2:</u> See 250.110, Exception No. 2, for pole-mounted distribution apparatus.
Substantiation: Presently, there isn't any guidance given in Art. 250, Part X (systems over 1kV) on what the minimum equipment grounding conductor size is to be based on other than the automatic overcurrent device ahead of the equipment. The addition of this sentence should clarify that the size should be based upon the protective device whether it's a breaker, fuse or relay.
Panel Meeting Action: Accept in Principle

Revise Section 250.190 in the 2008 NEC to read:
250.190 Grounding of Equipment.
(A) Equipment Grounding. All non–current-carrying metal parts of fixed, portable, and mobile equipment and associated fences, housings, enclosures, and supporting structures shall be grounded.
Exception: Where isolated from ground and located such that any person in contact with ground cannot contact such metal parts when the equipment is energized shall not be required to be grounded.
FPN: See 250.110, Exception No. 2, for pole-mounted distribution apparatus.
(B) Grounding Electrode Conductor. If a grounding electrode conductor connects non-current carrying metal parts to ground, the grounding electrode conductor shall be sized in accordance with Table 250.66 based on the size of the largest ungrounded service, feeder, or branch circuit conductors supplying the equipment. The grounding electrode conductor shall not be smaller than 6 AWG copper or 4 AWG aluminum.
(C) Equipment Grounding Conductor. Equipment grounding conductors shall comply with (C)(1) through (C)(3)
(1) General. Equipment grounding conductors that are not an integral part of a cable assembly shall not be smaller than 6 AWG copper or 4 AWG aluminum.
(2) Shielded Cables. If the cable assembly is suitably rated for the ground fault current and is of the concentric neutral type, the shield conductors shall be permitted as the equipment grounding conductor. For solidly grounded systems, the cable copper screen or ribbon shield or combination of both shall not be used as an equipment grounding conductor.
(3) Sizing. Equipment grounding conductors shall be sized in accordance with (a) and (b) as follows:
(a) Equipment grounding conductors shall be sized in accordance with Table 250.122 based on the current rating of the fuse or the overcurrent setting of the protective relay.
FPN: The overcurrent rating for a circuit breaker is the combination of the current transformer ratio and the current pickup setting of the protective relay.
(b) Equipment grounding conductors that are not an integral part of a cable assembly shall not be smaller than 6 AWG copper or 4 AWG aluminum.
~~FPN No.1: The protection device may be a breaker, fuse, or protection relay.~~
~~FPN No. 2: See 250.110, Exception No. 2, for pole-mounted distribution apparatus.~~
Panel Statement: The panel revision of Section 250.190 separates equipment connected to an equipment grounding conductor from equipment connected to a grounding electrode conductor and provides requirements for connection and conductor size. Editorial changes and new fine print notes have been added for clarity and to assist the user in understanding these provisions. The panel action meets the intent of the recommendation relative to the sizing requirements for equipment grounding conductors. The panel action incorporates a new provision on the limited use of cable shields as equipment grounding conductors based on their action on Proposal 5-314. CMP-5 recommends that this action be referred to CMP-6 and CMP-10 for comment.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:

HAMMEL, D.: I agree with the revision of Section 250.190. However, the text of the current second paragraph is repeated in the revised 250.190(C)(1) and (C)(3)(b). It is not necessary to repeat the rule.

MOHLA, D.: If the cable assembly <u>metallic insulation tape</u> shield or <u>drain wire</u> shield is suitably rated for the ground fault current ~~*and*~~ or is of the concentric neutral type <u>with an overall cable jacket</u>, the <u>metallic</u> shield conductor shall be permitted as the equipment grounding conductor. ~~For solidly grounded systems,~~ <u>The</u> Cable <u>copper tape screen</u> or ~~ribbon~~ drain wire shield or combination of both shall not be used as equipment grounding conductor <u>for solidly grounded systems.</u>

Terms used in the proposal have been corrected to utilize terminology used in 310.6. Concentric neutral wires without an overall jacket have been reported damaged thereby affecting the integrity of shield continuity. Last sentence has been rearranged for clarity<u>.</u>

5-314 Log #3853 NEC-P05 **Final Action: Accept in Principle**
(250.190)

Submitter: Bill McGovern, City of Plano
Recommendation: Revise text as follows:

Equipment grounding conductors not an integral part of cable assembly shall not be smaller than 6 AWG copper or 4 AWG aluminum. <u>The cable copper screen or ribbon shield or combination of both shall not be used as as an equipment grounding conductor.</u>
Substantiation: There have been three instances of medium voltage distribution systems 24940Y/14400 being installed using ribbon shield MV cable and the ribbon being used as the equipment grounding conductor. The cross sectional area of the copper ribbon only equates to an 8 AWG copper conductor, too small to meet the requirements of 250.190. Placing this statement in the body of the text makes it clear in no uncertain terms that an equipment grounding conductor is required to be installed along with the medium voltage feeder conductors.

Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 5-313 meets the intent of the recommendation.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-315 Log #616 NEC-P05 **Final Action: Accept in Principle**
(250.191 (New))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new Section 250.191 to read:
<u>250.191 Grounding System in AC Substations. For AC Substations, the grounding system shall be in accordance with Part III of Article 250.</u>
<u>FPN: For further information on AC substation grounding, see ANSI/IEEE 80-2000, *IEEE Guide for Safety in AC Substation Grounding.*</u>
Substantiation: The NEC presently doesn't address part of the grounding systems commonly used in AC high voltage substations such as touch and step bonding. NEC requirements are a good start, but IEEE 80 goes into much more detail on how to design a proper grounding system for AC substations.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
250.191 Grounding System <u>at</u> ~~in~~ AC Substations. For AC substations, the grounding system shall be in accordance with Part III of Article 250.
FPN: For further information on <u>outdoor</u> AC substation grounding, see ANSI/IEEE 80-2000, *IEEE Guide for Safety in AC Substation Grounding.*
Panel Statement: The panel revision clarifies the title of the new section and provides more specificity to the fine print note.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this revision. CMP-5 is aware that this provision is somewhat redundant, but concluded that the reference to Part III is warranted. Where high and medium voltage systems are concerned, it is important to include this language here to clarify that Part III does apply unless excluded by falling under the NESC or another exemption. It is recognized that more complete requirements related to medium and high voltage installations need to be included in the NEC for installations where the NEC applies.

ARTICLE 280 — SURGE ARRESTERS

5-316 Log #2730 NEC-P05 **Final Action: Accept**
(280.5)

Submitter: T. W. Olsen, Siemens Energy, Inc.
Recommendation: Delete 280.5, without substitution. ~~280.5 Listing. A surge arrester shall be a listed device.~~
Substantiation: 280.5 was added in the 2008 edition of NFPA 70. There are no listed surge arresters for 1000V and higher. For reference, see category VZQK in the UL. This category is entitled "Surge Arresters 1000 Volts and Higher", and it has no listing of firms that have a listing to this category. The UL reference is available at the following website http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm, and enter VZQK is in the "UL Category Code" box.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
MELLO, C.: See the ballot and comment for Proposal 5-317.
WILLIAMS, D.: Surge Arresters should remain listed and this proposal be rejected. As an electrician or an electrical inspector we often refer to the installation instructions that come with listed products for installing them properly. There is comfort in knowing that the product being installed has been evaluated by a National Recognized Testing Laboratory and tested to an appropriate listing standard. There are no surge arresters listed at this time, because they have not been submitted to a testing laboratory to be considered for meeting the standard criteria for surge arresters. Surge arresters are a product that electricians and inspectors are not very familiar with and the listing mark should be something they look for in choosing a product.

5-317 Log #2863 NEC-P05 **Final Action: Accept**
(280.5)

Submitter: Paul Lindemulder, MacLean Power Systems
Recommendation: Delete 280.5
~~280.5 Listing. A surge arrester shall be a listed device.~~
Substantiation: The 2008 NEC introduced a Listing requirement for surge arresters rated over 1000V for the first time in the history of the NEC. There was no substantiation presented that a safety issue exists with arresters rated over 1kV. The Listing requirement for surge protection was introduced into the NEC when Article 285 was introduced into the NEC to ensure the technology employed in a TVSS would protect safely.
The UL substantiation for adding 280.5 to the 2008 NEC refers strictly to low voltage arresters and UL1449. However section 280 is titled Surge Arresters Over 1kV. These arresters are not tested to UL1449 (as they note) and have very different application and test requirements. The only reference to high voltage arresters is that "The Surge Arrester designation will only be retained for devices used in circuits of 1 kV and over".
Therefore Article 280.5 does not apply to low voltage surge protective devices or conflict with the requirement to list them. Therefore their argument provides no substantiation for listing surge arresters over 1kV.
Surge arresters rated above 1000V are governed by the ANSI/IEEE standard. More than 99% of arresters installed in the US are for use by the electric utilities. Electric utilities maintain their own approval process for manufacturers based on the ANSI/IEEE standard. UL does not have the capability to test surge arresters rated 1000V and above. To require listing by UL will be redundant testing for products that have already been certified independently for utility approval.
Installation of surge arresters is performed by installers trained and certified specifically for equipment 1000V and above. Of the arresters installed in non-utility plant, by virtue of the safety requirements for higher than 1kV, all of these arresters are installed in safe locations not accessible to the public. Safety requirements are described in the 2007 National Electrical Safety Code (NESC) and OSHA 1910.269. The UL category has been in existence for years but there have been no market or safety issues that have led any surge arrester manufacturers to pursue such a listing. To date, there are no Listed surge arresters over 1000V. Currently there is no means to comply with the NEC requirement for Listed arrester over 1000V and there is no substantiation that would indicate a safety issue exists for arresters rated over 1000V. The Listing requirement for arrester has no basis for being in the NEC and should be deleted.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
MELLO, C.: Just because there are no Listings is no reason to delete this requirement. This is a new requirement and has not been really implemented by enforcement to cause listings to happen. Without a Listed surge arrester there is no way for users that are not part of utilities to have assurance of its safety, proper operation, and compliance with the applicable safety standard(s). Contrary to what was presented, these surge arrestors at the 5 kV, 8 kV, 15 kV, 25 kV and higher voltage classes are being installed at other than the interface of the utility and the premises wiring. These products are being installed by regular electricians separately or being installed within medium voltage equipment being installed or maintained by electricians. There are numerous projects underway today with outdoor substations, padmounted transformers and medium voltage switchgear incorporating these type surge arresters. Changes to the IEEE standard for surge arresters adopted since the completion of the 2008 NEC cycle, now requires short circuit testing and a short circuit rating. The present surge arrestors on the market likely are not tested for short circuit as yet and will not be unless there is a requirement to do so. The base technology of these surge arresters, is a MOV, which is the same technology as the under 1KV SPDs covered in UL 1149 and required by 285.5. The substantiation for the inclusion of listing for these in Article 285 was based on the same concerns for the reliability and performance under abnormal conditions and that a failure does not cause additional damage or hazards to the installation. It should be noted that there has been one submission by a manufacturer for a surge arrester over 1KV and that certification project is underway.
WILLIAMS, D.: See my Explanation of Negative on Proposal 5-316 (Log #2730).

5-318 Log #3592 NEC-P05 **Final Action: Accept**
(280.5)

Submitter: Chad Kennedy, Square D Company/Schneider Electric / Rep. NEMA
Recommendation: Delete 280.5
~~280.5 Listing. A surge arrester shall be a listed device.~~
Substantiation: The 2008 NEC introduced a Listing requirement for surge arresters rated over 1000V for the first time in the history of the NEC. There was no substantiation presented that a safety issue exists with arresters rated over 1kV. The Listing requirement for surge protection was introduced into the NEC when Article 285 was introduced into the NEC to ensure the technology employed in a TVSS would protect safely.
To date, there are no Listed surge arresters over 1000V. The UL category has been in existence for years but there has been no market or safety reason to pursue such listing. As a purchaser of these devices, there is no means to comply with the NEC requirement for a Listed arrester over 1000V and there is no substantiation that would indicate a safety issue exists for arresters rated over 1000V. The Listing requirement for arrester has no basis for being in the NEC and should be deleted.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
MELLO, C.:
See the ballot and comment for Proposal 5-317
WILLIAMS, D.: See my Explanation of Negative on Proposal 5-316 (Log #2730).

5-319 Log #3772 NEC-P05 **Final Action: Accept**
(280.5)

Submitter: Daleep C. Mohla, DCM Electrical Consulting Services, Inc.
Recommendation: Delete 280.5 text.
Substantiation: No listed surge arresters are available in the current market.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
MELLO, C.:
See the ballot and comment for Proposal 5-317
WILLIAMS, D.: See my Explanation of Negative on Proposal 5-316 (Log #2730).

5-319a Log #CP513 NEC-P05 **Final Action: Accept**
(280.21)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
The arrester ~~grounding conductor~~ shall be connected to one of the following:
Substantiation: The revision has been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-320 Log #3405 NEC-P05 **Final Action: Reject**
(280.21(1))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
280.21 Connection.
(1) Grounded service-<u>entrance</u> conductor.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-<u>Entrance</u> Cable. Service-<u>entrance</u> conductors made up in the form of a cable.
Service-<u>Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-<u>entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 5-88.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
WHITE, C.: See My Affirmative with Comment on 5-88.

5-320a Log #CP514 NEC-P05 **Final Action: Accept**
(280.24, 280.24(A), 280.24(B))

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
The ~~grounding conductor of a~~ surge arrester protecting a transformer that supplies a secondary distribution system shall be interconnected as specified in 280.24(A), (B), or (C).
(A) Metallic Interconnections. A metallic interconnection shall be made to the secondary grounded circuit conductor or the secondary circuit grounding <u>electrode</u> conductor provided that, in addition to the direct grounding connection at the surge arrester, the following occurs:
(B) Through Spark Gap or Device. Where the surge arrester grounding <u>electrode</u> conductor is not connected as in 280.24(A) or where the secondary is not grounded as in 280.24(A) but is otherwise grounded as in 250.52, an interconnection shall be made through a spark gap or listed device as required by (B)(1) or (B)(2):
Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-320b Log #CP515 NEC-P05 **Final Action: Accept**
(280.25)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
280.25 Grounding <u>Electrode</u> Conductor Connections and Enclosures.
Except as indicated in this article, surge-arrester grounding <u>electrode</u> conductor connections shall be made as specified in Article 250, Parts III and X. Grounding <u>electrode</u> conductors installed in metal enclosures shall comply with 250.64(E).
Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

ARTICLE 285 — TRANSIENT VOLTAGE SURGE SUPPRESSORS: TVSSs

5-321 Log #4376 NEC-P05 **Final Action: Reject**
(285.4)

Submitter: Alan Manche, Square D Company/Schneider Electric
Recommendation: Revise text in paragraph 285.4 as follows:
285.4 ~~Number Required~~ <u>Surge Protection Devices for the Electrical System</u>.
Where used at a point on a circuit, the SPD (surge arrester or TVSS) shall be connected to each ungrounded conductor.
(A) <u>SPDs in Dwelling Units</u>. <u>A surge protective device (SPD) shall be installed either integral or immediately adjacent to the service disconnecting means of the dwelling unit(s).</u>
<u>(1) Type. The surge protective device shall be a Type 1 or Type 2 SPD.</u>

(2) Replacement. When the service equipment is replaced, all of the requirements of this section shall apply.

Substantiation: The damage and losses associated with electrical surge sources including, lightning, utility switching and even internal operation of the electrical system continues to grow. Some damage is easily recognized and other is more difficult to understand simply based on shortened life of the device with electronics. I have personally experienced losses due to surges which include the loss of the communication interconnects for the smoke alarms, and the control panel within the air-handling equipment within my home. I only installed a whole house surge protection device at my service after the losses in my home that mounted to hundreds of dollars due to replacing the smoke alarms and having the air-handler service call in order to replace the electronic controller.

Panel Meeting Action: Reject

Panel Statement: Installation of surge protection is a design issue. Where mandated by design specification, surge protection becomes a requirement, but inadequate substantiation has been provided that demonstrates a need for requiring surge protection in the type of occupancy listed in this proposal.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

WILLIAMS, D.: Surge protective devices can prevent damage to electrical components, reduce electrical fires, and may save lives. I need to relate a fire that I investigated about a year ago. The utility high-voltage line had one of the insulators break due to high winds and the line landed on the 120/240 service drop feeding a house. A person driving by saw the front of a house on fire, across the street from the short circuit. The fire started at the outside receptacle on the front of the house. There was nothing plugged into the outlet when the fire occurred. The fire damaged the electrical device box and the siding on the front of the house. There was also a small fire in a GFCI receptacle device in the bathroom. Appliances were also affected by this high voltage surge into the premise wiring. If this home would have been protected by a surge protective device this fire may have been prevented. Fortunately someone saw the fire before it caused extensive damage and the residents were not harmed.

5-322 Log #4377 NEC-P05 **Final Action: Reject**
(285.4)

Submitter: Alan Manche, Square D Company/Schneider Electric

Recommendation: Revise text in paragraph 285.4 as follows:

285.4 ~~Number Required~~ Surge Protection Devices for the Electrical System.

Where used at a point on a circuit, the SPD (surge arrester or TVSS) shall be connected to each ungrounded conductor.

(B) SPDs Occupancies other than Dwelling Units. A surge protective device (SPD) shall be installed either integral or immediately adjacent to the service disconnecting means for occupancies including banks, churches, healthcare facilities, hotels, office buildings, restaurants, schools, stores and other similar occupancies where electronics are likely to be utilized.

(1) Type. The surge protective device shall be a Type 1 or Type 2 SPD.

(2) Replacement. When the service equipment is replaced, all of the requirements of this section shall apply.

Substantiation: The damage and losses associated with electrical surge sources including, lightning, utility switching and even internal operation of the electrical system continues to grow. Some damage is easily recognized and other is more difficult to understand simply based on shortened life of the device with electronics. It is common for a building to house multiple occupancies and the occupant does not own or have access to provide the protection necessary at the service in order to protect the electrical system or electronic assets of the individual occupant.

Many federal agencies have surge suppression requirements for their various electrical systems. Agencies that have established standard facility designs have SPD mandated as well as virtually all commercial designs. There are several agencies with very specific SPD requirements, based on the criticality of their power supplies. The FAA has categorized various bus segments of specific facilities as “critical” (the output of facility UPS systems), “essential” (lighting, HVAC) or “Standby” (emergency generator).

The FAA mandates specific SPD requirements for all Air Traffic Control Towers (ATCTs) and Terminal Radar Approach Control (TRACON) facilities and Air Traffic Control Centers (ATCC). In fact, virtually every FAA system, including runway lighting, radar, shelters, etc., have mandatory SPD requirements. SPD requirements also exist for Signal Data and Control Lines.

The occupancies listed in the proposal are already found and recognized in Table 220.12 in the NEC for load calculations. The entire list of occupancies was not included as surge protection may not be necessary in a garage, warehouse or other areas not listed.

Panel Meeting Action: Reject

Panel Statement: Installation of surge protection is a design issue. Where mandated by design specification, surge protection becomes a requirement, but inadequate substantiation has been provided that demonstrates a need for requiring surge protection in the types of occupancies listed in this proposal.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

WILLIAMS, D.: See my Explanation of Negative on Proposal 5-321 (Log #4376).

5-323 Log #2884 NEC-P05 **Final Action: Reject**
(285.8 (New))

Submitter: William Gross, Electric Service of Clinton

Recommendation: Add new text to read as follows:

285.8 Status Indication. An SPD device shall be equipped with status indication that the device is energized and indication that they are no longer effective or usable.

Substantiation: Many SPD devices do not indicate whether they are still effective for suppressing transient voltages. The MOV technology on which these devices are based will degrade as they absorb transient energy making them ineffective over time. Therefore, these devices should have status indication to alert the user that these devices are no longer effective and should be replaced.

Panel Meeting Action: Reject

Panel Statement: This proposed revision addresses a product standard issue and should be addressed in that arena. If the product standard requires this indication, then there is no need for inclusion in the NEC. Introducing this as a requirement in the code without a requirement in UL 1449 could lead to field installation of indication devices that could impact the original product certification or listing.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

5-323a Log #CP516 NEC-P05 **Final Action: Accept**
(285.23(B))

Submitter: Code-Making Panel 5,

Recommendation: Revise text to read as follows:

(B) At the Service. When installed at services, ~~the grounding conductor of a~~ Type 1 SPD shall be connected to one of the following:

Substantiation: The revision has been made to correlate with the deletion of the term “Grounding Conductor” in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term “grounding conductor” from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman’s report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term “grounding conductor.”

5-324 Log #3704 NEC-P05 **Final Action: Accept in Principle**
(285.25)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise text to read as follows:

285.25 Type 3 SPDs. Type 3 SPDs (TVSSs) shall be permitted to be installed anywhere on the load side of branch-circuit overcurrent protection up to the equipment served~~,~~. ~~provided t~~The Type 3 SPD connection ~~is~~must be a minimum 10 m (30 ft) of conductor distance from the service or separately derived system disconnect if the Type 3 SPD includes a cautionary marking, tag, or instruction statement pertaining to the 10 m (30 ft) distance.

Substantiation: The product listing standard, UL 1449, third edition, includes an exception for Type 3 SPDs that have been subjected to the Type 2 SPD Nominal Discharge Current Test to be installed anywhere on the load side of the branch-circuit overcurrent protection. The requirement and exception are as follows:

“64.2 Type 3 SPDs shall be marked on the unit, a marking tag, or an instruction sheet packed with the unit – “CAUTION – Do not install this device if there is not at least 10 meters (30 feet) or more of wire between the electrical outlet and the electrical service panel.”

Exception: Type 3 SPDs that have been subjected to the Nominal Discharge Current Test need not be provided with this marking.”

Since UL 1449 was not finalized at the time of the Code-Making Panel discussions for the 2008 NEC, there is no allowance for this exception in the 2008 NEC. The proposed revision corrects this omission.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

285.25 Type 3 SPDs. Type 3 SPDs (TVSSs) shall be permitted to be installed anywhere on the load side of branch-circuit overcurrent protection up to the equipment served~~,~~. ~~provided t~~The Type 3 SPD connection ~~is~~ ~~must~~ shall be a minimum 10 m (30 ft) of conductor distance from the service or separately derived system disconnect if the Type 3 SPD includes a cautionary marking, tag, or instruction statement pertaining to the 10 m (30 ft) distance.

Panel Statement: The panel action replaces the word “must” with “shall” to comply with the NEC Style Manual rules for mandatory requirements.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

5-324a Log #CP517 NEC-P05 **Final Action: Accept**
(285.27)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
An SPD (surge arrester or TVSS) shall be permitted to be connected between any two conductors — ungrounded conductor(s), grounded conductor, equipment grounding conductor, or grounding electrode conductor. The grounded conductor and the equipment grounding conductor shall be interconnected only by the normal operation of the SPD (surge arrester or TVSS) during a surge.
Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

5-324b Log #CP518 NEC-P05 **Final Action: Accept**
(285.28)

Submitter: Code-Making Panel 5,
Recommendation: Revise text to read as follows:
285.28 Grounding Electrode Conductor Connections and Enclosures.
Except as indicated in this article, SPD grounding connections shall be made as specified in Article 250, Part III. Grounding electrode conductors installed in metal enclosures shall comply with 250.64(E).
Substantiation: The revisions have been made to correlate with the deletion of the term "Grounding Conductor" in Article 100. The panel notes that this proposal is to only make the necessary revision in terminology for correlation with their action on Proposal 5-13.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
JOHNSTON, M.: Continue to accept this proposal as this revision is part of a larger effort and is necessary to correlate with the deletion of the defined term "grounding conductor" from Article 100. It should also be noted that coordinated proposals to revise this term in Chapter 8 have been submitted. The CMP-5 chairman's report to the TCC recommended that the TCC assign a Task Group made up of CMP-5 members and CMP-16 members to ensure correlation with the deletion of the term "grounding conductor."

ARTICLE 300 — WIRING METHODS

3-6 Log #175 NEC-P03 **Final Action: Reject**
(300)

Submitter: Tommy Young, Commonwealth of Kentucky
Recommendation: Add to Wiring Methods article:
On renovation projects shall remove abandoned raceways.
Substantiation: Confusing on locating raceways for identification and cosmetic.
Panel Meeting Action: Reject
Panel Statement: The proposal did not provide any technical substantiation for the change.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-7 Log #4817 NEC-P03 **Final Action: Reject**
(300.1(B))

Submitter: George Ferguson, Technical Education & Safety Institute
Recommendation: Revise text to read as follows:
"The provisions of this article are not intended to apply to the conductors that form an integral part of listed equipment,...".
Substantiation: I have had building owners try to supply electrical equipment which had no listing provision and was of inferior quality. Adding "listed" to this section would preclude that problem.
Panel Meeting Action: Reject
Panel Statement: Not all equipment is listed or even available as listed equipment, such as many motors, over 600-volt equipment, and unique equipment that must be field evaluated. This change may affect the use of classified equipment, which technically is not listed. In addition, the phrase "listed utilization equipment", which is already located in the existing text, covers utilization equipment.
The panel understands that the Technical Correlating Committee has jurisdiction over
Scope issues.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-8 Log #4815 NEC-P03 **Final Action: Reject**
(300.2(B))

Submitter: George Ferguson, Technical Education & Safety Institute
Recommendation: Revise text to read as follows:
Temperation limitation of conductors shall be in accordance with 310.10 and 110.14(C)(1).
Substantiation: Many electricians I work with are still unaware of the ampacity limitations of 110.14(C)(1) and are using THHN at 90 degrees celsius ampacity regardless of terminal listing. This overheats the terminals. The new language will help the electrician's awareness of the situation.
Panel Meeting Action: Reject
Panel Statement: 300.2(B) deals with the temperature limitation of conductors, whereas 110.14(C) deals with the terminals where the conductors are connected so the reference is not appropriate for this section. The NEC is not a manual for untrained personnel and the text on terminal temperature at equipment has been in the NEC since the 1993 Edition of the NEC so all electricians should be aware of it by now.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-9 Log #1997 NEC-P03 **Final Action: Reject**
(300.3(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part to read as follows: ....unless permitted otherwise elsewhere in this Code or in accordance with 300.3 (B)(1) through (B)(4).
Substantiation: Edit. Refer to 250.130 (C), 426.42, and 427.47.
Panel Meeting Action: Reject
Panel Statement: The added text is not necessary since 300.3(B) applies very specifically to raceways, auxiliary gutters, cable trays, cable bus assemblies, trenches, cables, or cords. The substantiation uses 250.130(C), which is already covered in 300.3(B)(2) for bonding and grounding conductors. In addition, the substantiation uses 426.42 and 427.47, but skin-effect heating systems as referred to in these two sections actually use a ferromagnetic envelope to encase the single conductor and not a wiring method or normal enclosure as would be covered in Chapter 3. The text in these two sections also excludes any application of 300.20 to these systems.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-10 Log #2575 NEC-P03 **Final Action: Reject**
(300.3(B)(1) and Exception No. 2 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Exception No. 1: Conductors of alternating current circuits installed in nonmetallic or nonmagnetic raceways run underground or in concrete slabs, concrete or masonry walls or ceilings shall be permitted to be arranged as isolated phase or grounded conductor installations. The raceways shall be installed in close proximity to each other but not in close proximity with parallel metal structural members, metal piping, or metallic-wiring, methods and the conductors shall comply with the provisions of 300.20(B).
Add new Exception No. 2: Conductors of direct-current circuits shall be permitted to be arranged as isolated polarity, neutral, or grounded conductor installations.
Substantiation: Conductors should be noted as AC since the reference is to isolated phases. Raceways that are nonmagnetic should be permitted, also isolated grounded or neutral conductors, not generally perceived as phase conductors. Such installations in concrete slabs or masonry should be acceptable where the likelihood of induced currents in nonelectrical metal is minimized. Is there a safety consideration why paralleled dc circuit conductors that comply with 300.4 should not be permitted as isolated installations?
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to expand the existing exception to include nonmagnetic metal raceways to be installed with all the same phase conductors in a paralleled conductor application. There was also no technical substantiation provided to add a new exception covering isolated polarity dc systems, other than it "should be acceptable where the likelihood of induced currents in non-electrical metal is minimized." The submitter also did not explain what constitutes "non-electrical metal".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-11 Log #4153 NEC-P03 **Final Action: Reject**
(300.3(B)(5))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 2 for action.
This action will be considered by Code-Making Panel 2 as a public comment.
Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Add new text as follows:
(5) Grouping. Individual branch circuits shall comply with 210.4 for grouping, including the Exception.
Substantiation: Grouping of ungrounded and grounded conductors in panelboards, similar distribution equipment, and other enclosures should apply to all branch circuits, not just multiwire branch circuits. The hazards are the same. This would assure that any extensions made to these circuits would utilize the correct grounded conductor.
Panel Meeting Action: Reject
Panel Statement: 210.4(B) only applies to multiwire branch circuits, not individual branch circuits. Using 210.4(B) to apply to an individual branch circuit would be an improper reference. The submitter could have removed the word "multiwire" in the title of 210.4 and elsewhere within 210.4(D) so the grouping requirement would apply to individual branch circuits. Code-Making Panel 3 does not have jurisdiction over the text in 210.4, however, Code-Making Panel 2 has jurisdiction and this proposal should be sent to Panel 2 for information.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-12 Log #4755 NEC-P03 **Final Action: Reject**
(300.3(B)(5))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 2 for action.
This action will be considered by Code-Making Panel 2 as a public comment.
Submitter: Robert K. Smith, City of WInston-Salem / Rep. Winston-Salem County Inspections Division
Recommendation: Add new text to read as follows:
Individual branch circuits shall comply with the grouping requirements of Section 210.4(D), including the exception.
Substantiation: Grouping of the ungrounded and grounded conductors in panelboards or similar distribution equipment, junction boxes and other enclosures should apply to all branch circuits, not just multiwire branch circuits. The same hazards exist. Also, this would assure that any extensions from these circuits would utilize the correct grounded conductor.
Panel Meeting Action: Reject
Panel Statement: See the Panel Statement on Proposal 3-11.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-13 Log #4606 NEC-P03 **Final Action: Accept in Principle**
(300.3(C)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete the exception; revise the fine print note by adding "See 690.4(B) for photovoltaic source and output circuits."
Substantiation: Ever since Art. 690 entered the Code in the 1984 edition, these circuits have been segregated from normal power applications; and there is no problem with technical merit. In fact, however, this exception should be removed and added to the existing fine print note. Back in the 1984 Code it was commonly believed that these exceptions in Chapters. 1 to 4 were necessary, but 90.3 makes this unnecessary and this construction violates 4.1 of the NEC Style Manual.
Panel Meeting Action: Accept in Principle
The Panel "Accepts" deleting the exception.
Change the existing "FPN" to "FPN No. 1" and add a new FPN No. 2 to read as follows:
"FPN No. 2: See 690.4(B) for photovoltaic source and output circuits."
Panel Statement: Rather than incorporating the text reference for 690.4(B) into the existing FPN, a new FPN was developed to ensure that the important reference to 725.136(A) for Class 2 and 3 conductors was not minimized or masked.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-14 Log #4769 NEC-P03 **Final Action: Reject**
(300.3(C)(2))

Submitter: Peter D. Noval, Jr., Philadelphia, PA
Recommendation: Revise text to read as follows:
(2) Over 600 volts, nominal. Conductors of circuits rated over 600 volts, nominal, shall not occupy the same equipment wiring enclosure, cable or raceway with conductors of circuits rated 600 volts, nominal, or less unless otherwise permitted in (C)(2)(a) through (C)(2)(e).
(a) Secondary wiring to electric-discharge lamps of 1000 volts or less, if insulated for the secondary voltage involved, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors.
(b) Primary leads of electric-discharge lamp ballasts insulated for the primary voltage of the ballast, where contained within the individual wiring enclosure, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors.
(c) Excitation, control, relay, and ammeter conductors used in connection with any individual motor or starter shall be permitted to occupy the same enclosure as the motor-circuit conductors.
(d) In motors, switchgear and control assemblies, and similar equipment, conductors of different voltage ratings shall be permitted.
(e) In manholes, if the conductors of each system are permanently and effectively separated from the conductors of the other systems and securely fastened to racks, insulators, or other approved supports, conductors of different voltage ratings shall be permitted.
~~Conductors having nonshielded insulation and operating at different voltage levels shall not occupy the same enclosure, cable, or raceway.~~
Where conductors operating at different voltage levels occupy the same enclosure, cable or raceway, those of circuits rated over 600 volts, nominal, shall have shielded in insulation.
Substantiation: This section, as presently written, can be interpreted to mean that all conductors, including those of circuits rated 600 volts, nominal, or less, require shielded insulation when occupying the same enclosure, cable or raceway and operating at different voltage levels.
This existing language is modified to clarify that the requirement for shielded insulation does not apply to those conductors operating at 600 volts, nominal, or less, only to those conductors of circuits rated over 600 volts, nominal.
The proposed revision will help to eliminate any misinterpretations of this section, facilitating design and inspection of such installation.
Panel Meeting Action: Reject
Panel Statement: The intent of the existing sentence in 300.3(C)(2) is to not permit non-shielded insulated conductors rated up to 2400 volts, as permitted by 310.6, Exception No. 1, to be installed with conductors rated for a different voltage level. The existing sentence applies to circuits rated over 600 volts and is not a part of (C)(2)(a) through (C)(2)(e) so the existing sentence is more applicable.
Reading it as a last sentence before (a) through (e) makes the existing text easier to understand that it does not permit 600-volt or less conductors to be installed with non-shielded over 600-volt installations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-15 Log #4899 NEC-P03 **Final Action: Reject**
(300.3(C)(2))

Submitter: Peter D. Novak, Jr., Philadelphia, PA
Recommendation: Revise text as follows:
(2) Over 600 Volts, Nominal. Conductors of circuits rated over 600 volts, nominal, shall not occupy the same equipment wiring enclosure, cable, cable tray or raceway with conductors of circuits rated 600 volts, nominal, or less unless otherwise permitted in (C)(2)(a) through (C)(2)(e).
(a) Secondary wiring to electric-discharge lamps of 1000 volts or less, if insulated for the secondary voltage involved, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors.
(b) Primary leads of electric - discharge lamp ballasts insulated for the primary voltage of the ballast, where contained within the individual wiring enclosure, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors.
(c) Excitation, control, relay, and ammeter conductors used in connection with any individual motor or starter shall be permitted to occupy the same enclosure as the motor-circuit conductors.
(d) In motors, switch gear and control assemblies, and similar equipment, conductors of different voltage ratings shall be permitted.
(e) In manholes, if the conductors of each system are permanently and effectively separated from the conductors of the other systems and securely fastened to racks, insulators, or other approved supports, conductors of different voltage ratings shall be permitted.
Conductors having nonshielded insulation and operating at different voltage levels shall not occupy the same enclosure, cable, cable tray, or raceway.
Substantiation: This section, as presently written, does not appear to specifically address cable tray as a wiring method. Consequently, the prohibited installation of conductors rated over 600 volts, nominal, in cable tray containing conductors of circuits rated 600 volts, nominal, or less can only be infrarred.
Further, the requirement for shielded insulation for conductors of circuits rated over 600 volts, where different voltage levels are present, should also be clarified to address cable tray.
By helping to eliminate potential misinterpretations, the proposed revision to text provides language an inspector can readily cite and convey the intent of this section to designers and installers alike.
Panel Meeting Action: Reject

Panel Statement: This is already covered in 392.6(F) and is under the jurisdiction of Code-Making Panel 8, not Code-Making Panel 3.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
AYER, L.: The panel action is correct, yet the panel statement is not accurate. The panel statement infers that the submitter's intent of not allowing conductors over 600 volts to occupy the same cable tray with conductors below 600 volts is already covered in 392.6(F). 392.6(F) allows conductors of different voltages to occupy the same cable tray as long as a barrier is provided. Adding "cable tray" to this section would convey the wrong message.

3-16 Log #1244 NEC-P03 **Final Action: Reject**
(300.3(C)(2)(e))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
In <u>handholes and</u> manholes if the conductors of each system are permanently and effectively separated from the conductors of the other system. ~~and~~ <u>Where installed in manholes conductors shall be</u> securely supported and fastened to racks insulators, or other approved supports. Conductor of different voltage rating shall be permitted.
Conductors having nonshielded insulation and operating at different voltage levels shall not occupy the same enclosure, cable, or raceway unless they comply with 300.3(C)(2)(e).
Substantiation: Handholes should be included. Racks, insulators and supports should not be necessary for handholes. Proposed deletion is superfluous, this subsection concerns circuit ratings, not conductor ratings. Section 300.3 should be referenced.
Panel Meeting Action: Reject
Panel Statement: Providing permanent and effective separation of 600-volt or less from over 600-volt conductors within a handhole would be very difficult, if not impossible. The submitter should provide additional technical substantiation and data showing handholes and the method of providing permanent and effective separation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-17 Log #2908 NEC-P03 **Final Action: Reject**
(300.3(D) (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 6 for action in Article 310.
This action will be considered by Code-Making Panel 6 as a public comment.
Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Add new paragraph as follows:
<u>300.3(D) **Fire-Rated Cable and Conductors**. Fire-rated cable and conductors shall be listed as part of an electrical circuit protective system. Cables and conductors shall also be listed for use in accordance with the wiring methods described in this code.</u>
<u>FPN: One method of defining the fire rating of electrical circuit protective systems is by testing the system in accordance with UL 2196-2006, *Standard for Tests of Fire Resistive Cables*.</u>
<u>(1) **Definition.** Cables and conductors used for survivability of critical circuits to ensure continued operation during a specified time under fire conditions.</u>
<u>(2) **Installation**. The installation of the electrical circuit protective system shall comply with any restrictions provided in the listing of the electrical circuit protective system such as cable and/or raceway support, couplings, boxes, conduit bodies, optional splices, vertical supports, grounds, and pulling lubricants.</u>
<u>FPN: UL guide information for electrical circuit protective systems (FHIT) contains information on proper installation requirements to maintain the fire rating.</u>
<u>(3) **Marking.** In addition to the marking required on the cable and/or tag by the product standard and electrical circuit protective system, cable and conductors shall be surface marked with the suffix –CIR (Circuit Integrity Rating), along with the circuit integrity duration in hours and system identifier.</u>
<u>FPN: For example; –CIR 2 FHIT.XX.</u>
Substantiation: There has been confusion between fire-rated and non-fire-rated cables. As an example, a RHW cable may be fire-rated as part of an electrical circuit protective system. This standardized marking would distinguish between the two types. There are particular installation requirements in order to maintain a fire rating, but these are not identified in the current code. The section on installation provides some guidance to clarify this.
Panel Meeting Action: Reject
Panel Statement: 300.3 applies unilaterally to conductors within cables and not to cables. This text providing listing requirements more appropriately belongs in the front of Article 310 with the marking requirements in 310.11 with the remainder of conductors and cable markings.
This is under the jurisdiction of Code-Making Panel 6, and the panel requests that the Technical Correlating Committee forward this proposal to Code-Making Panel 6 for their review and comment.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-18 Log #57 NEC-P03 **Final Action: Reject**
(300.4)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 9 for information.
Note: This Proposal appeared as Comment 3-8 on Proposal 3-32 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-32 was:
Add new text to read as follows:
Conductors, inside electrical boxes, subject to physical damage (such as router bits, sheetrock saws or knives) or nonconductive coatings (such as drywall mud, paint, lacquer or enamel) must be temporarily protected by means of a rigid metal coverplate, not less than.047 inches thick (the required thickness to prevent the router from penetrating the metal plate).
Exception No. 1: Listed covers to have equivalent strength and characteristics shall be permitted.
Submitter: John T. Smith, Wire Guard, Inc.
Recommendation: Add new text as follows:
300.4 Protection Against Physical Damage.
(G) Conductors Inside Electrical Boxes. Conductors, inside electrical boxes, subject to physical damage from router bits, sheet rock saws, and knives, and nonconductive coatings; such as drywall mud, paint, lacquer and enamel, must be protected during the construction process by means of a rigid cover, plate, or insert of a thickness and strength as to prohibit penetration by the above mentioned items.
Substantiation: I have been an electrician for over 30 years. During this time, I have encountered thousands of wires inside the electrical box damaged by sheetrock routers, knives, saws, mud, paint, enamel, and lacquer.
Furthermore, I have received many calls from homeowners complaining of "the smell of burning wires" or "a receptacle or switch that doesn't work". What I inevitably find are damaged wires inside the electrical box. The insulation on the wires has melted due to excessive heat because the amperage rating of the wires has been compromised or lessened as a result of a nick or cut in the wires. If the homeowner hadn't noticed the "smell of burning wires" or "that the switch or receptacle was not operational", the damaged wire would have eventually caused a fire.
Per the US Home Product Report, Appliances & Equipment, 01/02 issued by the NFPA's Fire Analysis & Research, Quincy, MA:
The number one cause of an "Electrical Distribution Equipment" fire is a short circuit or a ground fault. Damaged conductors cause short circuits and ground faults. When the conductors are damaged the amperage rating of the conductor is compromised or lessened. This results in overheating, which results in the fire.
The form of material first ignited from an "Electrical Distribution Equipment" fire is the electrical wire or cable insulation.
There are codes in place that provide for the Integrity of Electrical Equipment and Connections 110.12(C) and Protection Against Physical Damage 300.4(A-F).
These codes specifically protect the wire at all points of vulnerability from the distribution panel up to, but not including, the point where the wires are inserted into the electrical box.
There is no code that specifically ensures the protection of the conductors after they are inserted in the electrical box.
Once the conductors are inserted in the electrical box, they are extremely vulnerable to the inevitable damage caused by sheet rock routers, sheet rock saws and knives, and nonconductive coatings; such as drywall mud, paint, lacquer and enamel.
It may be assumed that an inspection will detect damaged wires and the electrician will be required to rerun the wires. That is not always true. An inspector may not always see a damaged wire hidden in the wall or spliced. The plug in tester used during the inspection will confirm that the outlet or receptacle is working even though the amperage rating of the conductor is compromised or lessened due to damage.
It may also be assumed that electricians will re-run a damaged wire that violates code 300.14 "Length of Free Conductors at Outlets, Junctions, and Switch Panels". However, from my experience and from conversations I've had with many electricians, that is not what is occurring.
Please see supporting material results of Survey of Electricians conducted from 2004 through 2006.
It is a simple case of economics, the electrician has contracted the job for a certain fee that doesn't allow for re-doing any part of the job. Nor does the electrician's scheduling for completion of that job or to begin future jobs permit the added delays. Nor will the electrician be a favorite with the General Contractor if he demands the drywall be removed so new wires can be run. As a result, electricians have found a work-around to re-running the wires.
As members of the NFPA, I feel that we have a responsibility to ensure that the wires are explicitly protected by a specific code at every point of vulnerability during construction from the distribution panel to inside the electrical box.

This is especially true of the conductors once they are inside the electrical box as they are extremely vulnerable to the inevitable damage from sheet rock routers, sheet rock saws and knives, and nonconductive coatings; such as drywall mud, paint, lacquer and enamel.

Please note that since this was is a proposal that was held by the Technical Correlating Committee, it has also been forwarded to Code-Making Panel 9 for their input.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The NEC Technical Correlating Committee established a Task Group, between the 2008 NEC and the 2011 NEC code cycles, to study the issue of whether Code-Making Panel 1, Code-Making Panel 3, or Code-Making Panel 9 has jurisdiction over requirements for protective cover plates for boxes.

Some of the discussion during the Task Group Meeting was related to plate thickness, enforceability, installation procedures and similar technical issues. The Task Group determined that Code-Making Panel 9 would have jurisdiction over this issue since Code-Making Panel 9 specifically deals with conductors within the box, box and cover construction requirements, and common box as well as cover sizes. Adding the suggested text to 300.4 would not be appropriate until after Code-Making Panel 9 deals with the technical issues of box covers.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-19 Log #1832 NEC-P03 **Final Action: Reject**
(300.4)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: Where <u>likely to be</u> subject to physical damage, conductors shall be ~~adequately~~ protected <u>by approved means</u>.

Substantiation: Edit. “Adequately” is subjective and a term to be avoided per the Style Manual. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: “Protected by approved means” is already a requirement of 90.4, 90.7, 110.2, and 110.3 so changing the text in this section is not necessary and could be subject to misinterpretation by installers. “Likely” to be damaged is very subjective and is recognized in Table 3.2.1 in the NEC Style Manual as a vague and unenforceable term. Section 3.2.5.5 of the NEC Style Manual uses similar text to the existing text to provide clarity on the subject of physical protection.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-20 Log #1941 NEC-P03 **Final Action: Reject**
(300.4)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: Where <u>likely to be</u> subject to physical damage.

Substantiation: Edit. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: “Likely” to be damaged is very subjective and is recognized in Table 3.2.1 in the NEC Style Manual as a vague and unenforceable term.

Section 3.2.5.5 of the NEC Style Manual uses similar text to the existing text to provide clarity on the subject of physical protection.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

9-23 Log #57a NEC-P09 **Final Action: Reject**
(300.4)

Note: This Proposal appeared as Comment 3-8 on Proposal 3-32 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 3-32 was:

Add new text to read as follows:

Conductors, inside electrical boxes, subject to physical damage (such as router bits, sheetrock saws or knives) or nonconductive coatings (such as drywall mud, paint, lacquer or enamel) must be temporarily protected by means of a rigid metal coverplate, not less than.047 inches thick (the required thickness to prevent the router from penetrating the metal plate).

Exception No. 1: Listed covers to have equivalent strength and characteristics shall be permitted.

Submitter: John T. Smith, Wire Guard, Inc.

Recommendation: Add new text as follows:

300.4 Protection Against Physical Damage.

(G) Conductors Inside Electrical Boxes. Conductors, inside electrical boxes, subject to physical damage from router bits, sheet rock saws, and knives, and nonconductive coatings; such as drywall mud, paint, lacquer and enamel, must be protected during the construction process by means of a rigid cover, plate, or insert of a thickness and strength as to prohibit penetration by the above mentioned items.

Substantiation: I have been an electrician for over 30 years. During this time, I have encountered thousands of wires inside the electrical box damaged by sheetrock routers, knives, saws, mud, paint, enamel, and lacquer.

Furthermore, I have received many calls from homeowners complaining of “the smell of burning wires” or “a receptacle or switch that doesn’t work”. What I inevitably find are damaged wires inside the electrical box. The insulation on the wires has melted due to excessive heat because the amperage rating of the wires has been compromised or lessened as a result of a nick or cut in the wires. If the homeowner hadn’t noticed the “smell of burning wires” or “that the switch or receptacle was not operational”, the damaged wire would have eventually caused a fire.

Per the US Home Product Report, Appliances & Equipment, 01/02 issued by the NFPA’s Fire Analysis & Research, Quincy, MA:

The number one cause of an “Electrical Distribution Equipment” fire is a short circuit or a ground fault. Damaged conductors cause short circuits and ground faults. When the conductors are damaged the amperage rating of the conductor is compromised or lessened. This results in overheating, which results in the fire.

The form of material first ignited from an “Electrical Distribution Equipment” fire is the electrical wire or cable insulation.

There are codes in place that provide for the Integrity of Electrical Equipment and Connections 110.12(C) and Protection Against Physical Damage 300.4(A-F).

These codes specifically protect the wire at all points of vulnerability from the distribution panel up to, but not including, the point where the wires are inserted into the electrical box.

There is no code that specifically ensures the protection of the conductors after they are inserted in the electrical box.

Once the conductors are inserted in the electrical box, they are extremely vulnerable to the inevitable damage caused by sheet rock routers, sheet rock saws and knives, and nonconductive coatings; such as drywall mud, paint, lacquer and enamel.

It may be assumed that an inspection will detect damaged wires and the electrician will be required to rerun the wires. That is not always true. An inspector may not always see a damaged wire hidden in the wall or spliced. The plug in tester used during the inspection will confirm that the outlet or receptacle is working even though the amperage rating of the conductor is compromised or lessened due to damage.

It may also be assumed that electricians will re-run a damaged wire that violates code 300.14 “Length of Free Conductors at Outlets, Junctions, and Switch Panels”. However, from my experience and from conversations I’ve had with many electricians, that is not what is occurring.

Please see supporting material results of Survey of Electricians conducted from 2004 through 2006.

It is a simple case of economics, the electrician has contracted the job for a certain fee that doesn’t allow for re-doing any part of the job. Nor does the electrician’s scheduling for completion of that job or to begin future jobs permit the added delays. Nor will the electrician be a favorite with the General Contractor if he demands the drywall be removed so new wires can be run. As a result, electricians have found a work-around to re-running the wires.

As members of the NFPA, I feel that we have a responsibility to ensure that the wires are explicitly protected by a specific code at every point of vulnerability during construction from the distribution panel to inside the electrical box.

This is especially true of the conductors once they are inside the electrical box as they are extremely vulnerable to the inevitable damage from sheet rock routers, sheet rock saws and knives, and nonconductive coatings; such as drywall mud, paint, lacquer and enamel.

Please note that since this was is a proposal that was held by the Technical Correlating Committee, it has also been forwarded to Code-Making Panel 3 for their input.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-51.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

3-21 Log #4573 NEC-P03 **Final Action: Accept in Part**
(300.4 and 300.4(A))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing text of the 2008 NEC as follows:

300.4 Protection Against Physical Damage.

<u>If likely to be damaged at the location installed,</u> ~~Where subject to physical damage,~~ conductors<u>, raceways and cables</u> shall be protected.

(**A) Cables and Raceways Through Wood <u>Framing</u> Members.**

(1) Bored Holes. In both exposed and concealed locations, <u>if</u> ~~where~~ a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1¼ in.) from the nearest edge of the wood member. <u>If</u> ~~Where~~ this distance <u>is not</u> ~~cannot be~~ maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring. <u>The steel plate shall be installed as soon as practicable after the wiring is installed.</u>

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

(2) Notches in Wood. If ~~Where~~ there is no objection because of weakening the building structure, in both exposed and concealed locations, cables or raceways shall be permitted to be laid in notches in wood studs, joists, rafters, or other wood members if ~~where~~ the cable or raceway at those points is protected against damage by ~~against~~ nails or screws by a steel plate at least 1.6 mm (1/16 in.) thick, and of appropriate length and width, installed to cover the area of the wiring. The steel plate shall be installed as soon as practicable after the wiring is installed ~~before the building finish is applied~~.

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, rigid nonmetallic conduit, or electrical metallic tubing.

Exception No. 2: A listed and marked steel plate less than 1.6 mm (1/16 in.) thick that provides equal or better protection against nail or screw penetration shall be permitted.

Substantiation: It can be safely said that all wiring methods are "subject to physical damage." This phrase is far too general and subjective. All wiring methods should be installed in a manner and location so the wiring method is not expected to be damaged in ordinary use. For example, the exposed wiring covered by the present rule can be reasonably expected to be isolated from physical damage in ordinary building operations. Can the cables be damaged in an unexpected event such as using the cables to support other objects or persons? Certainly. However that is not likely to happen in normal building operation. Wiring installed in a concealed location can be easily damaged by a reciprocating saw when a cut is made during remodeling project. Is the wiring that was installed in compliance with 300.4 "subject to physical damage?" The answer is most likely "Yes." However, the wiring, if installed in compliance with 300.4 is not likely to be damaged in the location installed. This seems to be a better phrase to use.

The term "likely" is used in many NEC sections such as providing a condition the event or condition will occur such as: "… likely to become energized …", "… maximum fault current likely to be imposed …", "… not likely to be damaged …", "…equipment likely to be disconnected for repairs or replacement …", "… not likely to stretch during or after installation …" and "… conduct safely any fault current likely to be imposed".

Adding "raceways and cables to the opening sentence seems appropriate since raceways and cables are covered in the following rules.

Steel plates for protection should be required to be installed as soon as practicable after the wiring is installed since the sub-sections apply to both concealed and exposed wiring. If the wiring is installed through framing members at a location where building finish is not to be applied, the protection should still be required to be installed.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Panel Meeting Action: Accept in Part

The panel "Accepts" the addition of "raceways and cables" in 300.4, however, "Rejects" the remainder of the proposed text.

Panel Statement: "Likely" to be damaged is very subjective and is recognized in Table 3.2.1 in the NEC Style Manual as a vague and unenforceable term.

Section 3.2.5.5 of the NEC Style Manual uses similar text to the existing text to provide clarity on the subject of physical protection.

The suggested text to require steel protector plates to be "installed as soon as practicable after the wiring is installed" is unenforceable. Where a plate is necessary for protection of wiring methods, the plate must be installed at a time between the installation of the wiring method and the inspection by the electrical inspector. Many electricians wait until the end of the rough-in stage before installing the nail plates. The new text implies a possible violation since the plate, obviously, could have been installed sooner than at the end of the rough-in stage.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-22 Log #1594 NEC-P03 **Final Action: Reject**
(300.4(A) Exception No. 1)

Submitter: Russell LeBlanc, The Peterson School of Engineering

Recommendation: Revise text to read as follows:

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, (~~rigid nonmetallic conduit~~), (schedule 80 PVC conduit), or electrical metallic tubing.

Substantiation: Schedule 40 PVC, HDPE, and RTRC are all nonmetallic conduits, but only Schedule 80 PVC is specifically identified for areas of physical damage.

See 352.10(F), FPN.

Panel Meeting Action: Reject

Panel Statement: No technical substantiation was provided to justify the change from rigid nonmetallic conduit to Schedule 80 PVC conduit.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-23 Log #1392 NEC-P03 **Final Action: Reject**
(300.4(A)(1))

Submitter: Charles Eldridge, Indianapolis, IN

Recommendation: Revise text to read as follows:

(1) Bored Holes. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in ~~joists, rafters, or~~ vertical wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (11/4 in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring.

In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in floor joists, holes shall be bored so that the edge of the hole is not less than 50 mm (2 in.) from the nearest edge of the joist and shall not exceed one-third the depth of the joist. Where bored holes are bored into engineered wood joists, the penetrations shall be done in accordance with the manufacturer's written directions.

In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in ceiling joists, holes shall be bored so that the edge of the hole is not less than 50 mm (2 in.) from the nearest edge of the joist. The diameter of the holes bored or cut into members shall not exceed one-third the depth of the joist. Where bored holes are bored into engineered wood joists, the penetrations shall be done in accordance with the manufacturer's written directions.

Substantiation: The building codes require 2" from the edge of joists for strength; the NEC should require the same 2".

Panel Meeting Action: Reject

Panel Statement: The purpose of 300.4 is to provide protection for conductors and the proposed text is dealing with structural integrity of wood joists. The proposed text is more appropriately covered in a building code based on structural integrity with the building inspector determining whether holes drilled in the support structure for a building have affected the structural integrity of the building.

Electricians must be aware of requirements in the building code, as well as requirements in the National Electrical Code, but building code issues should stay in the building code and not be placed in the NEC.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-24 Log #2761 NEC-P03 **Final Action: Reject**
(300.4(A)(1))

Submitter: Tom Dwyer, City of Bismarck

Recommendation: Revise text to read as follows:

(1) Bored Holes. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed through bored holes in joists, rafters, or wood members, holes shall be bored so that the edge of the hole is not less than 32 mm (1 1/4 in.) from the nearest edge of the wood member. Where this distance cannot be maintained, the cable or raceway shall be protected from penetration by screws or nails by a steel plate(s) or bushing(s), at least 1.6 mm (1/16 in.) thick, and of appropriate length and width installed to cover the area of the wiring and the steel plates or bushings shall extend past the bored hole 1/2 in. on both sides of the joists, rafters, or wood members.

Substantiation: The drywall installers miss the framing members and drive screws into the wiring. The extra 1/2 in. on both sides of the framing members would give added protection.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided to justify the addition of a ½ inch on either side of the bored hole. There may be installations where more than ½ inch would be needed for protection, but other cases where a nail plate directly over the hole is sufficient.

The panel recommends that the submitter provide the panel with a research report or some technical substantiation justifying the distance recommended in the proposal.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-25 Log #2075 NEC-P03 **Final Action: Reject**
(300.4(A)(1), 300.4(A)(2), 300.4(D), and 300.4(F) Exception No. 1)

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Revise text to read as follows:

Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, ~~rigid nonmetallic conduit,~~ or electrical metallic tubing.

Substantiation: Rigid nonmetallic conduit, as defined in Article 352, is not adequately protected by its construction to resist penetration by nails, staples, screws or other power-driven fasteners, and this consequently poses a risk of damage to the conductors contained within. On many occasions, nails, staples, or screws have been found to have penetrated the PVC conduit wall (before wire installation) or the conduit wall and contained wires where the conduit is routed through the bottom plate, inside of the structure wall, to a flush meter or

panel enclosure. By removing this type of conduit from the exception, this potential hazard will be diminished, and inspectors will have the code authority to enforce a level of protection which many already acknowledge the need for.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to justify the deletion of "rigid nonmetallic conduit".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-26 Log #2595 NEC-P03 **Final Action: Reject**
(300.4(A)(2) Exception No. 1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Steel plates shall not be required to protect rigid metal conduit or intermediate metal conduit~~, rigid nonmetallic conduit, or electrical metallic tubing~~.
Substantiation: RNMC and EMT secured in place in holes or notches can be penetrated rather easily with nails, motor-driven screws, power driven fasteners, electric saws, which may result in shock or short-circuit explosion.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to justify the deletion of "rigid nonmetallic conduit" or "electrical metallic tubing".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-27 Log #1592 NEC-P03 **Final Action: Reject**
(300.4(A)(2) Exception No. 2)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Revise text to read as follows:
Exception No. 2: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, (~~rigid nonmetallic conduit~~), (schedule 80 PVC conduit), or electrical metallic tubing.
Substantiation: Schedule 40 PVC, HDPE, and RTRC are all nonmetallic conduits, but only Schedule 80 PVC is specifically identified for areas of physical damage.
See 352.10(F), FPN.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement in Proposal 3-22.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-28 Log #1541 NEC-P03 **Final Action: Reject**
(300.4(B)(2))

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
(B) **~~Nonmetallic Sheathed~~ Cables and Electrical Nonmetallic Tubing Through Metal Framing Members.**
(2) ~~Nonmetallic Sheathed~~ Cables and Electrical Nonmetallic Tubing. Where nails or screws are likely to penetrate ~~nonmetallic sheathed~~ cables or electrical nonmetallic tubing, a steel sleeve, steel plate, or steel clip not less than 1.6 mm (1/6 in.) in thickness shall be used to protect the cable or tubing.
Substantiation: Cable Types AC, MC, and MI are subject to the same damages as nonmetallic-sheathed cable. The intent is to cover all cables not just nonmetallic-sheathed cable. With today's construction needs, the use of shallow steel stud is becoming more prevalent. Shallow steel studs are what used to be called furring strips (See 300.4(D)), but now are being used for partition walls.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide any technical substantiation to require the same physical protection for Types MC, AC, and MI cable, as is presently provided for NM cable in a metal framing member. The first sentence in the substantiation is incorrect because NM cable is more prone to possible damage due to its different characteristics.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-29 Log #3810 NEC-P03 **Final Action: Reject**
(300.4(D))

Submitter: Larry E. Ellison, Jr., Progressive Electrical Services
Recommendation: Revise text to read as follows:
Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, where a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, shall be installed through bored holes in joists and rafters, holes shall be bored so that the edge of the hole is not less than (3 in.) from the nearest edge of the wood member.
Substantiation: Less of a chance of cable- or raceway type wiring methods being damaged from nails or screws.
Panel Meeting Action: Reject
Panel Statement: The proposal specifies the location of a bored hole. This section of 300.4 addresses installations parallel to framing members and is, therefore, inappropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-30 Log #4572 NEC-P03 **Final Action: Reject**
(300.4(D))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
(D) Cables and Raceways Parallel to Framing Members and Furring Strips. In both exposed and concealed locations, if ~~where~~ a cable- or raceway-type wiring method is installed parallel to framing members, such as joists, rafters, or studs, or is installed parallel to furring strips, the cable or raceway shall be installed and supported so that the nearest outside surface of the cable or raceway is not less than 32 mm (1¼ in.) from the nearest edge of the framing member or furring strips ~~where nails or screws are likely to penetrate~~. If ~~Where~~ this distance cannot be maintained, the cable or raceway shall be protected from penetration by nails or screws by a steel plate, sleeve, or equivalent at least 1.6 mm (1/16 in.) thick. The steel plate shall be installed as soon as practicable after the wiring is installed.
Maintain the three exceptions.
Substantiation: The phrase "where nails or screws are likely to penetrate" should be removed from this section as it adds an unnecessary subjectivity to the protection issue and is subject to debate. This phrase is not used in 300.4(A) or (B). If the condition applies, install the protection!
Steel plates for protection should be required to be installed as soon as practicable after the wiring is installed since the sub-section applies both to concealed and exposed wiring. If the wiring is installed parallel to framing members at a location where building finish is or is not to be applied, the protection should still be required to be installed at the time the wiring project is being done.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Reject
Panel Statement: The word "where" does not imply a time justifying the use of either "when" or "if" as indicated in the substantiation. The word "where" just indicates that the cable or raceway must be installed so that there is at least 1 ¼ inch space from the edge of the framing member or furring strips.
The text "where nails or screws are likely to penetrate" provides the electrical inspector with the ability to not require the clearance where it is judged that screws or nails are already installed, such as where outside siding is already installed or there is only stucco being installed as an outer coating without the possibility of nails and screws being used during construction.
The suggested text to require steel protector plates to be "installed as soon as practicable after the wiring is installed" is unenforceable.
Where a plate is necessary for protection of wiring methods, the plate would have to be installed at a time between the installation of the wiring method and the inspection by the electrical inspector.
Many electricians wait until the end of the rough-in stage before installing the nail plates. The new text implies a possible violation since the plate obviously could have been installed sooner than at the end of the rough-in stage.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-31 Log #1593 NEC-P03 **Final Action: Reject**
(300.4(D) Exception No. 1)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Revise text to read as follows:
Exception No. 1: Steel plates shall not be required to protect rigid metal conduit, intermediate metal conduit, (~~rigid nonmetallic conduit~~), (schedule 80 PVC conduit), or electrical metallic tubing.
Substantiation: Schedule 40 PVC, HDPE, and RTRC are all nonmetallic conduits, but only Schedule 80 PVC is specifically identified for areas of physical damage.
See 352.10(F), FPN.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 3-22.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-32 Log #1493 NEC-P03 **Final Action: Accept in Principle**
(300.4(E))

Submitter: Robert G. Fahey, City of Janesville
Recommendation: Add new text as follows:
300.4(E) Cables or Raceways Installed Above or Below ~~Under~~ Roof Decking. A cable or raceway type wiring method, installed in exposed locations under metal-corrugated sheet roof decking, shall be installed and supported so the nearest outside surface of the cable or raceway is not less than 38 mm (1 ½ in.) from the nearest surface of the roof decking. A cable or raceway type wiring method shall not be installed where concealed directly above the metal-corrugated sheet roof decking, where concealed between the roof decking and the roof insulation/rubber roofing material.

Substantiation: The problem I have encountered on a construction site, is the electrical contractor has installed electrical nonmetallic tubing above the metal roof decking for supplying lights in the store, the ENT was then concealed by the roof insulation and the rubber roof system. When the rubber roof is initially installed or when replaced in the future, these concealed/invisible conduits and cables are subject to the long screws and may damage the conduits and cables and wiring inside the ENT as the future roofers will most likely not anticipate conduits or cables in this location. The additional wording in this section will add to the safety of the individuals who will work on the roof now and in the future. Many times the circuits in these conduits/cables are 277 or 480 volt circuits supplying lighting within the building.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-34 that addresses the submitter's concern without specifically naming the type of roofing material (roof insulation/rubber roofing) because the more generic text in Proposal 3-34 applies to all types of roofing materials that could be used with metal corrugated sheet roofing.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
CASPARRO, P.: The panel statement states that the panel action and statement on Proposal 3-34 addresses the submitters concern. I disagree. The submitter intends to prohibit the installation of cable and raceway between the metal roof decking and roof insulation and rubber roofing. The Panel may have incorrectly interpreted the submitter's intent to mean "In the webbing on the underside of the metal roof decking". The submitter intends to prohibit the practice of laying cables and raceways on top of the metal deck prior to the installation of the roofing material. As the submitter correctly points out, the wiring method is concealed as soon as the installation of the insulating material is put down. When the roofing contractor secures the insulation with screws, he has no way of knowing where the wiring methods have been placed and thus could very easily damage the wiring method. The Panel should have accepted this Proposal.

3-33 Log #1694 NEC-P03 **Final Action: Reject**
(300.4(E))

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Delete the exception to 300.4(E) to read as follows:
300.4 Protection Against Physical Damage.
(E) Cables and Raceways Installed Under Roof Decking. [remainder unchanged]
~~Exception: Rigid metal conduit and intermediate metal conduit shall not be required to comply with 300.4(E).~~
Substantiation: The self-taping screws that are used to hold down the insulated roofing material can penetrate a substantial metal roof deck and could easily penetrate IMC or rigid conduit, therefore, all conduit should be subject to the "1 1/2 in. from the nearest surface of the roof decking" provision.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide substantiation or any data to delete the exception that would indicate that problems have been encountered in the field.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-34 Log #2763 NEC-P03 **Final Action: Accept in Principle**
(300.4(E))

Submitter: Donald R. Offerdahl, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
(E) Cables ~~and~~, Raceways and Boxes Installed Under Roof Decking. A cable- or raceway-type wiring method, installed in exposed or concealed locations under metal-corrugated sheet roof decking shall be installed and supported so the nearest outside surface of the cable or raceway is not less than 38 mm (1 1/2 in.) from the nearest surface of the roof decking.
A cable- or raceway-type wiring method shall not be installed in concealed locations in metal-corrugated sheet decking type roof.
Exception: Rigid metal conduit and intermediate metal conduit shall not be required to comply with 300.4(E).
Substantiation: Boxes are exposed to the same damage as the cables and raceways are. This also true when cables or raceways are installed on top of the metal-corrugated sheet decking before the insulation material is installed.
Panel Meeting Action: Accept in Principle
Revise the recommended wording in the proposal to read as follows:
"(E) Cables, Raceways, or Boxes Installed In or Under Roof Decking.
A cable, raceway, or box, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported so there is not less than 38 mm (1 1/2 in.) measured from the lowest surface of the roof decking to the top of the cable, raceway, or box.
A cable, raceway, or box shall not be installed in concealed locations in metal-corrugated sheet decking type roof."
The existing exception remains unchanged.
Panel Statement: Changing the title to include cables, raceways, or boxes that are installed in roof decking will ensure that the title of this section reflects the existing and new text.
The text in the requirement was changed to delete "cable- or raceway-type wiring method" since cables and raceways are wiring methods and the additional text is redundant.
Adding "or box" to both the first and second paragraphs of the proposal will make the text consistent with the title.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-35 Log #3802 NEC-P03 **Final Action: Accept in Principle**
(300.4(E))

Submitter: Mark R. Hilbert, Wolfeboro, NH
Recommendation: Revise 300.4(E) as follows:
(E) Cables and Raceways Installed Under Roof Decking. A cable- or raceway-type wiring method, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported ~~so the nearest outside surface of the cable or raceway~~ there is not less than 38 mm (11/2 in.) measured from the ~~nearest~~ lowest surface of the roof decking to the top of the raceway or cable.
The existing FPN and Exception remain the same.
Substantiation: Having been involved in the original submittal of the proposal for this new requirement for the 2008 NEC it is true the work "nearest" was chosen to describe the lowest point of the deck as while standing on the floor and looking up at the bottom of the roof deck the nearest surface of the underside of the deck was the lowest point. However, as described in Support Material-Figure 1 of this proposal, this section is worded in the 2008 NEC, a raceway or cable method could be installed so the nearest edge of the raceway or cable is 1 1/2 in. from the nearest surface of the roof deck and still be subject to penetration by the fastener. The proposed text will make it clear that the cable or raceway must be at least 1 1/2 in. from the lowest point of the roof deck and thereby significantly reducing the possibility of damage from a fastener.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-34.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-36 Log #3831 NEC-P03 **Final Action: Reject**
(300.4(E))

Submitter: James H. Maxfield, Dover, NH
Recommendation: Revise text to read as follows:
(E) Cables, Raceways, Enclosures, and Luminaires Installed Under roof decking.
(1) A cable or... (remaining text unchanged)
FPN: (existing text unchanged)
Exception: (existing text unchanged)
(2) Enclosures and Luminaires installed in exposed locations under metal-corrugated sheet roof decking shall be installed and supported so the nearest outside surface of the enclosure or luminaire is not less than 38 mm (1-1/2 in.) from the nearest surface of the roof decking.
Substantiation: Physical damage is not limited to only cables and raceways installed within this area. Enclosures, luminaires and conductors within this equipment are also subject to the same physical damage. See the substantiation of NFPA 70,2008 edition comment on proposals 3-31.
Current code language helps protect the conductors within cable assemblies and raceways however the current language does not prohibit the installation of enclosures and luminaires in this area where the same physical damage hazards are possible. This is the appropriate code section for this requirement as it is specific to the wiring methods used under metal corrugated sheet roof decking. Acceptance of this proposal parallels the panel's objective in the last code cycle and is in harmony with 90.1(A) of NFPA 70, NEC, 2008 edition.
Panel Meeting Action: Reject
Panel Statement: Damage from long screws in metal corrugated roofing could occur to enclosures and luminaires; however, Article 300 only addresses wiring methods and accepting the proposed text would be outside the jurisdiction of Panel 3.
Enclosures are defined as the case or housing of apparatus to protect electrical equipment from physical damage, which is much more than just a box as found in wiring methods, although some handhole enclosures are found in Article 314. Handhole enclosures are designed to be installed in the ground and nowhere close to corrugated roofing.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-37 Log #3856 NEC-P03 **Final Action: Accept in Principle**
(300.4(E))

Submitter: Bill McGovern, City of Plano
Recommendation: Revise text as follows:
Junction Boxes, Cables, and Raceways Installed Under Roof Decking. A junction box, cable- or raceway type wiring method, installed in exposed or concealed locations under metal-corrugated sheet roof decking, shall be installed and supported so the nearest outside surface of the junction box, cable or raceway is not less than 38 mm (1$^1/_2$ in.) from the nearest surface of the roof decking.
Substantiation: Substantiation of proposal 3-31, log 3310 for the 2008 NEC addressed the hazards of cables and raceways being attached to the bottom side of the roof deck making them susceptible to penetration by long roof decking screws. The same requirements for junction boxes should be applied here requiring 1$^1/_2$ in of spacing from the nearest surface of the roof decking.
Panel Meeting Action: Accept in Principle
Panel Statement: The suggested change in this proposal only applies to junction boxes, but the change should apply to all boxes.
See the panel action and statement on Proposal 3-34.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-38 Log #3867 NEC-P03 **Final Action: Accept in Principle**
(300.4(E))

Submitter: Mike Weitzel, Bechtel
Recommendation: In 300.4(E) insert one word in the title and one word in the paragraph as follows;
(e) Cables. raceways, and Boxes Installed Under Roof Decking. A box, cableway, or cable type wiring method... remainder of paragraph remains the same.
Substantiation: Boxes require physical or mechanical protection just as much as raceways and cables. Not including this wording in the 2008 NEC may have been an oversight. The IAEI 2008, *Analysis of Changes* book, which I assisted with, has an excellent illustration to justify this proposal to protect boxes as well.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-34.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-39 Log #4608 NEC-P03 **Final Action: Accept in Principle in Part**
(300.4(E))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Delete the exception and revise the rule and fine print note to read as follows:
(E) Cables and Raceways Installed Under Roof Decking. A cable- or raceway-type wiring method, installed in exposed or concealed locations below metal-corrugated sheet roof decking, shall be installed and supported so the upper outside surface of the cable or raceway is not less than 38 mm (1½ in.) below the lowest surface of the roof decking.
FPN: Roof decking material is often repaired or replaced after the initial raceway or cabling and roofing installation and may be penetrated by the screws or other mechanical devices designed to provide “hold down” strength of the water-proof membrane or roof insulating material. Where the deck is of corrugated construction, the length of the holding screws is usually chosen to penetrate the lowest level of any corrugation as measured from the upper roof surface.
Substantiation: This proposal follows from extensive discussion on this topic at the “Super Code” IAEI meeting on Cape Cod in 2007 that included people who developed the original NEC proposal. There is no problem with the objective of the new NEC provision, however, the wording chosen by CMP 3 is likely to be misapplied in the field and inconsistently enforced. The principal issue is that the NEC will limit wiring placements “from the nearest surface of the roof decking” instead of from the lowest surface. The drawing below shows the problem with this wording:
The NEC text can easily be read as limiting the wiring method from the “nearest” decking surface in the sense of the lower side of the adjacent decking as opposed to the farthest surface (the upper part of the roof surface). The intent, however, is to limit the wiring placement in terms of the “nearest” decking surface in the sense of being nearest to the ground (lowest), even if a higher surface is actually closer to the wiring method. The roofing screws will be of consistent length regardless of where they are driven. The drawing shows a raceway 1½ in. from the decking surface nearest to its actual location. The NEC text could easily support this interpretation, and the raceway would be damaged by a screw of a length that would likely be used. The wording in this proposal, together with the additional sentence added to the fine print note, should make these concepts clear to installers and inspectors.
This proposal also includes RMC and IMC in the new rule by deleting the exception that would exempt them. This exception was never included in or substantiated by the original proposal or its supporting comment. The panel simply added it with the statement that these wiring methods would not be damaged. That is not true. The hold-down screws used for this roofing have robust drill points designed to easily penetrate heavy steel decking. If a section of steel conduit happens to be secured near the point of penetration of one of those deck screws, the screw will easily penetrate even heavy-wall conduit. When UL performed the fact-finding investigation requested by armored cabling manufacturers to support an exception for these cables from the requirements in NEC 300.4(D), in some instances sheet-rock screws were shown to penetrate heavy-wall steel conduits. Steel deck screws would certainly do the same, routinely.
Note: Supporting Material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle in Part
The panel rejects the deletion of the exception and the newly added sentence to the Fine Print Note, and Accepts in Principle the word “upper” and the phrase “below the lowest”.
Panel Statement: See the panel actions and statements on Proposals 3-33 and 3-34. The Fact Finding Report alluded to in the substantiation does not address this particular application.
The submitter did not provide substantiation or any data to delete the exception that would indicate that problems have been encountered in the field.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
STENE, S.: The Fact Finding Report alluded to in the substantiation was not addressing this particular application and should not be used as part of the substantiation for addressing this proposed change.

3-40 Log #4724 NEC-P03 **Final Action: Accept in Principle**
(300.4(E))

Submitter: Phillip J. Yehl, City of Peoria
Recommendation: Revise text as follows:
(E) Cables and Raceways Installed Under or Over Roof Decking.
A cable or raceway-type wiring method, installed in exposed or concealed locations under or over metal-corrugated sheet roof decking, shall be installed and supported so the nearest outside surface of the cable or raceway is not less than 38 mm (11/2 in.) from the nearest surface of the roof decking.
Substantiation: The new wording would make it clear that above the decking in the void of corrugation is included in this requirement no just underside. I have recently seen this very same installation.
See handbook Exhibit 300.4
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-34, which addresses the submitter’s concerns.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-41 Log #677 NEC-P03 **Final Action: Reject**
(300.4(G))

Submitter: Richard E. Loyd, R & N Associates
Recommendation: The Proposal should be Accepted. Add the following wording to 300.4(G):
Protection of Outlet Boxes During Construction. The open front of both metal and nonmetallic electrical outlet boxes shall be temporarily covered to protect insulated electrical conductors and components from physical damage due to power routers, and other cutting tools. Conductors and components shall not be damaged or contaminated by foreign materials such as paint, plaster, cleaners, abrasives, or corrosive residues. There shall be no damaged parts that may adversely affect safe operation of the equipment such as parts that are broken; cut and other potential damage during construction. The cover shall be constructed of a nonmetallic material and shall be clearly marked “Not for Permanent Installation”.
Substantiation: The integrity of the electrical installation is a problem and 110.12(C) is not adequate to cover this problem. Why would we pass codes about unused openings in junction boxes, but not address circuit integrity? It is not uncommon for an electrician to find that the copper wires have turned green due to an oxidation chemical reaction, and electricians often remove foreign materials and debris from junction boxes at their own time and expense.
Typically, the inspector and electrical contractor are not onsite during, or able to monitor, the sheet rock installation. Therefore, there is no care, nor custody, of electrical systems and terminations. It is not practical to hold the sheet rock installer liable; the only solution is to have the electrician protect his work from other crafts onsite.
Damage has continued to occur for many years often undetected due to the difficulty in seeing nicks and cuts to the insulation. Installers often encounter receptacles and switches full of sheetrock mud and paint when they are installing the final trim. They don’t always replace these damaged devices leading to early failure or worse fire and shock hazards.
In conclusion, the electrical conductors and enclosed devices need to be protected. It makes sense to protect electrical conductors from construction debris, until final electrical installation. The fire alarm industry manufacturers

ship smoke detectors with a protective covering, which is removed after there is no longer potential damage from the various construction trades. Some fire alarm control panels are shipped with a protective device (often a piece of cardboard) to place over the fire alarm system wiring and terminals in a rough-in-box for protection from paint, plaster, and general construction site grime. A steel plate may not be necessary for protection. Also, I recently renovated my condo. I was disappointed with the sheetrock mud, paint, and other construction debris that had to be scraped and chipped out of the electrical boxes and off the electrical conductors.

This requirement is an easy-to-implement solution to the aforementioned problem. It would shield against the plaster, spray from insulation, power routers, and paint contamination that is so often present as a result of the carelessness of nonelectrical tradespersons who are eager to finish their work in a timely manner. It would provide protection so that wiring and other electrical components within electrical outlet boxes are not damaged, broken, bent or cut by others during the rough-in or construction phases.

Please accept this proposal.

Panel Meeting Action: Reject

Panel Statement: This proposal was a comment held by the NEC Technical Correlating Committee from the 2008 ROC with the new reference section number as 300.4(G) for protector plates.

Since it was not accepted, but held for 2011, the section reference at the top of this proposal is incorrect. See the panel action and statement on Proposal 3-18.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-42 Log #1351 NEC-P03 **Final Action: Accept**

(300.4(G))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Change “substantial” in two places to “identified”.

Substantiation: Edit. The fitting and insulating material should be recognized as suitable for the use. “Substantial” is subjective and a term to be avoided.

Panel Meeting Action: Accept

Panel Statement: Identified (as applied to equipment) is a more appropriate term to use since the definition is as follows:

“Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement.”

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-43 Log #1534 NEC-P03 **Final Action: Reject**

(300.4(G))

Submitter: Carlo Compagnone, Jr., Compa Covers, Inc.

Recommendation: Add new text as follows:

The open front of both metal and nonmetallic electrical device boxes shall be temporarily covered to protect insulated electrical conductors from physical damage or deterioration due to power routers, plaster, paint spray guns, spray foam insulation, and other potential damage during construction. The covers shall be clearly marked “Not For Permanent Installation”.

Substantiation: Leaving the front end of an electrical box open during the preliminary stages of construction results in exposed wires. This allows electrical wiring to be vulnerable to be cut or damaged during construction with power routers along with plaster filled boxes and overspray from paint guns and spray foam insulation guns, which in the end will leave a poor and unsafe working environment. Having a temporary cover on an electrical box is most of all a safety factor. Such covers will prevent build up of debris and puts a stop to unauthorized personnel tampering with wiring during the time of construction.

I have also submitted this proposal to Code-Making Panel 9 for 314.17(E) or 314.26.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: This proposal was a comment held by the NEC Technical Correlating Committee from the 2008 ROC with the new reference section number as 300.4(G) for protector plates. Since it was not accepted, but held for 2011, the section reference at the top of this proposal is incorrect. See the panel action and statement on Proposal 3-18.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-44 Log #2151 NEC-P03 **Final Action: Reject**

(300.4(G))

Submitter: Mark T. Rochon, Peabody, MA

Recommendation: Revise text as follows:

Where raceways contain ~~4 AWG or larger~~ insulated circuit conductors and these conductors enter a cabinet, box, enclosure, or raceway, the conductors shall be protected by a substantial fitting providing a smoothly rounded insulating surface, unless the conductors are separated from the or raceway by substantial...

Substantiation: Conductors smaller than #4 AWG still get damaged by the pressure or weight on the conductor as it rests on the edge of the raceway. When pulling smaller than #4 AWG conductors, the insulation still gets nicked and skinned as it comes in contact with the 90° edge of raceway or enclosure.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided any technical substantiation that conductors smaller than No. 4 AWG have been damaged due to physical weight of the conductors on the edge of a fitting. The submitter also has not clarified if the insulation of the conductors mentioned in the substantiation was actually nicked and skinned.

The nylon jacket of THHN/THWN is for mechanical protection and not part of the insulation of the conductors.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-45 Log #1608 NEC-P03 **Final Action: Reject**

(300.4(H) (New))

Submitter: Sanford E. Egesdal, Egesdal Associates PLC

Recommendation: Add new 300.4(H):

(H) Conductors Inside Electrical Boxes. Conductors, inside electrical boxes, subject to physical damage from router bits, sheet rock saws, and knives, and nonconductive coatings, such as drywall mud, paint, lacquer and enamel, must shall be protected during the construction process by means of a rigid cover, plate, or insert of a thickness and strength as to prohibit penetration by the above mentioned items.

Substantiation: This proposal is a placeholder.

The proposed requirement was accepted by Code Making Panel 3 last code cycle, during the ROC meeting. The NEC TCC changed the action on the comment and related proposal to “hold.” The TCC appointed a Task Group with members from Panels 1, 3, and 9 to determine which Code Making Panel should have jurisdiction over the new material recommended by the related proposals and comments. The Task Group agreed, by a majority, that Panel 9 has jurisdiction. As a result, Panel 9 will have a proposal to consider this code cycle.

However, Panel 9 meets the week after the Panel 3 meeting. So, it seems reasonable for Panel 3 to take affirmative action on this comment. Then, if Panel 9 accepts text similar to this proposal, Panel 3 can revise 300.4(H) to reference 314.xx, along with other appropriate text.

It is important that this requirement be included in 300.4. Protection of conductors is part of the construction process. A protective cover should be placed on the electrical box after conductors are present in the box.

Panel Meeting Action: Reject

Panel Statement: The Article 300 text is meant to apply to only those issues not specifically covered in other articles in Chapter 3.

See the panel action and statement on Proposal 3-18.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-46 Log #2277 NEC-P03 **Final Action: Reject**

(300.4(H) (New))

Submitter: David H. Kendall, Thomas & Betts Corp.

Recommendation: Add a new Section 300.4(H) to read as follows:

(H) Structural Construction Joints. Conduits, tubings and other raceways shall utilize a listed expansion/deflection fitting or other approved means when crossing a structural construction joint used in buildings, bridges, parking garages, or other structures.

Substantiation: Add a new Section 300.4(H) Structural Construction Joints. Raceways are damaged when improperly installed in structural construction joints leaving conductors or cables exposed. Structural construction joints will experience shear and lateral loads due to gravity, expansion and contraction and movement of the structure. The International Building Code, Section 1906, refers you to the provisions of ACI 318 (American Concrete Institute). However, neither of these codes addresses the use of an expansion/deflection fitting or other approved means when electrical raceways cross the construction joint. It is the responsibility of the engineer or architects to define all construction joints in construction documentation and to ensure they are constructed as required.

This new section will emphasize that a raceway can be damaged if improperly installed in a construction joint and will be a tool for the electrical inspector to ensure the proper installation of electrical raceways. Currently there are expansion/deflection fittings on the market, in addition, the language in the new section allows for other approved means.

The attached pictures shows damage ENT, a flexible and pliable raceway, crossing a structural construction joint. Conductors are exposed which creates a safety hazard. Also attached is a drawing which shows an example of an approved, Department of Transportation, installation utilizing an expansion/deflection fitting in a structural construction joint.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Table 300.5

Location of wiring method or circuit	Column 1 Direct Burial Cables or Conductors	Column 4 Residential Branch Circuits rated 120 Volts or Less with GFCI Protection and Maximum Overcurrent Protection of 20 Amperes	Column 5 Circuits for Control of Irrigation and Landscape Lighting Limited to Not More Than 30 Volts and Installed with Type UF or in Other Identified Cable or Raceway
Under a building	0 0 (in only raceway or Type MC cable identified for direct burial)	0 0 (in only raceway or Type MC cable identified for direct burial)	0 0 (in only raceway or Type MC cable identified for direct burial)

Panel Statement: Even though the Department of Transportation has provided a drawing showing an expansion fitting permitting deflection of 30 degrees in all directions, the expansion fitting was only tested for expansion and contraction, not deflection, during the listing procedure. Expansion and contraction is already covered in 300.7(B).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12 Negative: 2
Explanation of Negative:
CASPARRO, P.: This Proposal should have been accepted. Listed expansion/deflection couplings are readily available and are tested for both deflection and expansion. Section 300.7(B) does not address Structural Expansion Fittings found in buildings, bridges and other structures.
EASTER, L.: This proposal should have been accepted by Panel 3. Listed expansion/deflection couplings are readily available and are tested for both deflection and expansion. Section 300.7(B) addresses "thermal" expansion and contraction due to temperature. Section 300.7(B) does not address Structural Expansion Fittings found in buildings, bridges and other structures that are affected by other forces such as wind, loading and ground movement.

3-47 Log #807 NEC-P03 **Final Action: Reject**
(300.5)

Submitter: William Marino, North Haven, CT
Recommendation: Revise text to read as follows:
Direct buried conductors and cables emerging from grade that are continuous, not terminated, spliced and/or entering a structure need to be protected from the minimum cover depth, to a point at least 2.5 m, 8 ft above grade.
Substantiation: The article states the "Direct buried conductors and cables emerging from grade need to be protected from the minimum cover depth, to a point at least 2.5 m, 8 ft above grade".
I find this wording to be confusing. It sounds as if the NEC is telling me to extend a raceway up 8 ft above the finished grade and then come back down with another piece of pipe to install a GFCI 18 in. above ground.
The wording should clarify that conductors that are terminated in a box, or if a conduit body enters a building, less than 8 ft above finished grade, then the conductors only need to be protected for that distance.
Panel Meeting Action: Reject
Panel Statement: The submitter is not applying the existing text correctly. The direct buried conductors must be protected by raceways extending from the minimum cover given in Table 300.5 and by a raceway that may have to extend up to 8 feet. If an enclosure is installed at 6 feet, then the raceway protects the direct buried conductors from the burial depth to the enclosure. The recommended text would allow the direct buried conductors or cables that are not continuous, are terminated, and/or enter a structure to be installed without any protection, which is certainly not the intent of the section.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-48 Log #2650 NEC-P03 **Final Action: Accept in Principle in Part**
(300.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows: Direct-buried conductors, cables, conduit or other and raceways shall be... (remainder unchanged).
(C) Underground conductors and cables except Type MI cable installed under a building shall be installed in a raceway.
(D)(1) Direct-buried conductors and cables (except Type MI cable) emerging from grade and specified in Columns 1 and 4 of Table 300.5 shall be protected by identified enclosures or raceways extending from the minimum cover distance required by 300.5(A) to a point at least not less than 2.5 m (8 ft) above finished grade or termination in an enclosure or transition to another identified wiring method.
Exception: Where the conductors or cables are identified for use aboveground and emerge into a wall space enclosures or raceways shall not be required.
Substantiation: Edit. "Cables" may be perceived as multiconductor types; (B), (D), (D)(1) and (2) Include "conductors". The provision should allow for a lower height for termination in enclosures or transition to other wiring methods. Limiting the requirement to Columns 1 and 4 of Table 300.5 doesn't correlate with cover requirements of column 5.
Panel Meeting Action: Accept in Principle in Part
Revise the wording in the proposal to read as follows:
"(C) Underground Cables Under Buildings. Underground cable installed under a building shall be in a raceway."
The exception in the proposal has been revised to read as follows:
"Exception No. 1: Type MI Cable shall be permitted under a building without installation in a raceway where embedded in concrete, fill, or other masonry in accordance with 332.10(6) or in underground runs where suitably protected against physical damage and corrosive conditions in accordance with 332.10(10).
Other suggested changes in the proposal were not accepted.
Panel Statement: The panel accepted the addition of MI Cable as a new Exception No.1 since there are certain conditions based on requirements in 332.10 before MI Cable can be installed underground under a building without an additional raceway requirement.
The remainder of the proposal is rejected since direct buried conductors and cables must be protected from physical damage by a wiring method that is suitable for use in an area subject to physical damage based on the requirements in the individual articles in Chapter 3.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-49 Log #4525 NEC-P03 **Final Action: Accept in Principle**
(Table 300.5)

Submitter: Phil Simmons, National Armored Cable Manufacturers Assn. / Rep. NACMA
Recommendation: Revise Columns 1, 4 and 5 of Table 300.5 for the "under a building" location as follows:

See Table 300.5 on Page 316

Substantiation: This is a companion proposal to one submitted for 300.5(C). In the ROC for the 2008 NEC the panel statement for comment 3-22 said, "The main reason for this subsection (300.5(c)) is to enable direct buried cables installed under a concrete slab under a building,"
MC Cable is available that is rated for direct burial and for encasement in concrete. It is not clear that the "Under a Building" rule requires that the cable or conductors be in a raceway. For example, Type MC cable that is listed and identified for direct burial is certainly suitable for installation in a crawl space under a building, for direct burial, as well as encased in concrete.
Panel Meeting Action: Accept in Principle
Revise the proposed text in Columns 1, 4, and 5 as follows:
"(in raceway or Types MC or MI cables identified for direct burial.)"
Panel Statement: The panel added "MI Cable" to correlate with the addition of two new Exceptions for 300.5(C) based on the actions on Proposals 3-48 and 3-52 recognizing MC and MI cable directly buried under a building without insertion in a raceway.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-50 Log #3449 NEC-P03 **Final Action: Reject**
(300.5(A))

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add text to read as follows:
Direct-buried cables or conduit or other raceways shall be installed to meet the minimum cover requirements of table 300.5 and have their location identified by a warning ribbon that is placed in the trench above the underground installation.
Substantiation: Any added protection to underground installations could help protect personnel from puncturing and damaging the raceways or cables whether it is a homeowner or professional possibly preventing a shock hazard, or leakage into the ground causing nuisance tripping of the overcurrent protection.
Panel Meeting Action: Reject
Panel Statement: Adding the proposed text to 300.5(A) would require warning ribbons to all installations in Table 300.5 including raceways under a building with zero depth, rigid and IMC raceways under concrete with a burial depth of 6 in., and other similar installations.
The reason 300.5(D)(3) requires service conductors to have a warning ribbon installed 12 in. above the direct buried cable is service conductors are not protected by overcurrent protective devices and constitute a much greater hazard where the service conductors may be damaged during excavation.
Anyone digging in a location where directly buried service conductors have a ribbon installed 12 in. above the cable should be warned that there is a cable below that location. Expanding this warning ribbon requirement to all underground direct burial applications would tend to desensitize the effect of the warning ribbon.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
CASPARRO, P.: I disagree with the panel action and panel statement. While it is true that a requirement cannot be made which would apply to the entire Table 300.5 since some of the installations do not require any cover, it should be made a requirement for all installations which are required to be 18” or deeper, similar to the requirement in 300.5(D)(3). I disagree with the panel statement “service conductors are not protected by overcurrent protective devices and constitute a much greater hazard”. The fact that these conductors are protected by overcurrent protective devices is irrevelent in this case. Overcurrent protective devices are intended for the protection of the conductors not the personnel doing the excavation. Protection for personnel is provided by GFCI not overcurrent protection devices.
Comment on Affirmative:
OWEN, R.: See my Comment on Affirmative on Proposal 3-55 (Log #2644).

3-51 Log #3560 NEC-P03 **Final Action: Reject**
(300.5(C))

Submitter: James T. Dollard, Jr., IBEW Local 98
Recommendation: Revise text to read as follows:
(C) Underground Cables Under Buildings. A single conductor cable or multiconductor ~~Underground~~ cable assembly installed under a building shall be in a raceway.
Substantiation: The proposed revision to 300.5(C) is editorial in nature. This proposed revision will provide increased clarity and usability by specifically recognizing single cables as well as multiconductor cable assemblies.
Panel Meeting Action: Reject
Panel Statement: 300.5(C) applies to all underground cables, whether single, multiconductor cables, or cable assemblies; therefore, adding this text is unnecessary and does not provide any additional clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-52 Log #4531 NEC-P03 **Final Action: Accept in Principle**
(300.5(C))

Submitter: Phil Simmons, National Armored Cable Manufacturers Assn. / Rep. NACMA
Recommendation: Revise 300.5(C) as follows:
(C) Underground Cables Under Buildings. Underground cable installed under a building shall be in a raceway. Type MC cable listed for direct burial or concrete encasement shall be permitted without installation in a raceway.
Substantiation: Type MC cable is available listed for direct earth burial and concrete encasement. This cable does not require protection in a raceway under a building for suitable installation.
Panel Meeting Action: Accept in Principle
Add the following new Exception No. 2: “Exception No. 2: Type MC Cable listed for direct burial or concrete encasement shall be permitted under a building without installation in a raceway in accordance with 330.10(A)(5) and in wet locations in accordance with 330.10(11).”
Panel Statement: The suggested text was added as an exception since the main text requires installation in a raceway and the proposed text permits MC cable without a raceway.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
STENE, S.: There is currently no exception to 300.5(C). Therefore, the new exception is the only exception, not exception 2.

3-53 Log #975 NEC-P03 **Final Action: Reject**
(300.5(D)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Direct-buried circuit conductors and cables emerging from grade and specified in columns 1 and 4 of Table 300.5 shall be protected by ~~enclosures~~ identified raceways from the minimum cover ~~distance~~ depth below grade required by 300.5(A) to a point not less than at least 2.5 m (8 ft) above finished grade unless the raceway(s) terminate inside a pole, within a wall, at a cabinet, box, or other enclosure, or transitions to another approved wiring method. ~~In no case shall protection be required to exceed 450 mm (18 in.) below finished grade.~~ Raceways on the exterior of buildings, poles or other structures and less than 2.5 m (8 ft) above finished grade shall be rigid metal conduit, intermediate metal conduit, electrical metallic tubing, schedule 80 PVC conduit or other approved types.
Substantiation: Circuit conductors should be specified since direct-buried grounding and bonding conductors do not have a required burial depth (proposals for such have been rejected) and are covered by 110.27(B) and 250.63(B) for protection. Direct-buried conductors do not always extend 8 ft. above finished grade. Since column 1 of Table 300.5 may require a burial depth greater than 18 in. (24 in.) the raceways should extend to that depth since protection to 18 in. would leave 6 in. of conductor at less than 4 in. deep. Proposal for raceways is prompted by 300.50(B) which specifies specific raceways.
Panel Meeting Action: Reject
Panel Statement: Adding “circuit” is not necessary since this section is dealing with the actual direct buried conductors, not the circuit.
Adding the word “identified” is unnecessary since only raceways appropriate for the installation can be installed based on the particular raceway article in Chapter 3.
Changing “distance” to “depth” does not correspond to Note 1 in the table where it uses “shortest distance.”
Inserting the phrase “unless the raceway(s) terminate inside a pole, within a wall, at a cabinet, box, or other enclosure, or transitions to another approved wiring method” adds unnecessary complexity.
The submitter is not applying the existing text correctly. The direct buried conductors must be protected by raceways extending from the minimum cover given in Table 300.5 and by a raceway that may have to extend up to 8 ft. If an enclosure is installed at 6 ft, then the raceway protects the direct buried conductors from the burial depth to the enclosure.
Adding a sentence requiring specific raceway types is also not necessary since any wiring method may be appropriate for the installation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-54 Log #3820 NEC-P03 **Final Action: Reject**
(300.5(D)(1))

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Add new text to read as follows:
300.5(D)(1) Emerging from Grade. Direct-buried conductors and cables, where judged subject to physical damage, emerging from grade, etc.
Substantiation: It is permissible to attache some cable wiring methods to the exterior of buildings or structures provided it is rated for exposure to sun light and not subject to physical damage without a mounting height restriction. The existing wording would require such a cable emerging directly from earth burial to be protected by a raceway up to eight feet and an adjacent cable of the same type that originated in the building to be installed without the height restriction.
Panel Meeting Action: Reject
Panel Statement: The individual article for the particular wiring method within Chapter 3 would determine whether the wiring method could be used where subject to physical damage, therefore, inserting the text here is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-55 Log #2644 NEC-P03 **Final Action: Reject**
(300.5(D)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Warning Ribbon. Direct-buried conductors, cables, and raceways (other than rigid metal conduit or intermediate metal conduit) that are not encased in a minimum 50 mm (2 in.) concrete envelope or not installed under a minimum 102 mm (4 in.) concrete cover shall have their location indicated by a continuous warning ribbon identified for the purpose placed in the trench at least 300 mm (12 in.) above the underground installation.
Substantiation: The presumed purpose is to minimize shock hazard rather than interruption of power. Conductors other than service conductors can provide the same degree of shock hazard and explosive power (MVA) (such as industrial premises). Since RMC and IMC can be buried 6 in. it is not practical to place the ribbon 12 in. above the installation. Such raceways are likely to be noticed if dug into or deenergize the circuit by short-circuit. Conductors under a concrete slab are not likely to be damaged. Circuits protected by ground-fault devices should be excluded.
Panel Meeting Action: Reject
Panel Statement: 300.5(D) only applies to direct buried conductors and cables and not raceways, as proposed in the change. See the panel statement on Proposal 3-50.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
CASPARRO, P.: This proposal should have been Accepted in Principle. Service conductors, Feeders, and Branch circuits that are buried 18 in. or more, and are not encased in concrete should have a warning ribbon placed 12 in. above the installation because of the high available fault currents that are present at various locations today.
Comment on Affirmative:
OWEN, R.: Although I am voting in the affirmative on the panel actions on this Proposal and Proposal 3-50, I am doing so because neither proposal has a completely effective solution for this issue. To reject this proposal by saying you can't be injured by a feeder or branch circuit with overcurrent is definitely open to debate. I agree you cannot require a warning ribbon if there is not adequate raceway burial depth to maintain the clearance, but to have the same requirement for a feeder or circuit buried 18" or greater has merit and should be reconsidered by the Panel.

3-56 Log #3412 NEC-P03 **Final Action: Reject**
(300.5(D)(3))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
300.5(D)(3) Service Conductors. Underground service-entrance conductors that are not encased in concrete and that are buried 450 mm (18 in.) or more below grade shall have their location identified by a warning ribbon that is placed in the trench or at least 300 mm (12 in.) above the underground installations.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Underground service lateral conductors, based on the Technical Correlating Committee comment in the 2008 ROP, are not limited to the "line side" of the service point with the existing text applying to any service conductors, not just service-entrance conductors. A Technical Correlating Committee Task Group has been assigned to deal with this entire issue. This Technical Correlating Committee Task Group has been given the task of coordinating the definitions and terminology for conductors covered by NESC and those covered by the NEC. The service point normally describes the point of demarcation from the utility company to the premises wiring, but with deregulation, the service point has become a moving target. This suggested change is part of an effort Panel 4 started at the end of last cycle and has been picked up by this Task Group. Panel 1 and Panel 4 must provide a clearer definition.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-57 Log #3331 NEC-P03 **Final Action: Reject**
(300.5(D)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by (D)(1) and (D)(2) and other permitted and not permitted uses of raceways.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to delete this section, and deleting this section is not editorial as indicated in the substantiation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-58 Log #3884 NEC-P03 **Final Action: Reject**
(300.5(F))

Submitter: Josh Brantley, E Light Electric Services
Recommendation: Revise text as follows:
Backfill that contains large rocks, paving materials cinders, large or sharply angular substances, or corrosive material shall not be placed in or compacted with an excavation where materials may damage raceways, cables, or other substructures ~~or prevent adequate compaction of fill~~ or contribute to corrosion of raceways, cables, or other substructures.
Where necessary to prevent physical damage to the raceway or cable, protection shall be provided in the form of granular or selected material, suitable running boards, suitable sleeves, or other approved means.
Substantiation: The revised wording clarifies the original text.
Panel Meeting Action: Reject
Panel Statement: The existing text is very specific to not permitting large rocks or sharply angular substances, etc that would prevent adequate compaction of the fill. Where adequate compaction is not possible, damage to raceways, cables, or other substructures may eventually occur due to settling or deflection of the raceway from voids in the earth. The new text would imply that compaction of large objects may damage the raceways, but that concept is covered in the first part of the existing text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-59 Log #3145 NEC-P03 **Final Action: Reject**
(300.5(G), FPN and 300.50(E))

Submitter: Timothy M. Croushore, Allegheny Power
Recommendation: Revise both 300.5 (G) and 300.50 (E) to read the same and as shown below. Eliminate the existing FPN after 300.5(G)
300.5(G) Raceway Seal. Where a raceway enters a building from an underground system, both ends of the raceway shall be sealed with an identified compound or plugged so as to limit the likely hood of entrance of moisture or gases. Gas-venting devices shall be permitted to supplement sealing or plugging in order to minimize the building up of positive gas pressures in the raceway. Raceways shall be so arranged to prevent moisture from contacting live parts.
300.50(E) Raceway Seal. Where a raceway enters a building from an underground system, both ends of the raceway shall be sealed with an identified compound or plugged so as to limit the likely hood of entrance of moisture or gases. Gas-venting devices shall be permitted to supplement sealing or plugging in order to minimize the building up of positive gas pressures in the raceway. Raceways shall be so arranged to prevent moisture from contacting live parts.

Substantiation: This proposal provides consistency of the requirements for the raceway seal regardless of the voltage of the cable or conductor within the raceway. This proposal also provides similar requirements as discussed in Rule 322 (B)(4) in the National Electrical Safety Code. The seals needed for the raceway are not required to be explosion proof seals.
Panel Meeting Action: Reject
Panel Statement: The proposed text would require raceway seals even where there may be no likelihood of entrance of moisture or gases. 300.7(B) applies where there may be a difference of temperature that could potentially cause moisture within the raceway or the connected equipment.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
MENENDEZ, J.: Reason to Ballot Negatively on Proposal 3-59
This proposal should have been accepted because it brings a uniform requirement to the installations covered within Article 300. The panel statement doesn't address the issue because there are conflicting requirements between the existing 300.5(G) and 300.50 (E) included as reference. One requirement is in the 600 Volt, nominal and less Part of Article 300 and the other requirement is in the above 600 Volt, nominal Part of Article 300.
However, there isn't any relationship between the voltage of the conductors within the raceway and the necessity of the raceway seal. Therefore, the requirements of both sections should be identical. Acceptance of this proposal will make these requirements identical.
Existing 2008 NEC included as reference.
2008 Edition of the NEC
300.5 (G) Raceway Seals. Conduits or raceways through which moisture may contact live parts shall be sealed or plugged at either or both ends.
FPN: Presence of hazardous gases or vapors may also necessitate sealing of underground conduits or raceways entering buildings.
300.50 (E) Raceway Seal. Where a raceway enters from an underground system, the end within the building shall be sealed with an identified compound so as to prevent the entrance of moisture or gases, or it shall be so arranged to prevent moisture from contacting live parts.

3-60 Log #1985 NEC-P03 **Final Action: Reject**
(300.5(I))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: All conductors of the same circuit, and where used, the equipment grounding and bonding conductors shall be installed in the same raceway, cable, cable tray or other enclosure. Direct-burial type conductors shall be installed in close proximity in the same trench, manhole, or handhole.
Exception No. 1: Conductors in parallel shall be permitted in accordance with applicable provisions of 310.4.
Exception No. 2: It shall be permitted to isolate ac phase, dc polarity, grounded conductors, equipment grounding or bonding conductors from such other paralleled conductors. Where such isolated ac circuit conductors are installed in raceways or cables, the raceways and cable outer coverings shall be nonmetallic or nonmagnetic. Raceways and cables for such ac circuits shall be in close proximity to each other.
Exception No. 3: Single conductor Type MC and Type MI cables shall be permitted.
Exception No. 4: Conductors installed for skin effect heating as covered in Articles 426 and 427.
Substantiation: Cable trays and other enclosures should be included; auxiliary gutters for example are not indicated as a raceway in the raceway definition. The reference to 310.4 provides additional applicable requirements. Exception No. 2 should include nonmagnetic raceways. Close proximity should only be required for ac circuits. Proposed exceptions 3 and 4 are necessary for correlation.
Panel Meeting Action: Reject
Panel Statement: 300.5 covers underground installations and (I) covers underground conductors of the same circuit. Adding cable trays and auxiliary gutters as indicated in the proposed text and the substantiation would not be possible since cable trays and auxiliary gutters are not approved for underground installations.
300.3(B)(1) already covers paralleled conductors in the same raceway, trench, or cable based on 310.4.
There was no technical substantiation provided in proposed Exception No. 2 to include nonmagnetic raceways in an exception permitting isolated conductors of the same circuit to be installed separately. This issue is already adequately covered in existing 300.3(B)(1), Exception for nonmetallic raceways.
Proposed Exception No. 3 covering single conductor MC and MI cables is already adequately covered in 300.3(B)(3).
Adding conductors for skin-effect heating as covered in 426.42 and 427.47 is not appropriate since skin-effect heating systems, as referred in these two sections, actually use a ferromagnetic envelope to encase the single conductor, not a wiring method or normal enclosure as would be covered in Chapter 3. The text in these two sections also excludes any application of 300.20 to these systems.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-61 Log #4607 NEC-P03 **Final Action: Accept in Principle**
(300.5(I) Exception No. 1)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows:
Conductors shall be permitted to be run in paralleled groups. Each raceway, or cable assembly, or grouping of single conductors shall contain all conductors of the same circuit including equipment grounding conductors.
Substantiation: The literal text of the current NEC requires that for single-conductor cables run in parallel, all of the conductors must run together, because this exception only covers cables or raceways that are capable of containing all of the circuit conductors, and therefor omits single conductors. Since derating applies to all conductors run in the same trench, the derating penalties for doing this are severe. This omission appears to be an inadvertent one, and needs to be corrected. There is no good reason to penalize single conductor make-ups, such as will frequently exist with USE applications.
Panel Meeting Action: Accept in Principle
Revise the proposed wording to read as follows:
"Exception No. 1: Conductors shall be permitted to be installed in parallel in raceways, multiconductor cables, or direct-buried single conductor cables. Each raceway or multiconductor cable shall contain all conductors of the same circuit including equipment grounding conductors. Each direct-buried single conductor cable shall be located in close proximity in the trench to the other single conductor cables in the same parallel set of conductors in the circuit, including equipment grounding conductors."
Panel Statement: The text was reworded from the proposed text to cover multiconductor underground cables (USE multiple conductor cables) as well as single underground conductor cables (single USE conductor cables) as provided in Article 338.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-62 Log #3555 NEC-P03 **Final Action: Reject**
(300.5(L))

Submitter: Robert Byrd, Winter Garden, FL
Recommendation: Add new text to read as follows:
All PVC boxes, Underground, shall be installed in a manner that does not allow the penetration of water through which entry and exit holes were created for conduits. You shall use a neoprene gasketed fitting on all openings.
Substantiation: With the entry holes having a threaded PVC Adapter with a regular lock nut, the entry holes are allowing water into the junction boxes, eventually flooding out the connections.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided in the proposal that water enters into an underground enclosure through the threaded PVC box openings. There are many different ways water can enter into an underground enclosure, other than just at threaded openings, such as leakage through covers and other potential leakage points. Condensation from temperature differentials could be a cause. Even if water does enter into the underground enclosure, the conductors [310.8(C) for conductors in wet locations] and any connectors [110.14(B) last sentence in the first paragraph] installed in the enclosure must be rated for wet locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-63 Log #3361 NEC-P03 **Final Action: Reject**
(300.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "suitable" to "identified".
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: Section 3.2.1 of the NEC Style Manual states the term "suitable" shall be reviewed in context and if the resulting requirement is unenforceable or vague, the term shall not be used. "Suitable for the environment" is not vague and is enforceable so it can remain as is. There was no technical substantiation provided in the proposal to justify this change.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-64 Log #3646 NEC-P03 **Final Action: Reject**
(300.6(A))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(A) Ferrous Metal Equipment. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material. Where corrosion protection is necessary and the conduit ~~is threaded in the field~~, threads do not have corrosion protection, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.
Substantiation: The current wording only applies to field cut threads. Where factory nipples and bends are used, these threads do not have corrosion protection and need field applied protection just like field cut threads do.
Panel Meeting Action: Reject
Panel Statement: RMC and IMC are listed and the corrosion protection is part of the listing. Section 5.4.2 in UL 6 provides the requirements for protection of threads. IMC and RMC are threaded before the final coating is provided for the overall length, but if it is field cut (after the final coating) then protection must be applied before the conduit is installed as required in 300.6(A). There is no technical substantiation to justify this proposed requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-65 Log #2153 NEC-P03 **Final Action: Accept in Principle**
(300.7)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text as follows:
Where portions of a cable, raceway or sleeve are known to be subjected to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building.
Substantiation: This comma being added between “cable” and “raceway” would allow the ends of the cable(s) being sealed to stop condensation and water from passing through the inside of the cables.
Panel Meeting Action: Accept in Principle
In the proposed wording, add a comma after “cable” and after “raceway” to read as follows:
“300.7 Raceways Exposed to Different Temperatures.
(A) Sealing. Where portions of a cable, raceway, or sleeve are known to be subjected to different temperatures and where...”.
Panel Statement: Add the comma between the word “cable” and the word “raceway” as proposed in addition, add a comma after the word “raceway” to comply with the NEC Style Manual.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
OWEN, R.: This text has remained “cable raceway” since its introduction into the NEC in 2002. The comma was included in the ROC text in the Panel Action for Comment 3-40 but was not carried over to the NEC text for 2002. This does not explain, however, how to seal the end of a cable if, for example, the cable extends well beyond the boundary between cold and hot environments. There was no technical substantiation that condensation inside a cable has been a problem, nor any technical information as to how far a cable can extend beyond this temperature boundary safely. Enforcement of this requirement becomes impossible.

3-66 Log #350 NEC-P03 **Final Action: Reject**
(300.7(B), FPN)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to the NFPA Glossary of Terms Advisory Committee for information.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “/” in four places and bring the text together on both sides of the slash.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: Adding a division sign, as proposed by the submitter, would create a unit of measurement that may be unclear to the user of the code. The present form is more appropriate.
The panel requests that the Technical Correlating Committee forward this Proposal to the Advisory Committee on the Glossary of Terminology for consideration of the Manual of Style recommendation made in the proposal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-67 Log #2818 NEC-P03 **Final Action: Reject**
(300.9)

Submitter: Jack Giblin, White Horse Electric, Inc.
Recommendation: Add text as follows:
300.9 Exception: Watertight raceways not more than 3 m (10 ft) in length where utilized to carry NM cable on single and two-family dwelling units from a dry location to a Type 3R enclosure or breaker panel, closely following and securely fastened to the building structure.
Substantiation: 300.9 does not allow for a common wiring method of bringing home runs out of a basement, attic, or crawl space, into a breaker panel. It has been suggested to mount a Type 3R junction box on the outside of the structure, making splices, then continuing the home runs in raceway to the panel with either UF or THWN. It would be better and safer to not have so many unnecessary splices in the home runs.
Panel Meeting Action: Reject
Panel Statement: While it may be possible to install a watertight raceway, exposure of the raceway to varying temperature in an outside environment can cause condensation inside the raceway due to varying temperatures and humidity. Type NM Cable is not designed or listed for use in a wet location. Type UF Cable can be installed in this application since Type UF Cable is approved for a wet location.
This proposal covers Type NM Cable, specifically, and more appropriately belongs with Code-Making Panel 7.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-68 Log #3698 NEC-P03 **Final Action: Reject**
(300.9)

Submitter: Joseph Whitt, JW Electric
Recommendation: Revise text to read as follows:
300.9 Raceways and Enclosures in Wet Locations Above Grade. Where raceways and enclosures are installed in wet locations abovegrade, the interior of these raceways and enclosures shall be considered to be a wet location. Insulated conductors and cables installed in raceways and enclosures in wet locations abovegrade shall comply with 310.8(C).
Substantiation: By adding “and enclosures” to 300.9 it will bring this section in line with 300.5. As presently worded one could argue that an enclosure installed in a wet location would provide protection for conductors or cables not mentioned in 310.8(C).
In the definition of wet location it states, “and in unprotected locations exposed to weather” and 300.9 makes no reference to enclosures attached to or installed outside of a building.
It could be argued that the enclosure would provide protection to wet locations or exposure to weather which would allow the installation of conductors and cables not outlined in 310.8(C).
Would not the interior of an enclosure be in the same location as the enclosure itself just as in a raceway?
Panel Meeting Action: Reject
Panel Statement: Enclosures installed in an underground application as noted in the substantiation and as covered by 300.5(B) is totally different than the enclosures installed above grade. The underground enclosures are assumed to be wet location rated since the enclosures are often submerged due to rain, ground water, or other circumstances. Above ground enclosures may have some small amounts of water intrusion due to the entrance of water around raceway fittings and other sources of water leakage. Type 3R enclosures, for example, have drain holes in the two back corners of the enclosure to permit water that may accumulate within the enclosure to drain out.
This issue is already addressed in 110.20 and Table 110.20 in the existing NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-69 Log #4495 NEC-P03 **Final Action: Reject**
(300.9)

Submitter: James H. Bundy, Randolph Community College
Recommendation: Revise text as follows:
300.9 Raceways and enclosures in Wet Locations Above Grade.
Where raceways and enclosures are installed in wet locations above grade, the interior of these raceways and enclosures shall be considered to be a wet location. Insulated conductors and cables installed in raceways and enclosures in wet locations above grade shall comply with 310.8(C).
Substantiation: This section should include enclosures as the interior of an enclosure installed in a wet location should be considered to be a wet location the same as a raceway. An enclosure installed in a wet location would also include the interior of the enclosure as it would be impossible to install an enclosure in one location and the interior of that enclosure in another location.
300.5 includes enclosures therefore 300.9 should include enclosures.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-68.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-70 Log #1737 NEC-P03 **Final Action: Reject**
(300.9 Exception (New))

Submitter: Gerald Garth Barnes, Mecklenburg County Inspection Dept.
Recommendation: Add a new Exception as follows:
300.9 Raceways in Wet Locations Above Grade. Where raceways are installed in wet locations above grade, the interior of these raceways shall be considered a wet location. Insulated conductors and cables installed in raceways in wet locations above grade shall comply with 310.8(C).
Exception: In residential applications it shall be permissible to sleeve NM cable in short sections of Rigid Nonmetallic Conduit or Liquidtight Flexible Nonmetallic Conduit to allow access to an outdoor panel from an attic or crawl space. Sleeves shall be as short as practicable and shall extend through the exterior wall.
Substantiation: The provisions of 300.9 require the use of UF cable or single conductors rated for wet locations in a completed raceway system to be used to gain access to crawl spaces and attics from an outdoor panel. This is commonly achieved by setting a junction box in the crawl space or attic, then changing over to NM cable to complete homeruns. Not only does this create unnecessary splices, but it further detracts from the integrity and safety of the installation by bringing into play grounding issues of metal boxes when used, weak points in the circuits and sometimes restricted accessibility to junction boxes that might otherwise not exist.
When properly installed in this type of installation, Rigid Nonmetallic Conduit and Liquidtight Flexible Nonmetallic Conduit make an adequate sleeve with sufficient protection from the elements and physical damage.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-71 Log #750 NEC-P03 **Final Action: Reject**
(300.11(A))

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete 2008 NEC 300.11(A)(1) and (A)(2) and revise the text in 300.11(A) as follows:
(A) Secured in Place. Raceways, cable assemblies, boxes, cabinets, and fittings shall be securely fastened in place. Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids. Where independent support wires are used, they shall be distinguishable by color, tagging or other effective means from those that are part of the ceiling support wires.
Exception No. 1: The ceiling support system for fire-rated assemblies shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.
FPN: One method of determining fire rating is testing in accordance with NFPA 251-1999, Standard Methods of Tests of Fire Endurance of Building Construction and Materials.
Exception No. 2: The ceiling support system for non-fire rated assemblies shall be permitted to support branch-circuit wiring and associated equipment where installed in accordance with the ceiling system manufacturer's instructions.
Substantiation: 300.11(A) currently includes requirements that prohibit the use of "ceiling support wires" for support of electrical cables, raceways, and other equipment. That requirement applies to both rated and non-rated ceiling assemblies. Current requirements only require the identification of the independent support wires for rated assemblies. Since the use of independent wires is a mandatory requirement for both ceiling types, it is equally important that these support wires be identified from an enforcement standpoint.
Panel Meeting Action: Reject
Panel Statement: Addressing specific issues with fire rated ceiling assemblies and those not fire rated with separate subsections provides more specific information for each type of installation. Requiring coloring identification or other methods of distinguishing between ceiling support wires and wiring support is a major issue for fire rated ceiling assemblies since the integrity of the ceiling assembly and its fire rating is based upon the design and specific installation methods.
A non-fire rated ceiling assembly is not as critical as a fire rated ceiling. The contractor is certainly not prohibited, by the existing NEC from color identifying the wiring support for non-rated ceilings.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-72 Log #4831 NEC-P03 **Final Action: Reject**
(300.11(A)(1), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of determining fire rating is testing in accordance with NFPA 251-2006, Standard Methods of Tests of Fire Resistance of Building Construction and Materials~~. See {1}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: This FPN information is valuable for the user of the code, and the user should not have to go back to an annex for this information.
The NEC Technical Correlating Committee has had a standing task group to promote user-friendliness of the NEC for the past four code cycles, and the panel requests that the Technical Correlating Committee review this information and provide feedback on this issue to Code-Making Panel 3.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
SANDERS, M.: The panel statement that this "FPN information is valuable for the user of the code, and the user should not have to go back to an annex for this information" implies that the user in the field would actually have access to the referenced standards in the field. While this panel statement may be true for most FPN's, it does not apply in this case where the FPN only references another standard, which would require the acquisition of the referenced standard anyway. For a user to refer to an annex for testing information does not impede field installation. Annex I would only be used for referenced standards, not other FPN information.

3-73 Log #486 NEC-P03 **Final Action: Accept in Principle**
(300.11(A)(2))

Submitter: Bill Schmenk, Maple Hts. Building Dept. / Rep. IAEI
Recommendation: Revise text as follows:
Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the non-fire rated assemblies.
Substantiation: As an inspector, how do I know which support wires are being used to support ceiling assemblies and which are being used to support electrical piping cables-boxes.
Panel Meeting Action: Accept in Principle
Revise the proposed text and add as a new last sentence to read as follows:
"Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means."
Panel Statement: The revision in the wording was made to ensure that the all wording in the paragraphs of this section remain consistent.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
CASPARRO, P.: Continue to Accept in Principle this proposal. It is very important for the inspector to be able to identify independent support wires being used to support electrical piping, cables, and boxes.

3-74 Log #4188 NEC-P03 **Final Action: Reject**
(300.11(B)(4) (New))

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Add new text as follows:
(4) Where the raceway is used to support equipment bonding jumpers in accordance with 250.102(E).
Substantiation: Using an external equipment bonding jumper is permitted by 250.102(E) and attaching it to the raceway is a common practice and makes sense but this section does not specifically permit it.
Panel Meeting Action: Reject
Panel Statement: The raceway is not supporting the equipment bonding jumper installed on the outside of the raceway as referenced in 250.102(E) since the bonding conductor is not permitted to be longer than 6 ft and must be connected to an approved fitting at each end of the raceway.
An example of this installation is a 6-ft length of liquidtight flex with an external bonding jumper. The fittings on both ends of the liquidtight are designed for the connection of the bonding jumper. Unlike grounding electrode conductors where securing is required by 250.64, there are no requirements in Part V of Article 250 for securing bonding conductors.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-75 Log #1505 NEC-P03 **Final Action: Reject**
(300.13(B))

Submitter: Bill Higgins, Lookout Mtn., GA
Recommendation: Revise text to read as follows:
"...in (~~multiwire~~) (all) branch circuits...".
Substantiation: Currently, a multiwire branch circuit must be fed from single disconnecting means for all ungrounded conductors - so if one leg is disconnected, the other leg will also be disconnected - thus, it is essentially no different, in that one sense, from a single branch circuit. Personally, I always pigtail my neutrals, even on single branch circuits, after discovering outlets that were overloaded, corroded, or burned away at the terminal screens, which resulted in outlets in the circuit being energized on the hot side, but with no neutral return to the source.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation to expand the requirements in 300.13(B) to an individual branch circuit, rather than for multiwire branch circuits.
The purpose of this section is to ensure that a multiwire branch circuit does not inadvertently cause loss of the neutral to other downstream devices on a different energized circuit.
As stated in the substantiation, the NEC permits an installer to pigtail all of the neutrals for all circuits.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-76 Log #1524 NEC-P03 **Final Action: Reject**
(300.13(B))

Submitter: Richard S. Anderson, RTKL Associates Inc.
Recommendation: Revise text to read as follows:
(B) Device Removal. ~~In multiwire~~ Conductors in branch circuits ~~the continuity of a grounded conductor~~ shall not depend on device connections such as lampholders, receptacles, and so forth, where the removal of such devices would interrupt ~~the~~ circuit continuity.
Substantiation: When devices such as receptacles are used as a means of splicing branch circuit conductors to provide continuity, the accumulative load of the circuit is required to feed through the first few devices, this in turn shortens the life expectancy of the device and will lead to failure which can and frequently does result in fire. This change would reduce the risk of fire in overloaded branch circuits and provide an increased safety factor particularly in residential installations.
Panel Meeting Action: Reject
Panel Statement: There are listed devices that are specifically designed and tested for downstream load connections to the devices. This information is located in the 2008 UL White Book on page 296.
Single and duplex receptacles rated 15 and 20 A that are provided with more than one set of terminals for the connection of line and neutral conductors have been investigated to feed branch circuit conductors connected to other outlets on a multi-outlet branch circuit, as follows:
● Back wire (screw actuated clamp type) terminations with multiple wire access holes used concurrently to terminate more than one conductor.
● Side wire (binding screw) terminals used concurrently with their respective push-in (screw-less) terminations to terminate more than one conductor.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Abstain: 1
Explanation of Abstention:
KEDEN, R.: I expect the submitter to return in the ROC with refined substantiation.

3-77 Log #2546 NEC-P03 **Final Action: Reject**
(300.14)

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
300.14 **Length of Free Conductors at Outlets, Junctions, and Switch Points.** After a conductor is spliced or terminated, each conductor shall be long enough to extend at least 75 mm (3 in.) outside the opening of the box. Where the opening to an outlet, junction, or switch point is more than 200 mm (8 in.) in any dimension, ~~A~~t at least 150 mm (6 in.) of free conductor, measured from the point in the box where it emerges from its raceway or cable sheath, shall be left at each outlet, junction, and switch point for splices or the connection of luminaires or devices. ~~Where the opening to an outlet, junction, or switch point is less than 200 mm (8 in.) in any dimension, each conductor shall be long enough to extend at least 75 mm (3 in.) outside the opening.~~
Substantiation: When an electrician first looks at this rule in 300.14, he/she has to stop and think, "What did I just read?" Bottom line, what is the general rule? If we have a 12x12x6 junction box, and we want to splice a conductor entering from opposite sides of the box is 6 in. enough? Is 7 in. enough? 300.14 implies that the general rule is a minimum of 6 in. unless the box is smaller than 8 in. in any dimension, then it can be shorter if it extends 3 in. beyond the surface. We believe that the general rule should be 3 in. beyond the surface in all cases if a splice or termination is made for ease of installation and repair/maintenance. The 6 in. minimum rule for larger than 8 in. box makes sense so that every conductor entering a box has enough length that after repairs/changes it can be spliced or terminated again.
Panel Meeting Action: Reject
Panel Statement: The suggested text in the first sentence would require the 3-in. measurement to be applied after the splice or termination. The purpose of the existing text is to require each conductor to be a minimum of 6 in. long from the point in the box where it emerges from the raceway or cable sheath so that the electrician can easily splice or terminate the conductor. This length is acceptable for larger boxes where the electrician can easily work with the individual conductors. Where the opening into an enclosure is smaller than 8 in. in any dimension, the conductors must be able to extend outside the enclosure for at least 3 in. to permit easy and safe termination or splicing.
The proposed new text would require potentially longer conductor lengths for the larger boxes without any technical substantiation that there is a problem with the lengths provided in the existing text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-78 Log #3888 NEC-P03 **Final Action: Reject**
(300.14)

Submitter: Tom Church, E Light Electric Services
Recommendation: Revise text as follows:
At least 150 mm (6 in.) of free conductor, measured from ~~the point in the box where it emerges from its raceway or cable sheath~~, the face of the box shall be left at each outlet, junction and switch point for splices to the connection of luminaires or devices. Where the opening to an outlet, junction or switch point is less than 200 mm (8 in.) in any dimension each conductor shall be long enough to extend at least 75 mm (3 in.) outside the opening.
Substantiation: Often times in deep junction boxes there is not enough free conductor left to allow for maintenance or repair after installation, especially for those installations that are recessed. This change will ensure that enough free conductors is left regardless of the box size. This can be accomplished now that box depth minimums have been added to 314.24.
Panel Meeting Action: Reject
Panel Statement: The proposed text would require 6 in. of conductor measured from the face of the enclosure substantially increasing the conductor fill of the box without any additional advantage over the existing method of measurement. The purpose of the existing text is to require each conductor to be a minimum of 6 in. long from the point in the box where it emerges from the raceway or cable sheath so that the electrician can easily splice or terminate the conductor. This length is acceptable for larger boxes where the electrician can easily work with the individual conductors. Where the opening into an enclosure is smaller than 8 in. in any dimension, the conductors must be able to extend outside the enclosure for at least 3 in. to permit easy and safe termination or splicing. The proposed new text would require potentially longer conductor lengths for the larger boxes without any technical substantiation that there is a problem with the lengths provided in the existing text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-79 Log #1520 NEC-P03 **Final Action: Reject**
(300.15(F) Exception (New))

Submitter: William Marino, North Haven, CT
Recommendation: Add and Exception to 300.15(F) that allows the use of field assembled combination fittings. See the material and photos that I have provided.
"Exception: If due to spacing, design, and other limitations encountered during the installation of a raceway, a box or conduit body cannot be used, and there is no commercially available "identified combination fitting." Then it shall be permitted to construct a field combination fitting. A rigid conduit coupling shall be permitted to mechanically join together EMT and flexible metal conduit or liquid metal conduit to transition from one wiring method to another. It shall be made wrench tight. All fittings are to be listed, labeled, and used within the scope of the fitting's design, and all applicable wiring methods followed. There shall be no splices or terminations within these fittings."
Substantiation: Now a fitting that is not identified as a combination fitting to transition from EMT to flex or liquidtight and field assembled, is in violation of the NEC.
300.15(F) states: "A fitting identified for use shall be permitted in lieu of a box or conduit body where conductors are not spliced or terminated." For instance, a combination fitting that would transition from flexible metal conduit to EMT, or liquidtight. Such fittings are common, and commercially available in smaller sizes of raceways. It's in the larger sizes of raceways, in areas of limited space, or the design of an installation that it becomes a problem. In many cases, field assembled fittings are often created to accommodate the transition from one type of wiring method to another. Such as using a rigid steel coupling to connect an EMT connector to a flexible metal conduit connector, or liquidtight. I've been told that this is a violation of 300.15(F) because technically, these field constructed fittings are not identified for the purpose they are being used for.

Also, in Article 100 definitions, "Identified (as applied to equipment) equipment must be used for its intended purpose." Since this is a common practice in the field, and all the fittings used are "listed & labeled" for use in electrical installations, my proposal is that an exception be added to 300.15(F) that allows for the use of field assembled combination fittings such as these shown in the photos I have provided.

I sent in this proposal because of an article I saw in EC&M magazine, (Sept./Oct., 2006) showing this as a violation of the NEC.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The existing second sentence of 300.15 already covers the application in the proposal as follows:

"Fittings and connectors shall be used only with the specific wiring methods for which they are designed and listed."

For example, where a rigid metal conduit is stubbed out of the ground, a threaded coupling can be installed on the end of the rigid **metal conduit** with a liquidtight flexible connector screwed into the rigid coupling.

The example given in the substantiation with an EMT connector screwed into a threaded coupling and then a liquidtight flex connector screwed into the coupling is certainly acceptable where transitioning from EMT to liquidtight. Section 110.2 requires the installation to be approved (acceptable to the AHJ). There are also transition fittings that are specifically listed for transitioning from one wiring method to another.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-80 Log #2860 NEC-P03 **Final Action: Reject**
(300.15(F) Exception (New))

Submitter: Richard M. Delgado, Apco Electric

Recommendation: Add new Exception as follows:

Exception: EMT, IMC, RMC, FMC, PVC couplings do not need to be accessible after installation. MC, AC connectors do not need to be accessible after installation. NM connectors do not need to be accessible after installation. Straight MC to EMT and FMC to EMT couplings do not need to be accessible after installation.

Substantiation: The definition of a fitting in article 100 is very broad. In 300.15(F), it states "the fitting shall be accessible after installation". As the AHJ, you could interpret this article incorrectly. According to 300.15(F) an EMT coupling would need to be accessible after installation. Please add exceptions or revise this article.

Panel Meeting Action: Reject

Panel Statement: The purpose of providing "fittings" in 300.15 is to permit fittings such as capped elbows and similar raceway fittings where these fittings are installed in lieu of a box. Couplings, connectors, and similar fittings are certainly used for all raceways, but are not being installed in lieu of a box as intended in 300.15(F).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-81 Log #247 NEC-P03 **Final Action: Accept**
(300.15(M))

Submitter: John W. Young, Siemens Energy & Automation

Recommendation: Delete text to read as follows:

~~(M) Closed Loop. A box shall not be required with a closed-loop power distribution system where a device identified and listed as suitable for installation without a box is used.~~

Substantiation: Article 780 – Closed Loop and Programmed Power Distribution was deleted from the 2008 NEC. Closed Loop is no longer addressed in the NEC therefore this Section should be deleted.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-82 Log #4609 NEC-P03 **Final Action: Accept**
(300.15(M))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee

Recommendation: Delete this paragraph.

Substantiation: Article 780 was deleted in the 2008 cycle for lack of interest. The application addressed by this rule no longer exists. Refer to the submitter's substantiation for Proposal 10-59 in the ROP for the 2008 NEC.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-83 Log #1432 NEC-P03 **Final Action: Reject**
(300.17)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: The number and size of conductors in any raceway <u>or enclosure</u> shall not be more than will permit dissipation of the heat and ready installation and withdrawal <u>and removal</u> of the conductors without damage to the conductors or <u>to other components</u> ~~their installation~~.

Add to the FPN: Auxiliary gutters 366.22, Boxes and conduit bodies 314.16, Handhole enclosures 314.30.

Substantiation: Edit. Since this provision is of a general nature it should include enclosures other than raceways.

Panel Meeting Action: Reject

Panel Statement: The text in 300.17 and the fine print note references are all dealing with dissipation of heat and ready installation and removal of conductors out of a raceway without damaging the insulation of the conductors, not removal or installation into enclosures.

There was no technical substantiation provided by the submitter to expand this section to cover enclosures. Raceways are often connected to boxes, conduit bodies, and handhole enclosures, but requiring ready installation and removal of conductors applies to the raceway, not the enclosure, and is more appropriately covered in Article 314.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-84 Log #181 NEC-P03 **Final Action: Reject**
(300.17, FPN)

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

FPN: See the following sections of this Code: intermediate metal conduit, 342.22; rigid metal conduit, 344.22; flexible metal conduit, 348.22; liquidtight flexible metal conduit, 350.22; PVC conduit, 352.22; HDPE conduit, 353.22; RTRC, 355.22; liquidtight nonmetallic flexible conduit, 356.22; electrical metallic tubing, 358.22; flexible metallic tubing, 360.22; electrical nonmetallic tubing, 362.22; cellular concrete floor raceways, 372.11; cellular metal floor raceways, 374.5; metal wireways, 376.22; nonmetallic wireways, 378.22; surface metal raceways, 386.22; surface nonmetallic raceways, 388.22; underfloor raceways, 390.5; fixture wire, 402.7; theaters, 520.6; signs, 600.31(C); elevators, 620.33; audio signal processing, amplification, and reproduction equipment, 640.23(A) and 640.24; Class 1, Class 2, and Class 3 circuits, Article 725~~;~~ <u>and</u> fire alarm circuits, Article 760~~; and optical fiber cables and raceways, Article 770.~~

Substantiation: Article 770 has no conductors.

Panel Meeting Action: Reject

Panel Statement: Composite optical fiber cables contain optical fibers and current-carrying electrical conductors with installation in various raceways, including optical fiber raceways, so reference to Article 770 in the fine print note is appropriate.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-85 Log #235 NEC-P03 **Final Action: Reject**
(300.18(C))

Submitter: Sprague Owings, Nassau County, FL

Recommendation: Add new text to read:

<u>(C) No Obstructions. All conduit raceways shall have the same interior dimension from start to end. Conduit size shall not change except at approved boxes or conduit bodies.</u>

Substantiation: I have been encountering periodic installations where a reducing bushing is used somewhere in the middle of a conduit run, thus creating an obstruction in the raceway.

This insertion could be accompanied by insertions to 342, 344, 348, 350, 352, 353, 356, 360 and 362 as:

Example: 342.21 Obstructions. No obstruction shall be created in a conduit by changing the size in mid-point in accordance with 300.18(C).

Panel Meeting Action: Reject

Panel Statement: There are many different locations in a raceway run where a listed reducing bushing can be installed within a hazardous (classified) location in a seal off device to permit a larger seal off device than the raceway fitting and expansion fittings.

If a listed reducing fitting was installed mid-span of a raceway installation, then it was a violation of the listing of the fitting. Adding the suggested text will affect those fittings that are listed for use with the raceway and unduly restrict the use of the legitimate fittings where used properly.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-86 Log #263 NEC-P03 **Final Action: Accept**
(Table 300.19(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change the column heading on the first column from "Size of Wire" to "Conductor Size".
Substantiation: The change in terminology will correlate with the use of the term in 310.19(A) and in other parts of the table.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-87 Log #1787 NEC-P03 **Final Action: Reject**
(300.19(A) and (C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A), delete "cable" in the second sentence.
In (C)(3), change "cables" to "conductors".
Substantiation: Edit. The use of "cables" and "conductors" implies some difference, such as single or multiconductor types. (B) uses the words "cables" and "conductors". "Conductors" includes single and multiconductor types.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to make the change from "cable support" to "conductor support" and no technical information on the availability of "cable support" methods and "conductor support."
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-88 Log #1829 NEC-P03 **Final Action: Reject**
(300.20(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where conductors ~~carrying~~ <u>of</u> alternating current <u>circuits</u> are installed in ferrous metal enclosures, or ferrous metal raceways, <u>or ferrous metal-covered cables,</u> they shall... (remainder unchanged).
Substantiation: Though raceways are enclosures they are specifically noted, and metal covered cables should also be specifically noted.
Panel Meeting Action: Reject
Panel Statement: The conductors in ferrous metal-covered cables cannot be arranged in the cable or in an enclosure unless the metal sheathing is removed since these cables are manufactured with the conductors in the cable.
Adding ferrous metal covered cables does not make sense in this application.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-89 Log #1998 NEC-P03 **Final Action: Reject**
(300.20(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. This provision is covered by 300.3 (B) which is more comprehensive and covers cable trays, trenches, and cords. The exceptions are superfluous since the referenced sections already apply.
Panel Meeting Action: Reject
Panel Statement: The submitter is incorrect in his statement that the requirements in 300.20(A) are covered in 300.3. 300.20(A) applies to both raceways and enclosures, with the arrangement of the alternating current conductors installed within the raceways and enclosures.
An example might be an auxiliary gutter with 10 sets of paralleled conductors per phase and neutral where all the phase A are installed first, then all phase B, then all phase C, and then all the neutrals.
These paralleled conductors must be installed in 10 groups of Phase A, Phase B, Phase C, and the neutral so the magnetic lines of flux will cancel properly, not set up currents within the ferrous metal auxiliary gutter, and cancel the magnetic lines of flux so each parallel conductor will carry the same amount of current as the other paralleled conductors in the same set.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-89a Log #3822 NEC-P03 **Final Action: Reject**
(300.20(A))

Submitter: James S. Nasby, Skokie, IL
Recommendation: Add a new: Exceptions No. 3 & 4:
<u>*Exception No. 3: Conductors carrying no more than 20 amperes if agreeable with the equipment, enclosure or raceway manufacturer.*</u>
<u>*Exception No. 4: Conductors carrying no more than 2 amperes, such as signaling circuits.*</u>
Substantiation: 1) In most, if not all, cases, 20 amperes will not cause noticeable metal heating.
2) 2 amperes won't cause noticeable metal heating.
3) These exceptions will prevent damage to equipment caused by field modifications which aren't needed.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided for either of the proposed exceptions. The substantiation in (1) indicates the submitter's uncertainty with the possibility of heating of the enclosures, even at 20 amperes.
The submitter did not provide any technical information as to why 2 amperes was picked for the low end in signaling circuits.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-90 Log #4370 NEC-P03 **Final Action: Reject**
(300.20(B))

Submitter: Travis Hannah, Tyco Thermal Controls Ltd.
Recommendation: Revise text as follows:
300.20 Induced Currents in Ferrous Metal Enclosures or Ferrous Metal Raceways
(B) Individual Conductors. Where a single conductor carrying alternating current<u>**, that exceeds 200 amps, per conductor,**</u> passes through metal with magnetic properties, the inductive effect shall be minimized by (1) cutting slots in the metal between the individual holes through which the individual conductors pass or (2) passing all the conductors in the circuit through an insulating wall sufficiently large for all of the conductors of the circuit.
Substantiation: The current wording in 2008 NEC Article 300.20(B) is in conflict with 2006 Canadian Electrical Code Section 12-Subsection 3022 Entrance of conductors into boxes, cabinets, and fittings. Note (7) "Where single-conductor cables or conductors enter metal boxes through separate openings, precaution shall be taken to prevent overheating of the metal by induction if the current carried per conductor exceeds 200A."
Reason for this proposal is for the continuing harmonization of the electrical code towards IEC standard, as proposed by members of the CANENA Technical Harmonization Committees (UL, CSA, ANCE).
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to justify setting a 200-ampere minimum current threshold. Providing the substantiation submitted to the Canadian Electrical Code for the corresponding change dealing with this issue may provide some justification that was not provided in the proposal by the submitter.
Harmonization between countries is good, but technical substantiation must still be provided.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-90a Log #3823 NEC-P03 **Final Action: Reject**
(300.20(B))

Submitter: James S. Nasby, Skokie, IL
Recommendation: Revise text to read as follows:
(1) ~~cutting slots in the metal between the individual holes through which the individual conductors pass~~ passing all of the conductors thru a non-ferrous metal wall or (2) passing all the conductors in the circuit through an insulating wall...
Substantiation: Cutting slots in the field will:
1) Almost always void the equipment or raceway or enclosure warrantee
2) Almost always void the equipment or enclosure Type (NEMA) rating.
3) Will void the Short Circuit (WIC) rating of equipment so labeled.
Panel Meeting Action: Reject
Panel Statement: Switchboard and panelboard enclosures mounted on a maintenance pad could have slots cut into the bottom without affecting the structural integrity of the enclosure.
For example, a manufacturer or an electrician could cut slots between the entry points with reinforcing metal installed within the enclosure based on the terminology in 300.20(B) with a field evaluation or approval from the AHJ.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-91 Log #1600 NEC-P03 **Final Action: Reject**
(300.21)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Add a third sentence to 300.21: <u>Conduits or raceways entering enclosures of the ventilated type, shall be sealed or plugged with an approved fire stopping material at the point of entrance to the enclosure to prevent fire, smoke, or other products of combustion from passing through the raceway into other areas of the building or structure.</u>
Substantiation: A fire in the area where the enclosure is located will produce smoke, poison gases, and other products of combustion which can easily be carried through the enclosure's vents and these unsealed raceways to other areas in the building. Essentially defeating any firewalls. I have not seen this particular problem addressed in building codes or fire resistance directories since these raceways are not "sleeves" which ARE required to be fire stopped, but rather they are complete raceway systems which generally require only sealing up around the OUTSIDE of the pipe where it penetrates a firewall. In this particular installation smoke could easily pass right through the INSIDE of the raceway because of the ventilation openings in the enclosure.

I have witnessed the results of this "chimney-effect" problem when the smoke from a fire in a basement electric room spread throughout the upper floors of a high rise building because the raceways leaving the switch gear acted like chimneys and transported heavy smoke from the basement directly to panelboards and switchboards on the upper floors of the building thus bypassing and defeating any fire walls that the raceways penetrated and completely filling the UPPER floors with smoke. Luckily nobody was injured. If the ends of the raceways were simply filled with some fire-stopping type caulk or similar material this situation would probably never have happened.

Once a fire starts to produce toxic fumes we almost have to think of that area as a Hazardous (classified) location similar to those in Article 500. We must try to prevent those hazardous gases passing from one area in a building to another.

Just as other sealing requirements throughout the code prevent moisture, condensation, dusts, gases or vapors from traveling through raceways, this requirement for some simple fire proof putty could prevent toxic fumes from spreading throughout the building. The seals required by this proposal are equally as important as any other seals required by the NEC such as 230.8, 300.5(G), 300.7(A), 300.50(E), 312.5(C) exception to (D), 324.40(A), 332.40(A), 368, 238, 372.7, 501.15, 502.15, 504.70, 505.16, 506.16, 680.24(B) and any other seals that may be required.

I am submitting companion proposals to sections 300.21, 770.26, 800.26, 820.26 and 830.26.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided for this very sweeping change. Based on the suggested text, any enclosure, including Type 1 outlet, junction, device, and many other types of enclosures, supplied by a raceway enclosing conductors would require a seal. The raceway could be ½ in. or larger and connected to a box that would require a seal preventing possible products of combustion from the conductor insulation from spreading into the building.

The submitter suggested that a fire in a high rise building developed smoke in the basement that spread through the upper floors of the building through raceways originating in the basement and connecting to the upper floors.

This incident is anecdotal without a fire report or any investigative report on the cause and origin as well as the cause of the smoke spread.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-92 Log #4518 NEC-P03 **Final Action: Accept in Part**
(300.21)

Submitter: Salvatore DiCristina, Rutgers, The State University of New Jersey / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to to read as follows:

300.21 Spread of Fire or Products of Combustion.

~~Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased.~~ When required by the building, fire or mechanical code, electrical installations within shaftways, plenums and air-handling ducts shall maintain a flame spread and smoke development index. Openings around electrical penetrations into or through ~~fire-resistant–rated~~ fire-resistive walls, partitions, floors, or ceilings and smoke partitions shall be firestopped using approved methods ~~to maintain the fire resistance rating~~.

Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.

This section covers two issues: 1) appurtenances in certain locations must comply with flamespread and smoke development requirements established in the building, fire and mechanical codes; and 2) penetrations made in fire-resistive construction shall be provided with firestopping to maintain their fire-resistance rating.

Currently, the first sentence is vague. It is unclear what quantitatively will prevent the possible spread of fire or products of combustion from being substantially increased. What is "substantially". Additionally, we could not identify what constitutes a hollow space, and we could not identify any requirement that the combustible loading is regulated in general in hollow spaces. We do agree that building, fire and mechanical codes regulate flame spread and smoke development for spaces that are used for air distribution, see 300.22.

The second issue is addressed in the second sentence, which has been clarified. The end of the second sentence is revised to eliminate redundancy. Adding the term "into or" makes it clear that not only through penetrations, but also membrane penetrations into fire-resistive construction must be provided with firestopping to maintain the fire-resistance rating. This should also apply to smoke partitions, which are not required to be fire resistive construction. Note that a "smoke barrier" is also required to be fire-resistive, hence the change to "fire-resistive" in the second sentence.

See similar proposal to 800.26.

Panel Meeting Action: Accept in Part

Revise the wording in the proposal to read as follows:

"Electrical installations in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around electrical penetrations into or through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating."

The FPN is to remain unchanged.

The panel rejects all other proposed changes in the recommended text.

Panel Statement: The proposed changes to the first sentence do not explain what a shaftway is and is not as clear as the existing text using "electrical installations in hollow spaces and vertical shafts."

Adding the requirement to comply with the building code, fire code, or mechanical code is unnecessary since in any installation where these codes exist, compliance with these other codes is already a requirement.

Adding the requirement to "maintain a flame spread and smoke development index" does not provide an electrician with any explanation of how to maintain that flame and smoke index. This information is more appropriately covered in the Fine Print Note directly below the required text in 300.21.

The change dealing the addition of "into or" in the second sentence was accepted since openings must be fire-stopped where there are penetrations into or through the wall, floor, ceiling, or partition.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-93 Log #3559 NEC-P03 **Final Action: Accept in Principle**
(300.22)

Submitter: James T. Dollard, Jr., IBEW Local 98

Recommendation: Revise text to read as follows:

300.22 Wiring in Ducts and Plenums~~, and Other Air-Handling Spaces~~. The provisions of this section apply to the installation and uses of electrical wiring and equipment in ducts, and plenums~~, and other air-handling spaces~~.

FPN: See Article 424, Part VI, for duct heaters.

(A) Ducts for Dust, Loose Stock, or Vapor Removal. No wiring systems of any type shall be installed in ducts used to transport dust, loose stock, or flammable vapors. No wiring system of any type shall be installed in any duct, or shaft containing only such ducts, used for vapor removal or for ventilation of commercial-type cooking equipment.

(B) Ducts or ~~Plenums~~ Spaces Used Solely for the Movement of Environmental Air. Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or plenums specifically fabricated to transport environmental air. Flexible metal conduit shall be permitted, in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires shall be permitted.

(C) ~~Other Space~~ Space Used as a Plenum for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and spaces ~~plenums~~ as specified in 300.22(A) and (B). This section ~~It~~ does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN No.1: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

FPN No.2: The term "Space Used as a Plenum For Environmental Air" used in this section correlates with the use of the term "plenum" in NFPA 90A and other Mechanical Codes. The use of the term plenum in NFPA 90A and other Mechanical Codes is typically used for all air handling spaces.

No changes are proposed to 300.22(C)(1), 300.22(C)(2) or 300.22(D).

Substantiation: This proposal is written in an effort to eliminate confusion between the use of the terms, duct, plenum, and other space.

As used in the current edition of the NEC, the term "plenum" essentially means a space built for the sole purpose of moving air. In the NEC a duct is a plenum but a plenum is not always a duct because a shaft built solely for the purpose of moving air is a plenum. This applies regardless of whether the duct or shaft is used for supply, return or exhaust.

As used in the current edition of the NEC, the term "Other Space Used For Environmental Air" essentially means a space built for many purposes in which return air is moved. The existing informational FPN does a good job explaining that the most common "other space" is the space above a hung ceiling used to move return air as well as to contain supply ducts, electrical power distribution, lighting, sprinkler and other systems.

Tremendous confusion occurs when building officials and users of other codes such as NFPA 90A, the International Mechanical Code (IMC), and the Uniform Mechanical Code attempt to apply their rules for air handling spaces that contain conductors and equipment addressed in the NEC. These other codes and standards refer to all spaces that move air as "plenums" including spaces that the NEC identifies as "other spaces." NFPA 90A and the IMC may use the following terms to describe a 300.22(C) space; plenum, ceiling cavity plenum and raised floor plenum

Additionally, confusion exists with product markings. A product tested, listed and labeled for use in a space addressed by 300.22(C) is often required to be marked as "suitable for use in "other spaces for environmental air" or equivalent language to comply with requirements in the NEC. However, this leads to confusion when the installer/maintainer is attempting to satisfy NFPA 90A or other Mechanical Codes where the term "plenum" is used. Conversely, if products are listed and labeled for use in "plenums", the installer/maintainer may misinterpret that the product (listed for use only in a 300.22(C) space) marked as "plenum" (to comply with the IMC and NFPA 90A) is rated for a 300.22(B) space due to the problems created by the use of different terms.

The proposed changes are additionally substantiated as follows:

- The term "plenum" is removed from 300.22(B) and the section is clarified as addressing ducts and spaces being used solely for the movement of environmental air." This will help to clarify these spaces.
- This proposal seeks the deletion of term "Other Air Handling Spaces" as this term is the basis for confusion when an installation must comply with more than one code or standard. This proposal suggests using the term "space used as a plenum for environmental air." This clearly describes a space such as the space above a ceiling or below a raised floor that is not built solely to move air.

This proposal is essentially editorial in nature seeking clarity with respect to 300.22 and other relevant codes and standards including NFPA 90A, the International Mechanical Code, and the Uniform Mechanical Code.

During the last code cycle, CMP-3 was directed to remain status quo on several issues until guidance could be given from NFPA 90A. This proposal follows that directive and attempts to better align terms with NFPA 90A. As a member of the NFPA 90A committee, I see first hand the tremendous confusion and feel that these changes are essential to clarify the application of 300.22(B) and (C).

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 3-94.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

EGESDAL, S.: See My Explanation of Negative on 3-94.

3-94 Log #4399 NEC-P03 **Final Action: Accept in Principle**
(300.22)

Submitter: Dwayne E. Sloan, Underwriters Laboratories Inc.

Recommendation: Revise text as follows:

300.22 Wiring in Ducts and Plenums~~, and Other Air-Handling Spaces~~. The provisions of this section apply to the installation and uses of electrical wiring and equipment in ducts, plenums, and other air-handling spaces.

(A) Ducts for Dust, Loose Stock, or Vapor Removal. No wiring systems of any type shall be installed in ducts used to transport dust, loose stock, or flammable vapors. No wiring system of any type shall be installed in any duct, or shaft containing only such ducts, used for vapor removal or for ventilation of commercial-type cooking equipment.

(B) Ducts or ~~Plenums~~ Spaces Solely for the Movement of Environmental Air. Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in ducts or plenums specifically fabricated to transport environmental air. Flexible metal conduit shall be permitted, in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these ducts and plenum chambers. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such air ducts or plenum chambers only if necessary for their direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires shall be permitted.

(C) ~~Other Space~~ Space Used as a Plenum for Environmental Air. This section applies to space used for environmental air-handling purposes other than air ducts and plenums used solely for the movement of environmental air as specified in 300.22(A) and (B). This section applies to raised floors and ceiling spaces where the space is not built for the sole purpose of moving air. ~~It~~ This section does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN No.1: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

FPN No.2: The term "Space Used as a Plenum For Environmental Air" used in this section correlates with the use of the term "plenum" in NFPA 90A and other Mechanical Codes where the plenum is used for return air purposes. The use of the term plenum in NFPA 90A and other Mechanical Codes is typically used for all air handling spaces.

Substantiation: The purpose of this proposal is to avoid confusion with the use of the terms, duct, plenum, and other space used for environmental air.

There is currently considerable confusion as Authorities Having Jurisdiction and other users of codes such as NFPA 90A, the International Mechanical Code (IMC), and the Uniform Mechanical Code (UMC) attempt to apply the requirements for air handling spaces that contain conductors and equipment addressed in the NEC. These other codes and standards refer to all spaces that move air as "plenums" including spaces that the NEC identifies as "other spaces." NFPA 90A, the UMC, and the IMC may use the following terms to describe a 300.22(C) space; plenum, ceiling cavity plenum and raised floor plenum.

Confusion also exists with product listed and labeled for use in a space addressed by 300.22(C). These products are often required to be marked as "suitable for use in "other spaces for environmental air" or equivalent language to comply with requirements in the NEC. However, this leads to confusion when the installer/maintainer is attempting to satisfy NFPA 90A or other Mechanical Codes where the term "plenum" is used. Conversely, if products are listed and labeled for use in "plenums", the installer/maintainer may misinterpret that the product (listed for use only in a 300.22(C) space) marked as "plenum" (to comply with the IMC, UMC, and NFPA 90A) is rated for a 300.22(B) space due to the problems created by the use of different terms.

The proposed changes are additionally substantiated as follows:

· The term "plenum" is removed from 300.22(B) and the section is clarified as addressing ducts and spaces being used solely for the movement of environmental air." This will help to clarify these spaces.

· This proposal seeks the deletion of term "Other Space Used for Environmental Air" as this term is the basis for confusion when an installation must comply with more than one code or standard. This term is not in NFPA 90A. This proposal suggests using the language "space used as a plenum for environmental air." This clearly describes a space such as the space above a ceiling or below a raised floor that is not built solely to move air.

In summary, this proposal is seeking align 300.22 with other relevant codes and standards including NFPA 90A, the International Mechanical Code, and the Uniform Mechanical Code. During the last code cycle, CMP-3 was directed to remain status quo on several issues until guidance could be given from NFPA 90A. This proposal follows that directive and attempts to better align terms with NFPA 90A.

Panel Meeting Action: Accept in Principle

Revise the wording in the proposal as follows:

"300.22 Wiring in Ducts Not for Air Handling~~, Plenums,~~ Fabricated Ducts For Environmental Air, and Other Spaces For Environmental Air (Plenums) ~~Air-Handling Spaces~~.

The provisions of this section apply to the installation and uses of electrical wiring and equipment in ducts used for dust, loose stock, or vapor removal, ~~plenums,~~ ducts specifically fabricated for environmental air, and other spaces used for environmental air (plenums). ~~air-handling spaces~~.

FPN: See Article 424, Part VI, for duct heaters.

(A) Ducts for Dust, Loose Stock, or Vapor Removal. No wiring systems of any type shall be installed in ducts used to transport dust, loose stock, or flammable vapors. No wiring system of any type shall be installed in any duct, or shaft containing only such ducts, used for vapor removal or for ventilation of commercial-type cooking equipment.

(B) Ducts ~~or Plenums Used~~ Specifically Fabricated for Environmental Air. Only wiring methods consisting of Type MI cable, Type MC cable employing a smooth or corrugated impervious metal sheath without an overall nonmetallic covering, electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, or rigid metal conduit without an overall nonmetallic covering shall be installed in ducts ~~or plenums~~ specifically fabricated to transport environmental air. Flexible metal conduit shall be permitted, in lengths not to exceed 1.2 m (4 ft), to connect physically adjustable equipment and devices permitted to be in these fabricated ducts ~~and plenum chambers~~. The connectors used with flexible metal conduit shall effectively close any openings in the connection. Equipment and devices shall be permitted within such ducts ~~or plenum chambers~~ only if necessary for the ~~their~~ direct action upon, or sensing of, the contained air. Where equipment or devices are installed and illumination is necessary to facilitate maintenance and repair, enclosed gasketed-type luminaires shall be permitted.

(C) Other Spaces Used for Environmental Air (Plenums). This section applies to spaces not specifically fabricated ~~used~~ for environmental air-handling purposes but used for air handling purposes as a plenum ~~, other than ducts and plenums as specified in 300.22(A) and (B).~~ It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN No. 1: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.

FPN No. 2: The phrase "Other space used for environmental air (plenum) used in this section correlates with the use of the term "plenum" in NFPA 90A, the Standard for the Installation of Air-Conditioning and Ventilating Systems, 2009, and other mechanical codes where the plenum is used for return air purposes, as well as some other air-handling spaces.

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for ~~the~~ use within an air handling space, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables, conductors, and raceways shall be permitted to be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

(2) Equipment. Electrical equipment with a metal enclosure, or electrical equipment with a nonmetallic enclosure listed for ~~the~~ use within an air handling space and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in such other space unless prohibited elsewhere in this Code.

Exception: Integral fan systems shall be permitted where specifically identified for ~~such~~ use within an air handling space."

Panel Statement: The titles have been revised to handle "fabricated" in (B) and "not specifically fabricated" in (C).

In 300.22(C)(2), the words "or electrical equipment" were added to the first sentence to clarify that electrical equipment with a metal enclosure is one issue and electrical equipment with a nonmetallic enclosure is a different issue.

The remainder of the revisions are editorial.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

EGESDAL, S.: If the NEC intends to correlate with NFPA 90A-2009, the two documents should use the same terms and definitions. Using different terms for the same part of a HVAC system is confusing to users of the documents, and leads to poor correlation. For example in NFPA 90A-2009, an air-handling room plenum is fabricated with noncombustible material or limited combustible material having a smoke developed index not greater than 50. An air-handling room plenum is essentially an air duct that is missing a section of air duct between return air duct (typically an opening in the wall) and the air handler (fan) inlet, and should fall under the requirements of 300.22(B). On the other extreme for plenum construction is the ceiling cavity plenum (hung ceiling) that is permitted to be constructed of combustible material having a flame spread index not greater than 25 and a smoke developed index not greater than 50, and is correctly placed under the requirements of 300.22(C). Also, an apparatus casing plenum is really a section of air duct that is fabricated to provide a transition (e.g., between a furnace bonnet and an air duct).

3-95 Log #4557 NEC-P03 **Final Action: Reject**
(300.22(C)(1))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council

Recommendation: Revise text as follows:

300.22 Wiring in Ducts, Plenums, and Other Air-Handling Spaces.

The provisions of this section apply to the installation and uses of electric wiring and equipment in ducts, plenums, and other air-handling spaces.

FPN: See Article 424, Part VI, for duct heaters.

(A) *(no change to text)*

(B) *(no change to text)*

(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

(1) Wiring Methods. The wiring methods for such other space shall be limited to the following:

(a) Totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections

(b) Type MI cable

(c) Type MC cable without an overall nonmetallic covering

(d) Type AC cable

(e) Factory-assembled multiconductor control or power cable that is specifically listed for the use

(f) Listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath

(g) Cables and conductors installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers

(h) Cables listed as plenum cables, types CL2P, CL3P, NPLFP, FPLP, OFNP, OFCP, CMP, CATVP, BLP.

FPN: One method of defining a plenum cable is a cable that is low smoke-producing cable and fire-resistant cable by exhibiting a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

~~totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers~~.

(2) Equipment. Electrical equipment with a metal enclosure, or with a nonmetallic enclosure listed for the use and having adequate fire-resistant and low-smoke-producing characteristics, and associated wiring material suitable for the ambient temperature shall be permitted to be installed in such other space unless prohibited elsewhere in this Code.

Exception: Integral fan systems shall be permitted where specifically identified for such use.

(D) *(no change to text)*

Substantiation: This proposal does not alter any of the requirements presently found in the NEC for wiring methods. However, this proposal does help the NEC user by explicitly placing all the appropriate wiring methods into article 300.22, instead of having them appear spread out throughout the code, in articles 725, 760, 770, 800, 820 and 830, where they appear somewhat haphazardly. This refers to the wiring methods in (h) which are now permitted by the following sections of the NEC, in articles 725, 760, 770, 800, 820 and 830. The wording in each section is different but the end result is that cables "listed as being suitable for use in ducts, plenums, and other space used for environmental air" and also "listed as having adequate fire resistant and low smoke producing characteristics" by exhibiting "a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262" are permitted for use as wiring methods in "other spaces used for environmental air". This is also consistent with the requirements in the 2009 edition of NFPA 90A, Standard for the Installation of Air-Conditioning and Ventilating Systems, which has been given jurisdiction by Standards Council over the fire safety requirements for materials in plenums.

The 2008 NEC wording follows:

725.3 Other Articles.

Circuits and equipment shall comply with the articles or sections listed in 725.3(A) through (G). Only those sections of Article 300 referenced in this article shall apply to Class 1, Class 2, and Class 3 circuits.

(C) Ducts, Plenums, and Other Air-Handling Spaces. Class 1, Class 2, and Class 3 circuits installed in ducts, plenums, or other space used for environmental air shall comply with 300.22.

Exception: Type CL2P or CL3P cables and plenum signaling raceways shall be permitted for Class 2 and Class 3 circuits installed in other spaces used for environmental air in accordance with 725.154(A).

725.154 Applications of Listed Class 2, Class 3, and PLTC Cables.

Class 2, Class 3, and PLTC cables shall comply with any of the requirements described in 725.154(A) through (H).

(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum signaling raceways shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.

760.3 Other Articles.

Circuits and equipment shall comply with 760.3(A) through (G). Only those sections of Article 300 referenced in this article shall apply to fire alarm systems.

(B) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22, where installed in ducts or plenums or other spaces used for environmental air.

Exception: As permitted in 760.53(B)(1) and (B)(2) and 760.154(A).

760.53 Multiconductor NPLFA Cables.

Multiconductor non–power-limited fire alarm cables that meet the requirements of 760.176 shall be permitted to be used on fire alarm circuits operating at 150 volts or less and shall be installed in accordance with 760.53(A) and (B).

(B) Applications of Listed NPLFA Cables. The use of non–power-limited fire alarm circuit cables shall comply with 760.53(B)(1) through (B)(4).

(1) Ducts and Plenums. Multiconductor non–power-limited fire alarm circuit cables, Types NPLFP, NPLFR, and NPLF, shall not be installed exposed in ducts or plenums.

FPN: See 300.22(B).

(2) Other Spaces Used for Environmental Air. Cables installed in other spaces used for environmental air shall be Type NPLFP.

Exception No. 1: Types NPLFR and NPLF cables installed in compliance with 300.22(C).

Exception No. 2: Other wiring methods in accordance with 300.22(C) and conductors in compliance with 760.49(C).

Exception No. 3: Type NPLFP-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.
760.154 Applications of Listed PLFA Cables.
PLFA cables shall comply with the requirements described in either 760.154(A), (B), or (C) or where cable substitutions are made as shown in 760.154(D).
(A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type FPLP. Types FPLP, FPLR, and FPL cables installed in compliance with 300.22 shall be permitted. Type FPLP-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.
770.3 Other Articles.
Circuits and equipment shall comply with 770.3(A) and (B). Only those sections of Chapter 2 and Article 300 referenced in this article shall apply to optical fiber cables and raceways.
(B) Ducts, Plenums, and Other Air-Handling Spaces. The requirements of 300.22 for electric wiring shall also apply to installations of optical fiber cables and raceways where they are installed in ducts or plenums or other space used for environmental air.
Exception: As permitted in 770.154(A).
770.154 Applications of Listed Optical Fiber Cables and Raceways.
Nonconductive and conductive optical fiber cables shall comply with any of the requirements given in 770.154(A) through (D) or where cable substitutions are made as shown in 770.154(E).
(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type OFNP or OFCP. Abandoned cables shall not be permitted to remain. Types OFNR, OFCR, OFNG, OFN, OFCG, and OFC cables installed in compliance with 300.22 shall be permitted. Listed plenum optical fiber raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only type OFNP and OFCP cables shall be permitted to be installed in these raceways.
800.3 Other Articles.
(B) Equipment in Other Space Used for Environmental Air. Section 300.22(C) shall apply.
800.154 Applications of Listed Communications Wires and Cables and Communications Raceways.
Communications wires and cables shall comply with the requirements of 800.154(A) through (D), 800.154(F) and 800.154(G) or where cable substitutions are made in accordance with 800.154(E).
(A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CMP. Abandoned cables shall not be permitted to remain. Types CMP, CMR, CMG, CM, and CMX and communications wire installed in compliance with 300.22 shall be permitted. Listed plenum communications raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CMP cable shall be permitted to be installed in raceways.
820.3 Other Articles.
(B) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22, where installed in ducts, plenums, or other spaces used for environmental air, shall apply.
Exception: As permitted in 820.154(A).
820.154 Applications of Listed CATV Cables and CATV Raceways.
CATV cables shall comply with the requirements of 820.154(A) through (E) or where cable substitutions are made as shown in Table 820.154(E).
(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CATVP. Abandoned cables shall not be permitted to remain. Types CATVP, CATVR, CATV, and CATVX cables installed in compliance with 300.22 shall be permitted. Listed plenum CATV raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CATVP cable shall be permitted to be installed in these raceways.
830.3 Other Articles.
Circuits and equipment shall comply with 830.3(A) through (D).
(B) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22 shall apply where installed in ducts, plenums, or other spaces used for environmental air.
Exception: As permitted in 830.154(A).
830.151 Medium-Power Network-Powered Broadband Communications System Wiring Methods.
Medium-power network-powered broadband communications systems shall be installed within buildings using listed Type BM or Type BMR, network-powered broadband communications medium power cables.
(A) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22 shall apply.
830.154 Low-Power Network-Powered Broadband Communications System Wiring Methods.
Low-power network-powered broadband communications systems shall comply with any of the requirements of 830.154(A) through (C).
(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type BLP. Type BLX cable installed in compliance with 300.22 shall be permitted.

This proposal does not change any requirements; it simply makes the code more user-friendly.
This has been proposed before but was caught in the NEC moratorium associated with plenum cables.
Panel Meeting Action: Reject
Panel Statement: Providing a list of the additional permitted wiring methods does not add any clarity to the section. Article 300 is an introductory article to wiring methods with other articles, such as Articles 725, 760, and others in Chapter 8, specifically covering cables and wiring systems installed in other spaces for environmental air.
Inserting all of these various cables into 300.22(C) is unnecessary since the application and listing requirements are in Articles 725, 760, and so forth.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-96 Log #4398 NEC-P03 **Final Action: Accept in Principle**
(300.22(C)(2))

Submitter: Dwayne E. Sloan, Underwriters Laboratories Inc.
Recommendation: Insert the following additional Fine Print Note after 300.22 (C) (2):
<u>FPN: One method of defining adequate fire-resistant and low-smoke producing characteristics for electrical equipment with a nonmetallic enclosure is that the equipment meets the requirements of ANSI/UL 2043-2008, *Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces*.</u>
Substantiation: The purpose of this FPN is to provide guidance towards an appropriate test method and the requirements used to determine adequate fire-resistant and low-smoke producing characteristics for discrete electrical equipment with nonmetallic enclosures. UL2043 has been used to establish listing for such equipment. Furthermore, Authorities Having Jurisdiction have accepted testing to UL2043 since the Standard was first published in 1992.
During the 2008 cycle, a similar proposal was rejected by the Committee based on the Standard Council's decision to remain "status quo" on issues that needed resolution through NFPA 90A. This issue has been resolved through NFPA 90A (2009 Edition) as it now permits electrical equipment with combustible enclosures in ceiling cavity plenums when tested in accordance with UL 2043. (Reference NFPA 90A 4.3.11.2.6.5).
Panel Meeting Action: Accept in Principle
Revise the proposed wording to read as follows:
"FPN: One method of defining adequate fire-resistant and low-smoke producing characteristics for electrical equipment with a nonmetallic enclosure is in ANSI/UL 2043-2008, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces."
Panel Statement: Deleting the phrase "that the equipment meets the requirements of" removes the mandatory text in the FPN in the proposal and replaces it with non-mandatory text consistent with the NEC Style Manual.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-97 Log #2278 NEC-P03 **Final Action: Accept in Principle**
(300.22(E) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by adding "Systems" to the title in (2) and to the title in (b).
This action will be considered by the panel as a public comment.
Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise Section 300.22(C)(1) as follows:
(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables, conductors, and raceways shall be permitted to be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers ~~or solid bottom metal cable tray with solid metal covers~~.
Add a new Section to 300.22(E) to read as follows:
<u>**(E) Cable Tray in a Plenum.** This section applies to the use of metallic cable tray systems when used in ducts, plenums or other space used for environmental air.</u>
<u>**(1) Metal Cable Tray Systems.** Metal cable tray systems, including, but not limited to solid bottom metal cable trays systems with solid metal covers, are permitted to be used in ducts, plenums, and other air-handling spaces to support those wiring methods defined in 300.22 and/or to support raceways and/or cable types permitted for use in other spaces used for environmental air as described elsewhere in this *Code*.</u>
<u>**(2) Solid Bottom Metal Cable Tray.** Solid bottom metal cable trays systems with solid metal covers shall be permitted to be used in other air-handling spaces to support other types of cables, conductors, raceways not defined in 300.22(C)(1).</u>

Substantiation: This new language clarifies the use of Cable Trays systems in Ducts, Plenum or Other Space for Environmental Air applications. Section 300.22(C)(1) makes it clear that solid bottom metal cable tray systems with solid covers are permitted to be used with non-plenum rated cables and raceways. Other types of metallic cable trays system such as ladder or ventilated are permitted to be used with those wiring methods defined in the separate sections of 300.22 and the raceways and cables found in Chapters 7 and 8.

Cable Tray is not a raceway, but a support system for wiring methods.

Panel Meeting Action: Accept in Principle

Revise the proposed wording as follows:

(2) Cable Tray in Other Spaces Used for Environmental Air (Plenums). ~~in a Plenum~~. ~~This~~ The provisions of this section apply ~~applies~~ to the use of metallic cable tray systems ~~when used~~ in ~~ducts, plenums or~~ other spaces used for environmental air (plenums).

(a) Metal Cable Tray Systems. Metal cable tray systems~~, including, but not limited to solid bottom metal cable trays systems with solid metal covers~~, shall be ~~are~~ permitted ~~to be used in ducts, plenums, and~~ in other ~~air-handling~~ spaces used for environmental air (plenums) to support ~~those~~ wiring methods ~~defined in 300.22 and/or to support raceways~~ and~~/or~~ cable types permitted ~~for use~~ in other spaces used for environmental air (plenums) ~~as described elsewhere in this *Code*~~.

(b) Solid Bottom Metal Cable Tray. Solid bottom metal cable trays systems with solid metal covers shall be permitted where accessible ~~to be used in other air-handling spaces~~ to ~~support~~ enclose other types of cables, conductors, and raceways not specifically permitted to be installed exposed in other ~~air-handling~~ spaces used for environmental air (plenums) ~~not defined in 300.22(C)(1)~~."

Renumber the remainder of the section accordingly.

Panel Statement: The proposed text has been changed to ensure that cable trays are not installed in a specifically fabricated duct as covered in 300.22(B).

The proposed (2) and the text within the proposed section has been changed to apply only to other spaces used for environmental air (plenums) as changed in the action taken on Proposal 3-94.

The proposed phrase "defined in 300.22" in both (a) and (b) was deleted since 300.22 does not contain any definitions of wiring methods.

Proposed (a) has been reworded to simplify the application of any metal cable tray in an other space used for environmental air (plenum) and (b) was reworded to ensure that only solid bottom covered cable tray be used with raceways, cables, or other wiring methods not suitable for use in any other spaces used for environmental air (plenum).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-98 Log #1970 NEC-P03 **Final Action: Accept**
(300.37)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add: "in auxiliary gutters" after "in cable trays".

Substantiation: Edit. Auxiliary gutters are not included in "other raceways" since not listed in Article 100 definition of raceway, but are suitable for enclosing conductors.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-99 Log #2415 NEC-P03 **Final Action: Accept in Principle**
(300.37)

Submitter: Jerry Feagans, City of St. Louis

Recommendation: Revise text to read as follows:

"...shall be installed in rigid metal conduit, intermediate metal conduit, in electrical metallic tubing, in rigid ~~nonmetallic~~ PVC conduit.

Substantiation: Conforming to style manual Article 352.

Panel Meeting Action: Accept in Principle

In the recommended wording, the panel is deleting the word "rigid" and inserting "RTRC".

The text will now read as follows:

"**300.37 Aboveground Wiring Methods.**
Aboveground conductors shall be installed in rigid metal conduit, in intermediate metal conduit, in electrical metallic tubing, in RTRC and PVC conduit, in cable tray...".

Panel Statement: The word "rigid" was deleted to be consistent with the use of the term "PVC." "RTRC" was added since PVC and RTRC can be used for above ground nonmetallic wiring methods for systems in excess of 600-volt installations.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-100 Log #270 NEC-P03 **Final Action: Reject**
(Table 300.50)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Delete "(1)" through "(6)" from the beginning of the column headings in the table.

Substantiation: These numbers were added into the column headings in the 2005 code when the last three columns were added, however, there are no notes or explanations that specifically relate to the parenthetical numbers.

There are three general notes that apply to the table and the four specific footnotes are identified with superscripts a through d.

Panel Meeting Action: Reject

Panel Statement: These column numbers provide a good method for the user (electrician, engineer, or inspector) of the NEC to reference the various columns within the table.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-101 Log #2416 NEC-P03 **Final Action: Accept in Part**
(Table 300.50)

Submitter: Jerry Feagans, City of St. Louis

Recommendation: (2) Rigid ~~nonmetallic~~ PVC conduit.

Substantiation: Conforming to style manual Article 352.

Panel Meeting Action: Accept in Part

In the column (2) title, replace "Rigid Nonmetallic Conduit" with "RTRC, PVC Conduit, and HDPE Conduit."

The panel requests that the bracketed numbers above the text be placed in a separate row at the top of each column, under the first set of headings, to clarify that they do not reference the Notes at the bottom of the table.

Panel Statement: Replacing "Rigid Nonmetallic Conduit" with "PVC, HDPE, and RTRC" applies this column to the three nonmetallic underground installation wiring methods that constitute the minimum cover requirements for these wiring methods.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-102 Log #2627 NEC-P03 **Final Action: Reject**
(300.50)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise heading: UNDERGROUND and EMBEDDED INSTALLATIONS.

Delete text of (B) and substitute: Underground or embedded conductors emerging from finished grade shall be enclosed in listed identified raceways or Type MI cable. Raceways installed on the exterior of poles, posts or other structures shall be identified for the use extending from the minimum cover depth specified in Table 300.60 to a point not less than 2.5 m (8 ft) above finished grade unless terminated in a box, cabinet, or other enclosure.

Substantiation: Conductors may emerge from concrete slabs which are not "ground" or in contact with ground. Type MI cable should be permitted where not subject to damage, or protected. Schedule 80 PVC is not necessary where emerging from a 3 or 4 ft high concrete base supporting a pole but could be required by "suitable for the use". EMT should be permitted also if "suitable for the use". "Equivalent" is a term to be avoided per the Style Manual. Present literal wording does not permit a height higher than 8 ft for the raceway. This section is somewhat redundant and conflicting with 300.5(D) which doesn't specify raceways.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided to justify adding the term "embedded" or the deletion of the specific raceways in the existing NEC.

This table covering over 600-volt installations is not conflicting with Table 300.5 since wiring methods for over 600 volts are very specific for protection of the high voltage cables.

"Identified for use" is not acceptable, based on the NEC Style Manual, and is in the process of being corrected by various code panels during each code cycle wherever the use of "listed for the use" or "identified for use" is used.

Where MI cables are listed for direct burial, Column 1 already provides the depth requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-103 Log #4913 NEC-P03 **Final Action: Reject**
(Table 300.50, Note 3)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: In Note 3 to Table 300.50, insert the words "or institutional" after the word "industrial".
Substantiation: This allowance had been in routine use at major institutional settings as well as industrial occupancies from the 1968 NEC until the 2005 NEC, and should be resumed. The submitter's home jurisdiction has routinely approved the use of this cover reduction at the flagship state university (under state rules implementing the language of this proposal). This campus has a staff of approximately 60 FTE licensed electricians and they are responsible for the campus 13.8 kV distribution as well as utilization voltages. The level of sophistication at that campus equals or exceeds that often seen at industrial facilities. The inspection community should not be routinely forced into providing special permission pursuant to 90.4 in facilities that are not "industrial" but have an equivalent level of control. Other panels are taking comparable actions. As an example, the broadening of 225.32 Exception No. 1 from industrial occupancies to all occupancies with appropriately documented procedures in the 1999 cycle had a similar motivation and substantiation.
CMP 3 rejected a comment making some of these arguments in the previous code cycle, saying the extension to institutional occupancies had not been substantiated. However, the panel has it exactly backwards. CMP 3 has never provided any substantiation to support its withdrawal of a permission that had been in the NEC for 36 years. The point of this proposal is either to restore that permission or else elicit compelling technical substantiation as to why it should be limited to industrial occupancies after all this time and without a single proposal from the public ever having been received (since the 1968 cycle) to impose such a limitation.
Panel Meeting Action: Reject
Panel Statement: The term "institutional" is vague and could be interpreted far beyond the submitter's example of a university. As the submitter pointed out, if the AHJ accepts a lesser burial depth for high voltage cables in occupancies other than an industrial location, where public access is usually limited, then the AHJ can use 90.4.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-104 Log #1996 NEC-P03 **Final Action: Reject**
(300.50(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Direct–burial type conductors emerging from the ground shall be enclosed in an identified raceway, equipment enclosure, or enclosed wall space. Such raceways shall extend from the minimum cover depth specified in Table 300.50. Where exposed the raceway shall extend to a point not less than 2.5m (8ft) above finished grade or to the point of connection to an enclosure or other identified wiring method. Conductors entering a building or structure shall be protected by an identified raceway or enclosure from the minimum cover depth to the point of entrance. Where direct-buried conductors, cables, or raceways are likely to be subject to movement by settlement or freezing they shall be installed to minimize damage to conductors and other associated equipment.
Substantiation: The provision appears to address direct-burial type conductors since other types will be in a cable or raceway. Conductors may also emerge into pedestal mounted equipment or floor or slab mounted equipment, or inside a pole. The height limitation should not be limited to installations on poles but to any exposed installation unless terminated in an enclosure or changed to another identified wiring method. Grounding is covered in Article 250 which permits enclosures (raceways) to be ungrounded per 250.86 Exceptions No. 2 and 3.
Panel Meeting Action: Reject
Panel Statement: Conductors emerging from ground must be enclosed in listed raceways with the listing requirements determining the identification requirements for the raceways; therefore, changing "listed" to "identified" is unnecessary. The existing text already covers installations located above finished grade and entering into a building so further change is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-105 Log #3701 NEC-P03 **Final Action: Accept**
(300.50(B))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add the following text as a new (B) and renumber the existing text (current (B) becomes (C), etc.).
<u>**Wet Locations.** The interior of enclosures or raceways installed underground shall be considered to be a wet location. Insulated conductors and cables installed in these enclosures or raceways in underground installations shall be listed for use in wet locations and shall comply with 310.8(C). Any connections or splices in an underground installation shall be approved for wet locations.</u>
Substantiation: This is the same text that was added to 300.5(B) (*Underground Installations)* in the 2008 NEC. This text should also appear in 300.50 (*Requirements for over 600 Volts, Nominal – Underground Installations)* to make it clear that the inside of all raceways and enclosures installed underground is a wet location regardless of voltage).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-106 Log #3927b NEC-P03 **Final Action: Accept in Principle**
(300.50(B))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Everywhere Schedule 80 PVC is mentioned, "Type RTRC marked with the suffix -XW" should also be included.
Substantiation: For the NEC 2008, Type RTRC marked with the suffix –XW and Schedule 80 PVC were added as sufficient for Class I Division 2 installations. The Type RTRC marked with the suffix –XW were "forgotten" at some places in the NEC, needs to be corrected.
Panel Meeting Action: Accept in Principle
Add "RTRC-XW " to 300.50(B) to read as follows:
"**300.50(B) Protection from Damage.** Conductors emerging from the ground shall be enclosed in listed raceways. Raceways installed on poles shall be of rigid metal conduit, intermediate metal conduit, RTRC-XW, Schedule 80 PVC conduit, or equivalent, extending from the minimum.
Panel Statement: The panel added "RTRC-XW " to the text in 300.50(B) as requested by the submitter. This text was not added anywhere else in Part II of Article 300 since there was no specific proposal to add RTRC in other than this location.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 310 — CONDUCTORS FOR GENERAL WIRING

6-8 Log #2395 NEC-P06 **Final Action: Accept in Principle**
(310)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation:
Revise Article 310 as shown except do not include the parenthetical identifiers of where the paragraphs were located in the 2008 Code when there was no identifying section number:

Article 310 Conductors for General Wiring

<u>**I. General**</u>

310.1 Scope. This article covers general requirements for conductors and their type designations, insulations, markings, mechanical strengths, ampacity ratings, and uses. These requirements do not apply to conductors that form an integral part of equipment, such as motors, motor controllers, and similar equipment, or to conductors specifically provided for elsewhere in this Code.

FPN: For flexible cords and cables, see Article 400. For fixture wires, see Article 402.

<u>310.2 Definitions</u>
~~310.60 Conductors Rated 2001 to 35,000 Volts.~~
~~(A) Definitions.~~
Electrical Ducts. As used in Article 310, electrical ducts shall include any of the electrical conduits recognized in Chapter 3 as suitable for use underground; other raceways round in cross section, listed for underground use, and embedded in earth or concrete.

Thermal Resistivity. As used in this Code, the heat transfer capability through a substance by conduction. It is the reciprocal of thermal conductivity and is designated Rho and expressed in the units °C-cm/watt.

<u>310.6</u> ~~(1) General~~. <u>Conductor Types.</u> For explanation of type letters used in tables and for recognized sizes of conductors for the various conductor insulations, see <u>Table 310.106(A) through Table 310.106(E)</u> ~~Table 310.13(A) and Table 310.13(B)~~. For installation requirements, see ~~310.1 through~~ 310.10 and the various articles of this Code. For flexible cords, see Table 400.4, Table 400.5(A), and Table 400.5(B). (was 310.15(B)(1) in 2008 Code)

<u>**II. Installation**</u>

<u>310.10 Uses Permitted</u>

These conductors shall be permitted for use in any of the wiring methods recognized in Chapter 3 and as specified in their respective tables or as permitted elsewhere in this Code. (was 2nd paragraph in 310.13 in 2008 Code)

FPN: Thermoplastic insulation may stiffen at temperatures lower than -10°C (+14°F). Thermoplastic insulation may also be deformed at normal temperatures where subjected to pressure, such as at points of support. Thermoplastic insulation, where used on dc circuits in wet locations, may result in electroendosmosis between conductor and insulation. (was in 310.13 in 2008 Code)

~~310.8 Locations.~~
(A) Dry Locations. Insulated conductors and cables used in dry locations shall be any of the types identified in this Code.

(B) Dry and Damp Locations. Insulated conductors and cables used in dry and damp locations shall be Types FEP, FEPB, MTW, PFA, RHH, RHW, RHW-2, SA, THHN, THW, THW-2, THHW, THWN, THWN-2, TW, XHH, XHHW, XHHW-2, Z, or ZW.

(C) Wet Locations. Insulated conductors and cables used in wet locations shall comply with one of the following:
(1) Be moisture-impervious metal-sheathed
(2) Be types MTW, RHW, RHW-2, TW, THW, THW-2, THHW, THWN, THWN-2, XHHW, XHHW-2, ZW
(3) Be of a type listed for use in wet locations

(D) Locations Exposed to Direct Sunlight. Insulated conductors or cables used where exposed to direct rays of the sun shall comply with (D)(1) or (D)(2):
(1) Conductors and cables shall be listed, or listed and marked, as being sunlight resistant
(2) Conductors and cables shall be covered with insulating material, such as tape or sleeving, that is listed, or listed and marked, as being sunlight resistant

(E) ~~310.6~~ Shielding.
Solid dielectric insulated conductors operated above 2000 volts in permanent installations shall have ozone-resistant insulation and shall be shielded. All metallic insulation shields shall be connected to a grounding electrode conductor, grounding busbar, or a grounding electrode. Shielding shall be for the purpose of confining the voltage stresses to the insulation.

Exception No. 1: Nonshielded insulated conductors listed by a qualified testing laboratory shall be permitted for use up to 2400 volts under the following conditions:
(a) Conductors shall have insulation resistant to electric discharge and surface tracking, or the insulated conductor(s) shall be covered with a material resistant to ozone, electric discharge, and surface tracking.
(b) Where used in wet locations, the insulated conductor(s) shall have an overall nonmetallic jacket or a continuous metallic sheath.
(c) Insulation and jacket thicknesses shall be in accordance with Table 310.106(D) ~~310.13(D)~~.

Exception No. 2: Where permitted in 310.10(F) ~~310.7~~, Exception No. 2.

(F) ~~310.7~~ Direct-Burial Conductors.
Conductors used for direct-burial applications shall be of a type identified for such use.

Cables rated above 2000 volts shall be shielded.

Exception No. 1: Nonshielded multiconductor cables rated 2001–2400 volts shall be permitted if the cable has an overall metallic sheath or armor.

The metallic shield, sheath, or armor shall be connected to a grounding electrode conductor, grounding busbar, or a grounding electrode.

Exception No. 2: Airfield lighting cable used in series circuits that are rated up to 5000 volts and are powered by regulators shall be permitted to be nonshielded.

FPN to Exception No. 2: Federal Aviation Administration (FAA) Advisory Circulars (ACs) provide additional practices and methods for airport lighting.

FPN No. 1: See 300.5 for installation requirements for conductors rated 600 volts or less.

FPN No. 2: See 300.50 for installation requirements for conductors rated over 600 volts.

(G) ~~310.9~~ Corrosive Conditions.
Conductors exposed to oils, greases, vapors, gases, fumes, liquids, or other substances having a deleterious effect on the conductor or insulation shall be of a type suitable for the application.

(H) ~~310.4~~ Conductors in Parallel.
(1) ~~(A)~~ General. Aluminum, copper-clad aluminum, or copper conductors of size 1/0 AWG and larger, comprising each phase, polarity, neutral, or grounded circuit conductor shall be permitted to be connected in parallel (electrically joined at both ends).

Exception No. 1: Conductors in sizes smaller than 1/0 AWG shall be permitted to be run in parallel to supply control power to indicating instruments, contactors, relays, solenoids, and similar control devices, or for frequencies of 360 Hz and higher, provided all of the following apply:
(a) They are contained within the same raceway or cable.
(b) The ampacity of each individual conductor is sufficient to carry the entire load current shared by the parallel conductors.
(c) The overcurrent protection is such that the ampacity of each individual conductor will not be exceeded if one or more of the parallel conductors become inadvertently disconnected.

Exception No. 2: Under engineering supervision, grounded neutral conductors in sizes 2 AWG and larger shall be permitted to be run in parallel for existing installations.

FPN to Exception No. 2: Exception No. 2 can be used to alleviate overheating of neutral conductors in existing installations due to high content of triplen harmonic currents.

(2) ~~(B)~~ Conductor Characteristics. The paralleled conductors in each phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor shall comply with all of the following:
(1) Be the same length
(2) Have the same conductor material
(3) Be the same size in circular mil area
(4) Have the same insulation type
(5) Be terminated in the same manner

(3) ~~(C)~~ Separate Cables or Raceways. Where run in separate cables or raceways, the cables or raceways with conductors shall have the same number of conductors and shall have the same electrical characteristics. Conductors of one phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor shall not be required to have the same physical characteristics as those of another phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor to achieve balance.

(4) ~~(D)~~ AmpacityAdjustment. Conductors installed in parallel shall comply with the provisions of 310.84(B)(1)(a) ~~310.15(B)(2)(a)~~.

(5) ~~(E)~~ Equipment Grounding Conductors. Where parallel equipment grounding conductors are used, they shall be sized in accordance with 250.122. Sectioned equipment grounding conductors smaller than 1/0 AWG shall be permitted in multiconductor cables in accordance with 310.106 ~~310.13~~, provided the combined circular mil area in each cable complies with 250.122.

310.~~15~~ 80 Ampacities for Conductors Rated 0–2000 Volts.

~~(A) General.~~

(A) ~~(1)~~ Tables or Engineering Supervision. Ampacities for conductors shall be permitted to be determined by tables as provided in 310.82 ~~310.15(B)~~ or under engineering supervision as provided in 310.86 ~~310.15(C)~~.

FPN No. 1: Ampacities provided by this section do not take voltage drop into consideration. See 210.19(A), FPN No. 4, for branch circuits and 215.2(A), FPN No. 2, for feeders.

FPN No. 2: For the allowable ampacities of Type MTW wire, see Table 13.5.1 in NFPA 79-2007, Electrical Standard for Industrial Machinery.

(B) ~~(2)~~ Selection of Ampacity. Where more than one calculated or tabulated ampacity could apply for a given circuit length, the lowest value shall be used.

Exception: Where two different ampacities apply to adjacent portions of a circuit, the higher ampacity shall be permitted to be used beyond the point of transition, a distance equal to 3.0 m (10 ft) or 10 percent of the circuit length figured at the higher ampacity, whichever is less.

FPN: See 110.14(C) for conductor temperature limitations due to termination provisions.

(C) ~~310.10~~ Temperature Limitation of Conductors~~.~~ No conductor shall be used in such a manner that its operating temperature exceeds that designated for the type of insulated conductor involved. In no case shall conductors be associated together in such a way, with respect to type of circuit, the wiring method employed, or the number of conductors, that the limiting temperature of any conductor is exceeded.

FPN: The temperature rating of a conductor [see Table 310.104(A)

~~310.13(A)~~ and Table 310.104(C) ~~310.13(C)~~] is the maximum temperature, at any location along its length, that the conductor can withstand over a prolonged time period without serious degradation. The allowable ampacity tables, the ampacity tables of Article 310 and the ampacity tables of Annex B, the correction factors associated with ~~at the bottom of~~ these tables, and the notes to the tables provide guidance for coordinating conductor sizes, types, allowable ampacities, ampacities, ambient temperatures, and number of associated conductors.

The principal determinants of operating temperature are as follows:
(1) Ambient temperature — ambient temperature may vary along the conductor length as well as from time to time.
(2) Heat generated internally in the conductor as the result of load current flow, including fundamental and harmonic currents.
(3) The rate at which generated heat dissipates into the ambient medium. Thermal insulation that covers or surrounds conductors affects the rate of heat dissipation.
(4) Adjacent load-carrying conductors — adjacent conductors have the dual effect of raising the ambient temperature and impeding heat dissipation.

310.82 ~~(B)~~ Tables. Ampacities for conductors rated 0 to 2000 volts shall be as specified in the Allowable Ampacity Table 310.82(A) ~~310.16~~ through Table 310.82(D) ~~310.19~~, and Ampacity Table 310.82(E) ~~310.20~~ and Table 310.82(F) ~~310.21~~ as modified by 310.84 ~~(B)(1) through (B)(6)~~.

FPN: Table 310.82(A) ~~310.16~~ through Table 310.82(D) ~~310.19~~ are application tables for use in determining conductor sizes on loads calculated in accordance with Article 220. Allowable ampacities result from consideration of one or more of the following:

(1) Temperature compatibility with connected equipment, especially the connection points.
(2) Coordination with circuit and system overcurrent protection.
(3) Compliance with the requirements of product listings or certifications. See 110.3(B).
(4) Preservation of the safety benefits of established industry practices and standardized procedures.

Table 310.82(A) ~~16~~ Allowable Ampacities of Insulated Conductors Rated 0 Through 2000 Volts, 60°C Through 90°C (140°F Through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)

Insert existing Table 310.16
(not submitted)

Table 310.82(B) ~~17~~ Allowable Ampacities of Single-Insulated Conductors Rated 0 Through 2000 Volts in Free Air, Based on Ambient Air Temperature of 30°C (86°F)

Insert existing Table 310.17
(not submitted)

Table 310.82(C) ~~18~~ Allowable Ampacities of Insulated Conductors Rated 0 Through 2000 Volts, 150°C Through 250°C (302°F Through 482°F). Not More Than Three Current-Carrying Conductors in Raceway or Cable, Based on Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.18
(not submitted)

Table 310.82(D) ~~19~~ Allowable Ampacities of Single-Insulated Conductors, Rated 0 Through 2000 Volts, 150°C Through 250°C (302°F Through 482°F), in Free Air, Based on Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.19
(not submitted)

Table 310.82(E) ~~20~~ Ampacities of Not More Than Three Single Insulated Conductors, Rated 0 Through 2000 Volts, Supported on a Messenger, Based on Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.20
(not submitted)

Table 310.82(F) ~~21~~ Ampacities of Bare or Covered Conductors in Free Air, Based on 40°C (104°F) Ambient, 80°C (176°F) Total Conductor Temperature, 610 mm/sec (2 ft/sec) Wind Velocity

Insert existing Table 310.21
(not submitted)

310.84 ~~(2)~~ Adjustment Factors.

(A) ~~(a)~~ More Than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.84(A) ~~310.15(B)(2)(a)~~. Each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.

Table 310.84(A) ~~310.15(B)(2)(a)~~ Adjustment Factors for More Than Three Current-Carrying Conductors in a Raceway or Cable

Insert existing Table 310.15(B)(2)(a)
(not submitted)

FPN No. 1: See Annex B, Table B.310.11, for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.

FPN No. 2: See 366.23(A) for adjustment factors for conductors in sheet metal auxiliary gutters and 376.22(B) for adjustment factors for conductors in metal wireways.

Exception No. 1: Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the derating factors shown in Table 310.84(A) ~~310.15(B)(2)(a)~~ shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).

Exception No. 2: For conductors installed in cable trays, the provisions of 392.11 shall apply.

Exception No. 3: Derating factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).

Exception No. 4: Derating factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.

Exception No. 5: Adjustment factors shall not apply to Type AC cable or to Type MC cable without an overall outer jacket under the following conditions:
(1) Each cable has not more than three current-carrying conductors.
(2) The conductors are 12 AWG copper.
(3) Not more than 20 current-carrying conductors are bundled, stacked, or supported on "bridle rings."

A 60 percent adjustment factor shall be applied where the current-carrying conductors in these cables that are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing exceeds 20.

(B) ~~(b)~~ More Than One Conduit, Tube, or Raceway. Spacing between conduits, tubing, or raceways shall be maintained.

(C) ~~(c)~~ Conduits Exposed to Sunlight on Rooftops. Where conductors or cables are installed in conduits exposed to direct sunlight on or above rooftops, the adjustments shown in Table 310.84(C) ~~310.15(B)(2)(c)~~ shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.82(A) ~~16~~ and Table 310.82(C) ~~18~~.

FPN: One source for the average ambient temperatures in various locations is the ASHRAE Handbook — Fundamentals.

Table 310.84(C) ~~310.15(B)(2)(c)~~ Ambient Temperature Adjustment for Conduits Exposed to Sunlight On or Above Rooftops

Insert existing Table 310.15(B)(2)(c) and FPN
(not submitted)

(D) ~~(3)~~ Bare or Covered Conductors. Where bare or covered conductors are installed with insulated conductors, the temperature rating of the bare or covered conductor shall be equal to the lowest temperature rating of the insulated conductors for the purpose of determining ampacity.

(E) ~~(4)~~ Neutral Conductor.
(1) ~~(a)~~ A neutral conductor that carries only the unbalanced current from other conductors of the same circuit shall not be required to be counted when applying the provisions of 310.84(A) ~~310.15(B)(2)(a)~~.
(2) ~~(b)~~ In a 3-wire circuit consisting of two phase conductors and the

neutral conductor of a 4-wire, 3-phase, wye-connected system, a common conductor carries approximately the same current as the line-to-neutral load currents of the other conductors and shall be counted when applying the provisions of 310.84(A) ~~310.15(B)(2)(a)~~.
(3) ~~(c)~~ On a 4-wire, 3-phase wye circuit where the major portion of the load consists of nonlinear loads, harmonic currents are present in the neutral conductor; the neutral conductor shall therefore be considered a current-carrying conductor.

(F) ~~(5)~~ Grounding or Bonding Conductor. A grounding or bonding conductor shall not be counted when applying the provisions of 310.84(A) ~~310.15(B)(2)(a)~~.

(G) ~~(6)~~ 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.84(G) ~~310.15(B)(6)~~, shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service-lateral conductors, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder between the main disconnect and the panelboard that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit. The feeder conductors to a dwelling unit shall not be required to have an allowable ampacity rating greater than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, and 230.42 are met.

Table 310.84(G) ~~310.15(B)(6)~~ Conductor Types and Sizes for 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. Conductor Types RHH, RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, XHHW, XHHW-2, SE, USE, USE-2

Insert existing Table 310.15(B)(6)
(not submitted)

(H) ~~(D)~~ Ampacity Adjustment. Conductors installed in parallel shall comply with the provisions of 310.84(A) ~~310.15(B)(2)(a)~~.

310.86 ~~(C)~~ Engineering Supervision. Under engineering supervision, conductor ampacities shall be permitted to be calculated by means of the following general formula:

Insert existing equation from 310.15(C) with corrected subscripts
(not submitted)

where:
TC= conductor temperature in degrees Celsius (°C)
TA= ambient temperature in degrees Celsius (°C)
TD= dielectric loss temperature rise
RDC= dc resistance of conductor at temperature TC
YC= component ac resistance resulting from skin effect and proximity effect
RCA= effective thermal resistance between conductor and surrounding ambient

FPN: See Annex B for examples of formula applications.

310.90 ~~60(B)~~ Ampacities of Conductors Rated 2001 to 35,000 Volts

~~(B) Ampacities of Conductors Rated 2001 to 35,000 Volts.~~ Ampacities for solid dielectric-insulated conductors shall be permitted to be determined by tables or under engineering supervision, as provided in 310.92 and 310.96 ~~310.60(C) and (D)~~.

~~(1) Selection of Ampacity.~~ Where more than one calculated or tabulated ampacity could apply for a given circuit length, the lowest value shall be used.

Exception: Where two different ampacities apply to adjacent portions of a circuit, the higher ampacity shall be permitted to be used beyond the point of transition, a distance equal to 3.0 m (10 ft) or 10 percent of the circuit length figured at the higher ampacity, whichever is less.

FPN: See 110.40 for conductor temperature limitations due to termination provisions.

310.92 ~~(C)~~ Tables. Ampacities for conductors rated 2001 to 35,000 volts shall be as specified in the Ampacity Table 310.92(A) ~~310.67~~ through Table 310.92(T), ~~310.86~~ adjusted in accordance with 310.94(A), (B), or (C). Ampacities at ambient temperatures other than those shown in the tables shall be determined by the formula in 310.94(D) ~~310.60(C)(4)~~.

FPN No. 1: For ampacities calculated in accordance with 310.96 ~~310.60(B)~~, reference IEEE 835-1994 (IPCEA Pub. No. P-46-426), Standard Power Cable Ampacity Tables, and the references therein for availability of all factors and constants.

FPN No. 2: Ampacities provided by this section do not take voltage drop into consideration. See 210.19(A), FPN No. 4, for branch circuits and 215.2(A), FPN No. 2, for feeders.

Table 310.92(A) ~~67~~ Ampacities of Insulated Single Copper Conductor Cables Triplexed in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.67
(not submitted)

Table 310.92(B) ~~68~~ Ampacities of Insulated Single Aluminum Conductor Cables Triplexed in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.68
(not submitted)

Table 310.92(C) ~~69~~ Ampacities of Insulated Single Copper Conductor Isolated in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.69
(not submitted)

Table 310.92(D) ~~70~~ Ampacities of Insulated Single Aluminum Conductor Isolated in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.70
(not submitted)

Table 310.92(E) ~~71~~ Ampacities of an Insulated Three-Conductor Copper Cable Isolated in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.71
(not submitted)

Table 310.92(F) ~~72~~ Ampacities of an Insulated Three-Conductor Aluminum Cable Isolated in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.72
(not submitted)

Table 310.92(G) ~~73~~ Ampacities of an Insulated Triplexed or Three Single-Conductor Copper Cables in Isolated Conduit in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.73
(not submitted)

Table 310.92(H) ~~74~~ Ampacities of an Insulated Triplexed or Three Single-Conductor Aluminum Cables in Isolated Conduit in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.74
(not submitted)

Table 310.92(I) ~~75~~ Ampacities of an Insulated Three-Conductor Copper Cable in Isolated Conduit in Air Based on Conductor Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.75
(not submitted)

Table 310.92(J) ~~76~~ Ampacities of an Insulated Three-Conductor Aluminum Cable in Isolated Conduit in Air Based on Conductor

Temperatures of 90°C (194°F) and 105°C (221°F) and Ambient Air Temperature of 40°C (104°F)

Insert existing Table 310.76
(not submitted)

Table 310.92(K) ~~77~~ Ampacities of Three Single-Insulated Copper Conductors in Underground Electrical Ducts (Three Conductors per Electrical Duct) Based on Ambient Earth Temperature of 20°C (68°F), Electrical Duct Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.77
(not submitted)

Table 310.92(L) ~~78~~ Ampacities of Three Single-Insulated Aluminum Conductors in Underground Electrical Ducts (Three Conductors per Electrical Duct) Based on Ambient Earth Temperature of 20°C (68°F), Electrical Duct Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.78
(not submitted)

Table 310.92.(M) ~~79~~ Ampacities of Three Insulated Copper Conductors Cabled Within an Overall Covering (Three-Conductor Cable) in Underground Electrical Ducts (One Cable per Electrical Duct) Based on Ambient Earth Temperature of 20°C (68°F), Electrical Duct Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°C)

Insert existing Table 310.79
(not submitted)

Table 310.92(N) ~~80~~ Ampacities of Three Insulated Aluminum Conductors Cabled Within an Overall Covering (Three-Conductor Cable) in Underground Electrical Ducts (One Cable per Electrical Duct) Based on Ambient Earth Temperature of 20°C (68°F), Electrical Duct Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°C)

Insert existing Table 310.80
(not submitted)

Table 310.92(O) ~~81~~ Ampacities of Single Insulated Copper Conductors Directly Buried in Earth Based on Ambient Earth Temperature of 20°C (68°F), Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°C)

Insert existing Table 310.81
(not submitted)

Table 310.92(P) ~~82~~ Ampacities of Single Insulated Aluminum Conductors Directly Buried in Earth Based on Ambient Earth Temperature of 20°C (68°F), Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.82
(not submitted)

Table 310.92(Q) ~~83~~ Ampacities of Three Insulated Copper Conductors Cabled Within an Overall Covering (Three-Conductor Cable), Directly Buried in Earth Based on Ambient Earth Temperature of 20°C (68°F), Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.83
(not submitted)

Table 310.92(R) ~~84~~ Ampacities of Three Insulated Aluminum Conductors Cabled Within an Overall Covering (Three-Conductor Cable), Directly Buried in Earth Based on Ambient Earth Temperature of 20°C (68°F), Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures of 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.84
(not submitted)

Table 310.92(S) ~~85~~ Ampacities of Three Triplexed Single Insulated Copper Conductors Directly Buried in Earth Based on Ambient Earth Temperature of 20°C (68°F), Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.85
(not submitted)

Table 310.92(T) ~~86~~ Ampacities of Three Triplexed Single Insulated Aluminum Conductors Directly Buried in Earth Based on Ambient Earth Temperature of 20°C (68°F), Arrangement per Figure 310.94(C) ~~310.60~~, 100 Percent Load Factor, Thermal Resistance (RHO) of 90, Conductor Temperatures 90°C (194°F) and 105°C (221°F)

Insert existing Table 310.86
(not submitted)

310.94 Adjustment Factors

(A) ~~(1)~~ Grounded Shields. Ampacities shown in Table 310.92(C) ~~310.69~~, Table 310.92(D) ~~310.70~~, Table 310.92(O) ~~310.81~~, and Table 310.92(P) ~~310.82~~ are for cable with shields grounded at one point only. Where shields are grounded at more than one point, ampacities shall be adjusted to take into consideration the heating due to shield currents.

(B) ~~(2)~~ Burial Depth of Underground Circuits. Where the burial depth of direct burial or electrical duct bank circuits is modified from the values shown in a figure or table, ampacities shall be permitted to be modified as indicated in 310.94(B)(1) and (2) ~~(C)(2)(a) and (C)(2)(b)~~.

(1) ~~(a)~~ Where burial depths are increased in part(s) of an electrical duct run, no decrease in ampacity of the conductors is needed, provided the total length of parts of the duct run increased in depth is less than 25 percent of the total run length.

(2) ~~(b)~~ Where burial depths are deeper than shown in a specific underground ampacity table or figure, an ampacity derating factor of 6 percent per 300-mm (1-ft) increase in depth for all values of rho shall be permitted.

No rating change is needed where the burial depth is decreased.

(C) ~~(3)~~ Electrical Ducts in Figure 310.94(C) ~~310.60~~. At locations where electrical ducts enter equipment enclosures from under ground, spacing between such ducts, as shown in Figure 310.94(C) ~~310.60~~, shall be permitted to be reduced without requiring the ampacity of conductors therein to be reduced.

Insert existing Figure 310.60
(not submitted)

Figure 310.94(C) ~~310.60~~ Cable Installation Dimensions for Use with Table 310.92(K) ~~310.77~~ Through Table 310.92(T) ~~310.86~~.

(D) ~~(4)~~ Ambients Not in Tables. Ampacities at ambient temperatures other than those shown in the tables shall be determined by means of the following formula:

Insert existing equation from 310.60(C)(4) with corrected subscripts
(not submitted)

where:
I 1= ampacity from tables at ambient TA1
I 2= ampacity at desired ambient TA2
TC= conductor temperature in degrees Celsius (°C)
TA1= surrounding ambient from tables in degrees Celsius (°C)
TA2= desired ambient in degrees Celsius (°C)
TD= dielectric loss temperature rise

310.96 ~~(D)~~ Engineering Supervision. Under engineering supervision, conductor ampacities shall be permitted to be calculated by means of the following general formula:

Insert existing equation from 310.60(D) with corrected subscripts

(not submitted)

where:
TC= conductor temperature in °C
TA= ambient temperature in °C
TD= dielectric loss temperature rise
RDC= dc resistance of conductor at temperature TC
YC= component ac resistance resulting from skin effect and proximity effect
RCA= effective thermal resistance between conductor and surrounding ambient

FPN: See Annex B for examples of formula applications.

III. Construction Specifications

310.104 ~~310.13~~ Conductor Constructions and Applications.
Insulated conductors shall comply with the applicable provisions of Table 310.104(A) ~~310.13(A)~~ through Table 310.104(E) ~~Table 310.13(E)~~.

Equipment grounding conductors shall be permitted to be sectioned within a listed multiconductor cable, provided the combined circular mil area complies with 250.122. (was last paragraph in 310.13 in 2008 Code)

FPN: Thermoplastic insulation may stiffen at temperatures lower than -10°C (+14°F). Thermoplastic insulation may also be deformed at normal temperatures where subjected to pressure, such as at points of support. Thermoplastic insulation, where used on dc circuits in wet locations, may result in electroendosmosis between conductor and insulation.

Table 310.104 ~~13~~(A) Conductor Applications and Insulations Rated 600 Volts

Insert existing Table 310.13(A)
(not submitted)

Table 310.104 ~~13~~(B) Thickness of Insulation for Nonshielded Types RHH and RHW Solid Dielectric Insulated Conductors Rated 2000 Volts

Insert existing Table 310.13(B)
(not submitted)

Table 310.104 ~~13~~(C) Conductor Application and Insulation Rated 2001 Volts and Higher

Insert existing Table 310.13(C)
(not submitted)

Table 310.104 ~~13~~(D) Thickness of Insulation and Jacket for Nonshielded Solid Dielectric Insulated Conductors Rated 2400 Volts

Insert existing Table 310.13(D)
(not submitted)

Table 310.104 ~~13~~(E) Thickness of Insulation for Shielded Solid Dielectric Insulated Conductors Rated 2001 to 35,000 Volts

Insert existing Table 310.13(E)
(not submitted)

310.106 ~~310.2~~ Conductors

(A) ~~310.5~~ Minimum Size of Conductors. The minimum size of conductors shall be as shown in Table 310.106(A) ~~310.5~~, except as permitted elsewhere in this Code.

Table 310.106(A) ~~310.5~~ Minimum Size of Conductors

Insert existing Table 310.5
(not submitted)

(B) ~~310.2(B)~~ Conductor Material. Conductors in this article shall be of aluminum, copper-clad aluminum, or copper unless otherwise specified.

~~310.14 Aluminum Conductor Material.~~
Solid aluminum conductors 8, 10, and 12 AWG shall be made of an AA-8000 series electrical grade aluminum alloy conductor material. Stranded aluminum conductors 8 AWG through 1000 kcmil marked as Type RHH, RHW, XHHW, THW, THHW, THWN, THHN, service-entrance Type SE Style U and SE Style R shall be made of an AA-8000 series electrical grade aluminum alloy conductor material.

(C) ~~310.3~~ Stranded Conductors. Where installed in raceways, conductors of size 8 AWG and larger shall be stranded.

Exception: As permitted or required elsewhere in this Code.

(D) ~~2(A)~~ Insulated. Conductors shall be insulated.

Exception: Where covered or bare conductors are specifically permitted elsewhere in this Code.

FPN: See 250.184 for insulation of neutral conductors of a solidly grounded high-voltage system.

310.110 ~~12~~ Conductor Identification.

(A) Grounded Conductors. Insulated or covered grounded conductors shall be identified in accordance with 200.6.

(B) Equipment Grounding Conductors. Equipment grounding conductors shall be in accordance with 250.119.

(C) Ungrounded Conductors. Conductors that are intended for use as ungrounded conductors, whether used as a single conductor or in multiconductor cables, shall be finished to be clearly distinguishable from grounded and grounding conductors. Distinguishing markings shall not conflict in any manner with the surface markings required by 310.120 ~~11~~ (B)(1). Branch-circuit ungrounded conductors shall be identified in accordance with 210.5(C). Feeders shall be identified in accordance with 215.12.

Exception: Conductor identification shall be permitted in accordance with 200.7.

310.120 ~~11~~ Marking.
(A) Required Information. All conductors and cables shall be marked to indicate the following information, using the applicable method described in 310.120(B) ~~310.11(B)~~:
(1) The maximum rated voltage.
(2) The proper type letter or letters for the type of wire or cable as specified elsewhere in this Code.
(3) The manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified.
(4) The AWG size or circular mil area.
FPN: See Conductor Properties, Table 8 of Chapter 9, for conductor area expressed in SI units for conductor sizes specified in AWG or circular mil area.
(5) Cable assemblies where the neutral conductor is smaller than the ungrounded conductors shall be so marked.

(B) Method of Marking.
(1) Surface Marking. The following conductors and cables shall be durably marked on the surface. The AWG size or circular mil area shall be repeated at intervals not exceeding 610 mm (24 in.). All other markings shall be repeated at intervals not exceeding 1.0 m (40 in.).
(a) ~~(1)~~ Single-conductor and multiconductor rubber- and thermoplastic-insulated wire and cable
(b) ~~(2)~~ Nonmetallic-sheathed cable
(c) ~~(3)~~ Service-entrance cable
(d) ~~(4)~~ Underground feeder and branch-circuit cable
(e) ~~(5)~~ Tray cable
(f) ~~(6)~~ Irrigation cable
(g) ~~(7)~~ Power-limited tray cable
(h) ~~(8)~~ Instrumentation tray cable

(2) Marker Tape. Metal-covered multiconductor cables shall employ a marker tape located within the cable and running for its complete length.

Exception No. 1: Mineral-insulated, metal-sheathed cable.

Exception No. 2: Type AC cable.

Exception No. 3: The information required in 310.120(A) ~~310.11(A)~~ shall be permitted to be durably marked on the outer nonmetallic covering of

Type MC, Type ITC, or Type PLTC cables at intervals not exceeding 1.0 m (40 in.).

Exception No. 4: The information required in 310.120(A) ~~310.11(A)~~ shall be permitted to be durably marked on a nonmetallic covering under the metallic sheath of Type ITC or Type PLTC cable at intervals not exceeding 1.0 m (40 in.).

FPN: Included in the group of metal-covered cables are Type AC cable (Article 320), Type MC cable (Article 330), and lead-sheathed cable.

(3) Tag Marking. The following conductors and cables shall be marked by means of a printed tag attached to the coil, reel, or carton:
(a) ~~(1)~~ Mineral-insulated, metal-sheathed cable
(b) ~~(2)~~ Switchboard wires
(c) ~~(3)~~ Metal-covered, single-conductor cables
(d) ~~(4)~~ Type AC cable

(4) Optional Marking of Wire Size. The information required in 310.120(A)(4) ~~310.11(A)(4)~~ shall be permitted to be marked on the surface of the individual insulated conductors for the following multiconductor cables:
(a) ~~(1)~~ Type MC cable
(b) ~~(2)~~ Tray cable
(c) ~~(3)~~ Irrigation cable
(d) ~~(4)~~ Power-limited tray cable
(e) ~~(5)~~ Power-limited fire alarm cable
(f) ~~(6)~~ Instrumentation tray cable

(C) Suffixes to Designate Number of Conductors. A type letter or letters used alone shall indicate a single insulated conductor. The letter suffixes shall be indicated as follows:
(1) D — For two insulated conductors laid parallel within an outer nonmetallic covering
(2) M — For an assembly of two or more insulated conductors twisted spirally within an outer nonmetallic covering

(D) Optional Markings. All conductors and cables contained in Chapter 3 shall be permitted to be surface marked to indicate special characteristics of the cable materials. These markings include, but are not limited to, markings for limited smoke, sunlight resistant, and so forth.
Substantiation: This revision will comply with the NEC Style Manual and provide consistency with other Articles in Chapter 3. Other than some additional Part headings, renumbering of sections, and relocation of text, all rules and contents of tables have remained the same as currently in the 2008 Code. It was not the intent to make any changes to the existing rules. The proposed revised Article is shown in the proposal. Table contents and equations that appear in the 2008 NEC have been omitted but their locations have been indicated.
310.6 was revised to include conductors rated over 2000 V since 310.6 addresses all conductor types within Article 310.
Additional references were proposed when the existing rules had to be separated into separate sections to comply with 2.3.1 of the NEC Style Manual which states “That tables and figures shall be referenced in the text and shall be designated by the number of the NEC rule in which they are referenced.” Without the separation, confusion might exist with the table or figure designations to the NEC rules.
Panel Meeting Action: Accept in Principle
Panel Statement: This proposal is strictly editorial and complies with the NEC Style Manual. There are no technical changes being made. In addition, this proposal is modified by the panel actions on all associated proposals related to this section.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-9 Log #3212 NEC-P06 **Final Action: Reject**
(310.2.Jacket and Sheath (New))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: This proposal should only be considered if the proposal to renumber Article 310 is accepted.
Add the following definitions to 310.2:
Jacket. A nonmetallic material applied as an outer covering over a single conductor or a multiconductor cable.
Sheath. A metallic interlocking armor or a continuous metal covering.
Substantiation: These definitions will provide consistency in the use of the terms “jacket” and “sheath” and prevent confusion when the terms are interchanged.
Panel Meeting Action: Reject
Panel Statement: NM is a sheathed cable but is not metallic. Sheath is commonly used to refer to both metallic and non-metallic materials. UL currently refers to jackets with cords but there is no convention and they are routinely used interchangeably. Section 300.6(C) refers to metallic jackets. No additional clarification is provided by the addition of these definitions.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-10 Log #1554 NEC-P06 **Final Action: Reject**
(310.2(A))

Submitter: Pat Goggins, I.B.E.W. Electrician/Apprentice Instructor / Rep. I.B.E.W. Local #176
Recommendation: Add new text as follows:
310.2 Conductors.
(A) Insulated. **General.** Conductors shall be insulated.
Exception: Where covered or bare conductors are specifically permitted elsewhere in this Code.
Substantiation: This would emphasize that the **general rule** is that conductor(s) are to be insulated, except where permitted elsewhere in the code.
Panel Meeting Action: Reject
Panel Statement: This proposal violates the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
PICARD, P.: The Panel should have replaced “Insulated” with “General”, which seems to be more consistent with NEC practice. We can find no violation of the NEC Style manual. The word “General” is often used as a title for subdivisions in the NEC, see 250.122(A), 110.22(A), 210.60(A), 310.4(A), etc.

6-11 Log #3767 NEC-P06 **Final Action: Accept**
(310.2(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
(A) Insulated. Conductors, not having specific permission elsewhere in this Code to be covered or bare, shall be insulated.
~~*Exception: Where covered or bare conductors are specifically permitted elsewhere in this Code.*~~
Substantiation: This revision will change an exception into a positive rule and comply with the TCC request to convert exceptions into positive text wherever possible.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-12 Log #3858 NEC-P06 **Final Action: Accept**
(310.2(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text as follows:
(A) Insulated. Conductors not having specific permission elsewhere in this Code to be covered or bare, shall be insulated.
~~Exception: Where covered or bare conductors are specifically permitted elsewhere in this Code.~~
Substantiation: This revision will change an exception into a positive rule and comply with the TCC request to convert exceptions into positive text wherever possible.
Panel Meeting Action: Accept
Panel Statement: Identical proposal to 6-11.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-13 Log #3337 NEC-P06 **Final Action: Reject**
(310.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Where flexibility is frequently or regularly required, after installation circuit conductors and equipment grounding and bonding jumpers shall be stranded type conductors and installed in a manner to avoid strain on the terminations.
Substantiation: Where frequently or regularly flexed after installation conductors should be stranded and secured to avoid strain on terminations.
Panel Meeting Action: Reject
Panel Statement: The panel believes that this proposal does not clarify existing text or substantiate that there is a problem needing to be addressed. The terms “frequently” or “regularly required” are unenforceable language.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-14 Log #3768 NEC-P06 **Final Action: Accept**
(310.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
310.3 Stranded Conductors. Where installed in raceways, conductors of size 8 AWG and larger, not having specific permission or requirements elsewhere in this Code to be solid, shall be stranded.
~~*Exception: As permitted or required elsewhere in this Code.*~~
Substantiation: This revision will change an exception into a positive rule and comply with the TCC request to convert exception into positive text wherever possible.
The text "of size" was deleted as being redundant.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-15 Log #3859 NEC-P06 **Final Action: Accept**
(310.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: 310.3 Stranded Conductors. Where installed in raceways, conductors ~~of size~~ 8 AWG and larger, not having specific permission or requirements elsewhere in this Code to be solid, shall be stranded.
~~Exception: As permitted or required elsewhere in this Code.~~
Substantiation: This revision will change an exception into a positive rule and comply with the TCC request to convert exceptions into positive text wherever possible.
The text "of size" was deleted as being redundant.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-16 Log #3647 NEC-P06 **Final Action: Accept in Principle in Part**
(310.4)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
310.4 Conductors in Parallel.
(A) General. Aluminum, copper-clad aluminum, or copper conductors of size ~~1/0~~ 1 AWG and ~~larger~~ smaller, comprising each phase, polarity, neutral, or grounded circuit conductor shall ~~be permitted to~~ not be connected in parallel (electrically joined at both ends). Where conductors of size 1/0 and larger are installed in parallel they shall be installed in accordance with 310.4(B) through 310.4(E).
Substantiation: There is no reasonable reading of the words "shall be permitted" in the current code that leads the reader to conclude that these words are intended to prohibit the paralleling of conductors smaller than 1/0. The words "shall be permitted" in no way act to prohibit other uses. The use of "shall be permitted" in this section are not in compliance with the intended use per 3.1.2 of the NEC Style Manual as they do not permit an optional or alternate method.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
310.4 Conductors in Parallel.
(A) General. Aluminum, copper-clad aluminum, or copper conductors ~~of size 1/0~~ 1 AWG and ~~larger~~ smaller, comprising each phase, polarity, neutral, or grounded circuit conductor shall not be permitted to be connected in parallel (electrically joined at both ends). Where conductors 1/0 AWG and larger are installed in parallel they shall be installed in accordance with 310.4(B) through 310.4(E).
Panel Statement: The panel rejected the deletion of the text "be permitted to" and accepted the remainder of the proposal because it is necessary text. The panel deleted "of size" because it is redundant.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-17 Log #3754 NEC-P06 **Final Action: Accept**
(310.4)

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise item (B) as shown and add a new item (F):
(B) Conductor Characteristics. The paralleled conductors in each phase, polarity, neutral, grounded circuit conductor, ~~or~~ equipment grounding conductor, or equipment bonding jumper shall comply with all of the following:
(F) Equipment Bonding Jumpers. Where parallel equipment bonding jumpers are installed in raceways, they shall be sized and installed in accordance with 250.102.
Substantiation: During a recent review of a set of plans, it became evident that we do not address the issue of paralleled equipment bonding jumpers in 310.4. Take the example of a transformer (separately derived system) that is supplying a large switchboard with multiple paralleled conduits. The conductor that joins the metallic parts of the transformer and the switchboard is actually an equipment bonding jumper and not an equipment grounding conductor. 250.102(C) has the sizing requirements for the equipment bonding jumper in this case and makes it clear that the EBJ has to be installed in the parallel conduits and is sized based on the conductors in the conduit.
However, since this is a parallel conductor the user is naturally drawn to 310.4 for any other requirements. Since there are none, it raises the question as to whether we expect the bonding jumper to be the same size, material, length, etc. 310.4 already states this for equipment grounding conductors and it would appear that an extension to equipment bonding jumpers makes good technical sense.
To cover the EBJ, 310.4(B) is revised to add in equipment bonding jumper. A new item (F) is added to 310.4 to simply refer the user to the sizing requirements outlined in 250.102. Having these provisions will also make it clear that the 1/0 minimum size limitation on paralleled conductors does not apply to the EBJ.
Panel Meeting Action: Accept
Panel Statement: Panel 5 accepted the actions referenced by the submitter.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-18 Log #271 NEC-P06 **Final Action: Reject**
(310.4(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Exception No. 2" to "Exception" and relocate following the first paragraph in 310.4(A).
Change "FPN to Exception No.2: Exception No. 2 can" to "FPN: The Exception may" and locate following the exception.
Delete the words "Exception No. 1:" and relocate all of the text in that exception intact as a positive code ruling following the exception and FPN.
Substantiation: Exception No. 1 can readily be changed into a positive code rule with no changes in the content. It does not conflict with the first paragraph since it specifically defines different conditions. This change from an exception to a positive code rule complies with the recommendation in 3.1.4 of the NEC Style Manual.
Placement of the exception and FPN immediately following the first paragraph is in accordance with 2.6.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: This proposal would conflict with the panel action on Proposal 6-16.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-19 Log #2024 NEC-P06 **Final Action: Accept in Principle in Part**
(310.4(A) Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Under electrical engineering supervision 2 AWG and 1 AWG grounded neutral conductors ~~in size 2 AWG and larger~~ shall be permitted to be run in parallel for existing installations of the same size conductors where installed in compliance with applicable provisions of 310.4.
Substantiation: Conductors 1/0 ("and larger") are already permitted to be run in parallel without engineering supervision. All engineering disciplines may not be qualified.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
Under engineering supervision 2 AWG and 1 AWG grounded neutral conductors ~~in size 2 AWG and larger~~ shall be permitted to be run in parallel for existing installations.
Panel Statement: The panel is of the opinion that other engineering disciplines may be qualified to supervise the installation. The panel does agree with the submitter that conductors 1/0 ("and larger") are already permitted to be run in parallel without engineering supervision. The proposed phrase "of the same size conductors where installed in compliance with applicable provisions of 310.4" is already a requirement in the code and is not needed.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-20 Log #4532 NEC-P06 **Final Action: Accept in Principle in Part**
(310.4(C))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised text as follows:
(C) Separate Cables or Raceways. If ~~Where~~ run in separate cables or raceways, the cables or raceways with conductors shall have the same number of conductors and shall have the same physical ~~electrical~~ characteristics. Conductors of one phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor shall not be required to have the same physical characteristics as those of another phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor ~~to achieve balance~~.
Substantiation: Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
The phrase "electrical characteristics" was changed from "physical characteristics" by the Panel during the processing of the 2008 NEC. However, the Panel did not provide substantiation for the change. The term "physical characteristics" had been used for many years to ensure that raceways used to enclose conductors in parallel are identical in physical and electrical properties. This requirement helps ensure an equal distribution of the current in the parallel conductors. The term "physical characteristics" is easier for the installer and inspector to understand that "electrical characteristics." This answers questions such as does the rule intend that all conduits be magnetic? or conductive? or non-conductive?
The phrase "to achieve balance" is not needed in the rule as this states the purpose for the entire rule, not only this section. Stating the purpose of the rule is not an essential component of the NEC requirements.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
(C) Separate Cables or Raceways. When ~~Where~~ run in separate cables or raceways, the cables or raceways with conductors shall have the same number of conductors and shall have the same electrical characteristics. Conductors of one phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor shall not be required to have the same physical characteristics as those of another phase, polarity, neutral, grounded circuit conductor, or equipment grounding conductor ~~to achieve balance~~.
Panel Statement: The panel accepts in principle the change from the word "where" but finds the word "when" more appropriate than "if," and both words are in compliance with the NEC Style Manual. The Panel agrees with the submitter that there was no substantiation for the change from "physical" to "electrical" in the 2008 Code. However, subsequent discussions within the panel resulted in the agreement that "electrical" was the more appropriate term. The panel accepts the deletion of the phrase "to achieve balance".
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-21 Log #266 NEC-P06 **Final Action: Accept**
(Table 310.5)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise Table 310.5 as shown:
0-2000 14 12
~~2001-8000 8 8~~
–2001-5000 8 8
5001-8000 6 6
8001-15,000 2 2
15,001-28,000 1 1
28,001-35,000 1/0 1/0
Substantiation: This revision will correlate Table 310.5 with the current Tables 310.13(B), (D), and (E).
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-21a Log #CP600 NEC-P06 **Final Action: Accept**
(310.6)

Submitter: Code-Making Panel 6,
Recommendation: Revise section 310.6 as follows :
310.6 Shielding. Solid dielectric insulated conductors operated above 2000 volts in permanent installations shall have ozone-resistant insulation and shall be shielded. All
metallic insulation shields shall be connected to a grounding electrode conductor, grounding busbar, or a grounding electrode. ~~Shielding shall be for the purpose of confining the voltage stresses to the insulation.~~
Create new FPN to 310.6 as follows:
The primary purposes of shielding are to confine the voltage stresses to the insulation, dissipate insulation leakage current, drain off the capacitive charging current, and carry ground fault current to facilitate operation of ground fault protective devices in the event of an electrical cable fault.
Substantiation: The proposed fine print note clarifies the purpose and benefits of shielding. The noted text was moved from the body of the Code to the new fine print note because it was explanatory information and does not belong in the body of the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
MCCLUNG, L.: Support the panel action with the following affirmative statement: "Requirements for Grounding of metallic shields over 1kV are covered in NEC Article 250 Part X."
ZIMNOCH, J.: For proper ground fault protection, the amount of shielding may or may not be sufficient depending on the amount of fault current available.

6-21b Log #CP601 NEC-P06 **Final Action: Accept**
(310.6)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with 3.1.3 of the NEC Style Manual related to Fine Print Notes.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 6,
Recommendation: Renumber the existing exception No.2 to exception No.3. and add a new exception No. 2 to read as follows:
Nonshielded insulated conductors listed by a qualified testing laboratory shall be permitted for use up to 5000 volts to replace existing nonshielded conductors in industrial establishments only, under the following conditions:
(a) Where the condition of maintenance and supervision ensures that only qualified personnel install and service the installation.
(b) Conductors shall have insulation resistant to electric discharge and surface tracking, or the insulated conductor(s) shall be covered with a material resistant to ozone, electric discharge, and surface tracking.
(c) Where used in wet locations, the insulated conductor(s) shall have an overall nonmetallic jacket or a continuous metallic sheath.
(d) Insulation and jacket thicknesses shall be in accordance with Table 310.13(D).
FPN: Cable usage is intended to be limited to the replacement of existing nonshielded cable on existing equipment. Relocation or replacement of equipment may not meet the term 'existing' as related to this exception.
Substantiation: The Panel recognizes the issue and concerns of current requirements for replacing existing nonshielded cable with shielded cable for existing installations, and believes that replacing nonshielded cable in existing installations with nonshielded cable is appropriate.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:
FRIEDMAN, S.: Panel proposal 6-21b accepting use of 5 KV unshielded cables for existing installations should not be accepted. This proposal is not enforceable and does not belong in the NEC. Without providing a date and defining "existing installations" for every possible occurrence this change will only add confusion. In addition, the panel has stated repeatedly that non-shielded cables are not safe. In the previous code cycle the panel consistently indicated that additional technical substantiation would be required to permit the use of non-shielded cables.
ZIMNOCH, J.: The definition of "existing", "replacement" and "relocation" are not adequately defined.
Comment on Affirmative:
CLINE, S.: I hope that we all keep the excellent balance achieved after so many hours of discussion in multiple meetings. This is a very rational allowance for existing conditions. It will result in a superior and safer cable replacing old, without requiring some adapted field-conversion of termination facilities. My guess is that if 6-21b and 6-24 are enacted, the subject will be essentially closed. Please Accept this Proposal.
HUDDLESTON, JR., R.: The Panel should be commended for realizing that they placed undue burden on users of non-shielded cable by requiring the use of shielded cable for replacement of existing cable. This Proposal is excellent.
KENT, G.: While the unshielded cable above 2000 volts needs to continue to be eliminated, the fact is much of it is in existence and time is needed to work it out of the system. There is not need to put lives in danger using unsafe means in existing equipment. I would have preferred this to have a sunset clause.
LAIDLER, W.: We are voting affirmative with the panel action to Accept proposal number 6-21b. The action on this proposal provides relief for situations in industrial facilities where the cable in existing raceways must be replaced. Without this new exception, the cable would have to be replaced with shielded cable which may create concerns due to the fact that the raceway and enclosures are sized for nonshielded cable.
WALL, C.: I am voting affirmative. I believe the panel has acted properly to allow the replacement of existing non-shielded cables with non-shielded cables. There are many pieces of equipment in service that have small termination enclosures without adequate space for the longer terminations required by shielded cable. This change will simplify the replacement of existing non-shielded cables and provide safe installations.

6-22 Log #1394 NEC-P06 **Final Action: Reject**
(310.6)

Submitter: Gordon Robertson, American Petroleum Institute (API)
Recommendation: Revise text to read as follows:
310.6 Shielding. Solid dielectric insulated conductors operated above 2000 volts in permanent installations shall have ozone-resistant insulation and shall be shielded. All metallic insulation shields shall be connected to a grounding electrode conductor, grounding busbar, or a grounding electrode. Shielding shall be for the purpose of confining the voltage stresses to the insulation.
Exception No. 1: Nonshielded insulated conductors listed by a qualified testing laboratory shall be permitted for use up to ~~2400~~ 5000 volts under the following conditions:
(a) Conductors shall have insulation resistant to electric discharge and surface tracking, or the insulated conductor(s) shall be covered with a material resistant to ozone, electric discharge, and surface tracking.
(b) Where used in wet locations, the insulated conductor(s) shall have an overall nonmetallic jacket or a continuous metallic sheath.
(c) Insulation and jacket thicknesses shall be in accordance with Table 310.13(D).
Exception No. 2: Where permitted in 310.7, Exception No. 2.
Substantiation: This proposal undoes the change to the 2005 NEC that eliminated unshielded 5 kV cable as a valid power cable. The substantiation for this proposal is in 7Parts:
1) Nonshielded insulated single conductor and multi-conductors up to 5000 volts can be safely applied provided that proper minimum insulation thicknesses are used. This proposal is coupled with and requires a companion proposal recommending revisions to Table 310.13D that add the required insulation thicknesses for 2401 volt through 5000 volt conductors. The companion proposal re-establishes the same insulation requirements that existed in the 2002 NEC for nonshielded conductors rated up to 8000 volts. Note that the insulation thicknesses required in the companion proposal for cable rated 5000 volts is up to twice the levels required for cable rated 2400 volts.
2) One reason for potential problems in the past has been the allowable thin 90, 110, and 125 mil insulation thickness levels for up to 5000 volt jacketed conductors that were permitted in the 1999 NEC Table 310-63 and the 2002 NEC Table 310.63. These thin insulation thicknesses have caused some problems, especially in cases where the conductor jacket is removed and the insulation is lying directly against grounded surfaces such as within motor junction boxes and, in some cases has exhibited corona discharge within the interstices of three-conductor cables within a jacket. This proposal greatly increases the minimum insulation thicknesses required for the 5000 volt nonshielded cables in wet or dry locations and will alleviate the problems that led to the 2005 NEC position to completely eliminate the use of unshielded 5000 volt cable except in the case of airport lighting.
3) Proposal 6-12 of the May 2004 RoP provided only one example of a non-shielded cable application that may have posed a safety risk. The Panel did not consider if a shielded cable in the same application would have created the same or additional safety risks.
4) The substantiation Panel 6 based their May 2004 decision on was insufficient. Proposal 6-12 of the May 2004 RoP provided only one example of a non-shielded cable application and characterized it as a safety risk. In the same Code cycle, the Panel dismissed at least 9 comments that provided numerous examples citing years and miles of safe and reliable installations using non-shielded cable. Despite the overwhelming experience of numerous safe installations, the Panel determined that the single cable failure was a substantial argument while the numerous safe installation examples were not. We could probably locate a GFCI failure that was manufactured or installed improperly, yet we would not outlaw all GFCIs because of faulty manufacturing or inadequate installation of the device.
5) For the 2008 NEC, Panel 6 received another 7 Proposals and 19 Comments advocating a reinstatement of the use of non-shielded cables at voltages above 2400 volts. Again, despite solid arguments in support of the proposals, the Panel rejected them all with little basis other than the single example of a potential safety risk mentioned during the previous Code cycle.
6) While the NEC is not an installation document, the proper installation of both shielded and non-shielded cable is a critical factor in determining whether a particular application will be safe and reliable. Specifically, a non-shielded cable must be carefully installed respecting pulling tensions and minimum bending requirements and avoiding abrasions, the insulation must be cleanly and carefully removed at the termination points, appropriately sized lugs with the proper metallurgy must be properly crimped to the conductor, and then the termination must be properly mated with the utilization or supply equipment and properly torqued. For a shielded cable, ALL of the preceding requirements must be met, but in addition, a properly selected shield termination and a stress control method must also be properly installed at each termination. A shielded cable quite simply requires a more complicated termination, and therefore, requires a higher skill level.
7) The 2008 NEC now includes an exception to 310.7 that permits the use of 5kV non-shielded cables for airport lighting. By accepting that Airport Lighting circuits can be installed safely using 5kV non-shielded cable, Panel 6 also accepts that this type of cable can be installed safely.
Panel Meeting Action: Reject
Panel Statement: The Panel rejects this proposal for the following reasons, which correspond to the submitter's substantiation numbering:
(1,2) The substantiation does not provide any technical information or documentation to justify the proposed changes. The Panel has addressed existing installations in 6-21b and new installations in Proposal 6-24.
(3,4,5) All previous editions of the code are there due to compliance with the rules of the Code. Any challenge to the decisions of the panel needed to be made to the TCC. Stating disagreement with the Panel's previous action is not proper substantiation on its own - evidence supporting the disagreement must be presented.
(6) Compliance with installation requirements is always required.
(7) This special condition allowance does not transfer as rationalization for general allowance.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
HUDDLESTON, JR., R.: The Panel should have Accepted In Principle and referred to Proposal 6-24, which (after modification by the Panel) allows the use of non-shielded metal-sheathed cable up to 5 kV.

6-23 Log #3868 NEC-P06 **Final Action: Accept**
(310.6)

Submitter: Mike Weitzel, Bechtel
Recommendation: All text in the paragraph remains the same, with three new words inserted.
310.6 Shielding. Solid Dielectric insulated conductors... ". All metallic insulation shields shall be connected to a grounding electrode conductor, grounding busbar, equipment grounding conductor, or a grounding electrode. Shielding...".
Substantiation: Connecting on over 2,000-volt feeder or branch circuit metallic cable shield to an equipment grounding conductor that is installed in accordance with the requirements found in 250.180 is a safe and accepted practice.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-24 Log #4089 NEC-P06 **Final Action: Reject**
(310.6)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Change first and second sentences in 310.6 to read:
Non-shielded, ozone-resistant insulated conductors with a maximum phase-to-phase voltage of 5000 volts shall be permitted in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and the cables have an overall metallic sheath or armor, or are installed in a metal raceway such as rigid metal conduit. For other establishments, solid dielectric insulated conductors operated above 2000 volts in permanent installations shall have ozone-resistant insulation and shall be shielded.
Substantiation: For years, large industrial facilities have utilized non-shielded insulated conductors for medium voltage distribution and motor feeder systems within their facilities. Virtually all problems that have arisen have been caused by improper installation techniques, such as allowing conductors to cross at skew angles in junction boxes where corona between cables can manifest. The proposal submitted requires that the cable be either armored, protected in an overall metal sheath, or placed in a metal raceway such as rigid metal conduit, which completely eliminates any safety concerns to personnel.
Since the question of safety involving the installation and use of unshielded 5 KV cable began two NEC code cycles ago, many different user organizations, including but not limited to API, Edison Institute, and IEEE have researched the use of nonshielded cable at 5 KV and have found no cases where properly installed and maintained installations had any reported problems. There simply is no data to support the original basis for deleting this installation practice from the NEC.
Often, older electrical gear and equipment does not allow enough room for stress cones terminations, and modifications to the enclosures may be required in order to terminate shielded cables. Listed equipment should never be modified or the listing is voided, which could necessitate replacing the equipment at enormous cost.
The National Electrical Code is written to provide for "the practical safeguarding of person and property from hazards arising from the use of electricity." (90.1(A)). Nonshielded medium voltage cable, when properly installed and maintained in supervised industrial installations, with an overall metallic sheath or armor or when installed in a conduit system, in no way violates this purpose.
Panel Meeting Action: Accept in Part
Revise text to read as as follows:
Non-shielded, ozone-resistant insulated conductors with a maximum phase-to-phase voltage of 5000 volts shall be permitted in industrial establishments where the conditions of maintenance and supervision ensure that only qualified

persons service the installation and the cables have an overall metallic sheath. For other establishments, solid dielectric insulated conductors operated above 2000 volts in permanent installations shall have ozone-resistant insulation and shall be shielded.

Panel Statement: The panel's action is in recognition of the enhanced reliability of the construction of metal-armored cable containing non-shielded conductors; the conductors have a concentric lay-orientation and their insulation is protected from damage during installation. The requirements for insulation type, the industrial establishments, and qualified personnel convince us to allow use at the higher level.

The panel does not agree with the use of non-shielded conductors within metal raceways. The inconsistencies of conductors-into-conduit installation do not assure a lack of insulation damage and do not assure a concentric lay-orientation of the cables.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 7 Negative: 4

Explanation of Negative:

FRIEDMAN, S.: The panel has changed its position on use of armored non-shielded 5 KV cable without any additional technical information establishing why the panel position should be changed. The panel for two code cycles has agreed that 5 KV non-shielded armored or not armored cable is not safe and has now decided to change. NEMA does not agree to modify position without better substantiation for doing so.

KENT, G.: For existing installations, the panel has addressed the submitters request. New installations of cables above 2000 volts can be safely installed using shielded cable.

PICARD, P.: The Panel has agreed that shielded cable provides a safer installation and that new installations should be designed for shielded cables when voltage is over 2.4kV. In this cycle the Panel provided an exception, Panel Proposal 6-21b, allowing the use of nonshiedled cable up to 5kv for existing facilities meeting specified criteria. The submitter has not provided sufficient substantiation to negate previous work on limiting use of nonshielded cables.

ZIMNOCH, J.: See My Explanation of Negative on 6-21b.

Comment on Affirmative:

CLINE, S.: Again, as with 6-21b I have to hope that we all keep our good balance. This restricted application provides for a cable type with superior physical and electrical-physical attributes leading to an installation with practical safeguarding. This is our charge in Article 90: the "practical safeguarding of persons and property from hazards arising from the use of electricity." We worked so many hours over two cycles to get here, I hope we don't throw it away. My guess is that if 6-21b and 6-24 are enacted, the subject will be essentially closed. Please Accept this Proposal.

HUDDLESTON, JR., R.: The Panel should be commended for realizing that non-shielded metal-sheathed cable can be safely used up to 5 kV. Further information shall be provided to the panel members substantiating many other safe long-term installations of non-shielded metal-sheathed cable.

LAIDLER, W.: We are voting affirmative with the panel action to Accept in Principle proposal number 6-24. We continue to support the use of shielded cable on systems where the voltage exceeds 2400 volts. During the panel's discussion it was brought to light that because of the way metal-armored cable is constructed the electrostatic charges circling the conductors are kept uniformly distributed around the insulation by the grounded armor which reduces the concentration of the stress lines and the possibility of a discharge to ground or to another conductor.

WALL, C.: I am voting affirmative. I agree with the panel that non-shielded cables with metallic armor can be installed, operated and maintained safely. I do not agree with the panel's concerns about non-shielded cables in metal raceways. The panel alluded to insulation damage being caused by inconsistencies and lack of concentric lay orientation, none of which were supported by technical substantiation.

Additionally, the termination enclosures on medium voltage motors are dictated by NEMA standard MG-1. Discussion during the panel meeting revealed that NEMA has not revised standard MG-1 to provide increased dimensions for termination enclosures on motors requiring shielded cables. This is justification for allowing use of non-shielded cables up to 5000 volts because there is insufficient space in many termination enclosures for shielded cable terminators. Also, observance of NFPA 70E, Electrical Safety in the Workplace, ensures safety in the workplace for work involving live parts.

6-25 Log #3488 NEC-P06 **Final Action: Accept in Principle**
(310.6 Exception No. 1)

Submitter: Mark Rucker, Toyota Motor Mfg., Kentucky, Inc.

Recommendation: Revise text to read as follows:

Exception No. 1: Non-shielded insulated conductors listed by a qualified testing laboratory shall be permitted for use up to ~~2400~~ 8000 volts under the following conditions:

Substantiation: We possess ~25 4, 160V starters made during the 1980s and 1990s. All the starters used non-shielded 5kV cable to make internal connections. (Conductors leaving the starters to feed loads are shielded type.) The internal connections are numerous and do not allow room to make stress cones if shielded cable is used in place of non-shielded. We also possess 7.3kV capacitor/reactor banks that were made using non-shielded 8kV cable to make internal connections.

With NEC 2005, the provisions for non-shielded 5kV and 8kV conductors were dropped. Manufacturers of medium voltage cable now no longer make for open market purchase non-shielded cable rated above 2.4kV, requiring us to use the 2.4 kV rated cable made to the old 5kV specifications but listed for only 2.4kV to make repairs, or to buy a custom made, specially marked, non-listed cable by the 10,000 ft reel for a 10 ft piece.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel has addressed existing installations in 6-21b. See panel action on that proposal.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

FRIEDMAN, S.: Panel proposal 6-21b accepting use of 5 KV unshielded cables for existing installations should not be accepted. This proposal is not enforceable and does not belong in the NEC. Without providing a date and defining "existing installations" for every possible occurrence this change will only add confusion. In addition, the panel has stated repeatedly that non-shielded cables are not safe. In the previous code cycle the panel consistently indicated that additional technical substantiation would be required to permit the use of non-shielded cables.

ZIMNOCH, J.: See My Explanation of Negative on 6-21b.

Comment on Affirmative:

WALL, C.: See my statement for 6-21b and 6-24.

6-26 Log #3564 NEC-P06 **Final Action: Accept in Principle**
(310.6 Exception No. 1)

Submitter: Thomas L. Adams, Macomb, IL

Recommendation: Revise text to read as follows:

Exception No. 1: Non-shielded insulated conductors listed by a qualifying testing laboratory shall be permitted for use up to ~~2400~~ 5000 volts under the following conditions: (The remainder of the text to remain the same.)

Substantiation: Please reconsider the changes to this section based on the negative ballot comments from the last cycle. The use of any wiring method is unsafe if used improperly. Properly installed, operated and maintained as specified, listed non-shielded cables achieve the required level of safety.

As noted in the ballot comments, the main hazard is the removing of a cover from a termination enclosure while the cables are energized. That hazard exists whether it is a shielded or non-shielded conductor. However, by following the requirements of NFPA 70E and OSHA, safe installation, operation and maintenance are achieved. In fact, as also noted in the ballot comments, there are "many years of solid evidence supporting the fact that non shielded cable may be used safely…".

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 6-21b.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

FRIEDMAN, S.: Panel proposal 6-21b accepting use of 5 KV unshielded cables for existing installations should not be accepted. This proposal is not enforceable and does not belong in the NEC. Without providing a date and defining "existing installations" for every possible occurrence this change will only add confusion. In addition, the panel has stated repeatedly that non-shielded cables are not safe. In the previous code cycle the panel consistently indicated that additional technical substantiation would be required to permit the use of non-shielded cables.

ZIMNOCH, J.: See My Explanation of Negative on 6-21b.

Comment on Affirmative:

WALL, C.: See my statement for 6-21b and 6-24.

6-27 Log #3824 NEC-P06 **Final Action: Accept in Principle**
(310.6 Exception No. 3 (New))

Submitter: James S. Nasby, Skokie, IL

Recommendation: Add new text to read as follows:

Exception No. 3: Nonshielded insulated conductors listed by a qualified testing laboratory shall be permitted for use up to 5000 volts under the following conditions:

(a) Conductors are part of a fire pump circuit and in the fire pump room.

(b) Conductors shall have insulation resistant to electric discharge and surface tracking, or the insulated conductor(s) shall be covered with a material resistant to ozone, electric discharge, and surface tracking.

(c) Where used in wet locations, the insulated conductor(s) shall have an overall nonmetallic jacket or a continuous metallic sheath.

(d) Insulation and jacket thicknesses shall be in accordance with Table 310.13(D).

Substantiation: 1) Junction Boxes on Medium voltage Fire Pump Motors, which are typically in the range of 100 thru 400 Hp, are too small for shield cable and stress cones.

2) No problem is known to exist using non-shielded cable at up to 4,800 Volt is know to exist, even with installations several decades old.

3) The 2002 Edition and older allowed Listed Cable up to 8,000 Vac.

4) Fire Pump Rooms are now all required to be two hour construction.

5) Corona is not significant at and below 5,000 Volts with Listed 5,000 Volt

Cable.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel actions on Proposals 6-24 and 6-21b. In addition, the submitter did not provide any technical documentation to support his substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:
FRIEDMAN, S.: Panel proposal 6-21b accepting use of 5 KV unshielded cables for existing installations should not be accepted. This proposal is not enforceable and does not belong in the NEC. Without providing a date and defining "existing installations" for every possible occurrence this change will only add confusion. In addition, the panel has stated repeatedly that non-shielded cables are not safe. In the previous code cycle the panel consistently indicated that additional technical substantiation would be required to permit the use of non-shielded cables.
ZIMNOCH, J.: See My Explanation of Negative on 6-21b.
Comment on Affirmative:
WALL, C.: See my statement for 6-21b and 6-24.

6-28 Log #3565 NEC-P06 **Final Action: Accept in Principle**
(310.7 Exception No. 1)

Submitter: Thomas L. Adams, Macomb, IL
Recommendation: Revise text to read as follows:
Exception No. 1: Non-shielded insulated conductors rated 2001 - ~~2400~~ 5000 volts shall be permitted if the cable has an overall metallic sheath or armor. (The remainder of the text to remain the same.)
Substantiation: Please reconsider the changes to this section based on the negative ballot comments from the last cycle. The use of any wiring method is unsafe if used improperly. Properly installed, operated and maintained as specified, listed non-shielded cables achieve the required level of safety.
As noted in the ballot comments, the main hazard is the removing of a cover from a termination enclosure while the cables are energized. That hazard exists whether it is a shielded or non-shielded conductor. However, by following the requirements of NFPA 70E and OSHA, safe installation, operation and maintenance are achieved. In fact, as also noted in the ballot comments, there are "many years of solid evidence supporting the fact that non shielded cable may be used safely…".
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-24.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:
FRIEDMAN, S.: The panel has changed its position on use of armored non-shielded 5 KV cable without any additional technical information establishing why the panel position should be changed. The panel for two code cycles has agreed that 5 KV non-shielded armored or not armored cable is not safe and has now decided to change. NEMA does not agree to modify position without better substantiation for doing so.
ZIMNOCH, J.: See My Explanation of Negative on 6-21b.
Comment on Affirmative:
WALL, C.: See my statement for 6-21b and 6-24.

(Note: Sequence 6-29 was not used)

6-30 Log #4818 NEC-P06 **Final Action: Accept in Principle in Part**
(310.10, FPN No. 2 (New))

Submitter: George Ferguson, Technical Education & Safety Institute
Recommendation: FPN No. 2: Also see 110.14(C)(1).
Substantiation: Many electricians are still using THHN at full 90 degree ampacity regardless of terminal rating. New text will help emphasize the need to include terminal consideration when calculating conductor size.
Panel Meeting Action: Accept in Principle in Part
1. Re-identify the existing FPN in 310.10 as FPN No.1.
2. Add text as follows:
FPN No. 2: Refer to 110.14(C) for the temperature limitation of terminations.
Panel Statement: Re-identification of the FPN as FPN No. 1 is required since there are now two FPNs. The rewording of the proposed FPN No. 2 was made for consistency with text used in other parts of the Code. The Panel rejects the reference to (1) of 110.14(C) as well as the word 'also see' to further clarify the FPN.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-31 Log #244 NEC-P06 **Final Action: Reject**
(310.11(A)(6))

Submitter: Ronald Deering, City of Portage
Recommendation: Add new text to read as follows:
(6) The conductor color for types THHN/THVN 51260 14 AWG through 6 AWG.
Substantiation: Various contractors have mentioned an issue with the green and gray conductors being hard to distinguish by a color blind individual. Without supervision, a safety issue could result on most installations by that person.
Panel Meeting Action: Reject
Panel Statement: Technical substantiation must include documentation of a problem and the submitter has not provided that with his recommendation. Currently, there is no evidence of a problem.
Qualified individuals who are color blind have worked in the electrical industry since its inception. These individuals are well aware of their disability and have used methods such as re-identifying the conductor with tape or using wire markings to compensate for that disability.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-32 Log #3836 NEC-P06 **Final Action: Accept**
(310.11(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In (B)(2) Exception No. 1, change "Mineral-insulated, metal-sheathed cable" to "Type MI cable".
In (B)(3)(1), change "Mineral-insulated, metal-sheathed cable" to "Type MI cable".
Substantiation: This will provide consistency since the other cable types are designated by Type.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-33 Log #3769 NEC-P06 **Final Action: Reject**
(310.11(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
(2) ~~Marker Tape~~ Other Marking Methods ~~Metal covered multiconductor cables shall employ a marker tape located within the cable and running for its complete length.~~
(a) Metal-covered multiconductor cables, other than type AC or mineral-insulated, metal-sheathed cables, shall employ a marker tape located within the cable and running for its complete length.
(b) Type MC, Type ITC, or Type PLTC cables shall be permitted to be durably marked on the outer nonmetallic covering at intervals not exceeding 1.0 m (40 in.).
(c) Type ITC or Type PLTC cables shall be permitted to be durably marked on a nonmetallic covering under the metallic sheath at intervals not exceeding 1.0 m (40 in.).
~~*Exception No. 1: Mineral insulated, metal sheathed cable.*~~
~~*Exception No. 2: Type AC cable.*~~
~~*Exception No. 3: The information required in 310.11(A) shall be permitted to be durably marked on the outer nonmetallic covering of Type MC, Type ITC, or Type PLTC cables at intervals not exceeding 1.0 m (40 in.).*~~
~~*Exception No. 4: The information required in 310.11(A) shall be permitted to be durably marked on a nonmetallic covering under the metallic sheath of Type ITC or Type PLTC cable at intervals not exceeding 1.0 m (40 in.)*~~
FPN: Included in the group of metal-covered cables are Type AC cables (Article 320), Type MC cable (Article 330), and lead-sheathed cable.
Substantiation: This revision will change the exceptions into positive rules and comply with the TCC request to convert exceptions into positive text wherever possible.
Panel Meeting Action: Reject
Panel Statement: This proposal does not add clarity to the requirements but rather adds a conflict between items in the proposed wording. See panel action on Proposal 6-34.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-34 Log #3860 NEC-P06 **Final Action: Reject**
(310.11(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text as follows:
(2) ~~Marker Tape~~ Other Marking Methods ~~Metal covered multiconductor cables shall employ a marker tape located within the cable and running for its complete length.~~
(a) Metal-covered multiconductor cables, other than Type AC or mineral-insulated, metal-sheathed cables, shall employ a marker tape located within the cable and running for its complete length.
(b) Type MC, Type ITC, or Type PLTC cables shall be permitted to be durably marked on the outer nonmetallic covering at intervals not exceeding 1.0 m(40 in.).
(c) Type ITC or Type PLTC cables shall be permitted to be durably marked on a nonmetallic covering under the metalllic sheath at intervals not exceeding 1.0 m (40 in.).
~~Exception No. 1: Mineral insulated, metal sheathed cable.~~
~~Exception No. 2: Type AC cable.~~
~~Exception No. 3: The information required in 310.11(A) shall be permitted to~~

~~be durably marked on the outer nonmetallic covering of Type MC, Type ITC, or Type PLTC cables at intervals not exceeding 1.0 m (40 in.).~~

~~Exception No. 4: The information required in 310.11(A) shall be permitted to be durably marked on a nonmetallic covering under the metallic sheath of Type ITC or Type PLTC cable at intervals not exceeding 1.0 m (40 in.).~~

FPN: Included in the group of metal-covered cables are Type AC cable (Article 320), Type MC cable (Article 330), and lead-sheathed cable.

Substantiation: This revision will change the exceptions into positive rules and comply with the TCC request to convert exceptions into positive text wherever possible.

Panel Meeting Action: Reject

Panel Statement: This proposal does not add clarity to the requirements but rather adds a conflict between items in the proposed wording.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-35 Log #3835 NEC-P06 **Final Action: Accept**
(310.11(B)(2), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Delete text to read as follows:

FPN: Included in the group of metal-covered cable are type AC cable (Article 320) and Type MC cable (Article 330).~~, and lead sheathed cable.~~

Substantiation: Except for some major city electric utilities, lead-sheathed cable is not manufactured for the users that are governed by the NEC due to environmental restrictions.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

LAIDLER, W.: We are voting against this Proposal because it has been pointed out that lead-sheathed cable is still being manufactured and used in the industry.

ZIMNOCH, J.: Many NEC users still install lead sheathed cable for hostile environments and require NEC acknowledgment. UL still lists this type cable.

6-36 Log #2683 NEC-P06 **Final Action: Reject**
(310.11(B)(3), FPN (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add:

FPN: See 400.6 for flexible cords and cables.

Substantiation: Edit. Tag marking required by 400.6(A) should be referenced for correlation.

Panel Meeting Action: Reject

Panel Statement: A new Fine Print note to 310.11(B)(3) would be redundant because of the Fine Print Note in 310.1. This fine print note refers the user to Articles 400 and 402 for the requirements for flexible cord and fixture wire.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-37 Log #2393 NEC-P06 **Final Action: Accept**
(310.13)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 5 for information.

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Delete the second paragraph that reads: “Equipment grounding conductors shall be permitted to be sectioned within a listed multiconductor cable, provided the combined circular mil area complies with 250.122.”

Substantiation: This is a companion proposal to relocate this text to 250.122(A) and is contingent upon CMP-5 accepting the proposal to include this text in 250.122(A).

It is more appropriate to have this provision located under 250.122(A) Size of Equipment Grounding Conductors rather than under 310.13 Conductor Constructions and Applications.

Panel Meeting Action: Accept

Panel Statement: The panel accepts this proposal contingent upon acceptance of Proposal 5-285 by Panel 5. The panel recognizes that this is in reference to the third paragraph.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-38 Log #2553 NEC-P06 **Final Action: Accept in Principle**
(Table 310.13)

Submitter: John Stuckwisch, Barth Electric / Rep. IEJATC Local 481 IBEW

Recommendation: Revise text as follows:

XHHW~~4~~

Substantiation: Note 4 doesn’t apply any more - 2005 Code Table 310.13, Note 4 stated the “2” suffix equals 90°C - now Note 4 covers rubber insulation.

Panel Meeting Action: Accept in Principle

1. In Table 310.13(A), delete the superscript “4” from type letters XHHW, RHW, and RHW/RHW-2 in the column titled “Outer Covering”.
2. Delete Note 4.
3. Renumber Notes 5 through 7 as Notes 4 through 6 respectively and change the superscripts in the table.

Panel Statement: The panel understands that the proposal addresses Table 310.13(A) since Table 310.13 was re-identified as Table 310.13(A) in the 2008 code. Rubber insulation can be used in both XHHW and RHW and depending on the insulation characteristics may not require an outer covering to comply with the product standards. Notes 1 and 4 are redundant and Note 1 is more general.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-39 Log #1155 NEC-P06 **Final Action: Accept**
(Table 310.13(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: In the “mm” and “mils” columns under “Thickness of Insulation”, add columns with the dimensions for (B) Nylon jacket or equivalent.

	(A)	(B)	(A)	(B)	(A) NONE (B) NYLON JACKET OR EQUIVALENT
22-12	0.76	0.38	30	15	
10	0.76	0.51	30	20	
8	1.14	0.76	45	30	
6	1.52	0.76	60	30	
4-2	1.52	1.02	60	40	
1-4/0	2.03	1.27	80	50	
213-500	2.41	1.52	95	60	
501-1000	2.79	1.78	110	70	

Substantiation: Construction B was inadvertently dropped from the 2008 NEC. Missing text was taken from the 2005 NEC.

Panel Meeting Action: Accept

Panel Statement: Based on the proposed text, the panel understands that this addition refers to type MTW in Table 310.13(A).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-40 Log #3519 NEC-P06 **Final Action: Accept**
(Table 310.13(A))

Submitter: Tim Henry, Code Electrical Classes Inc.

Recommendation: Revise as follows:

THW (size 14-8 only as permitted in ~~410.33~~ 410.68)

Substantiation: Old Section 410.33 is now Section 410.68.

Panel Meeting Action: Accept

Panel Statement: This may have already been processed as an errata and corrected in some copies of the 2008 Edition. This should be corrected for all future editions.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-41 Log #1153 NEC-P06 **Final Action: Accept**
(Table 310.13(C))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Relocate “105°C” under “90°C”.

Substantiation: The maximum operating temperature for Type MV-105 is 105°C.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-42 Log #449 NEC-P06 **Final Action: Reject**
(Table 310.13(D))

Submitter: Harold Ueland, American Crystal Sugar Co.
Recommendation: Revise text to read as follows:

Break up table into 2 voltage ratings: 2400 Dry & 4160/2400 Wet or Dry Cable.

Table 310.13(D)a Thickness … Rated 2400v …

Dry Locations, Single Cond.						Multiconductor Insulation	
Without Jacket Insulation		With Jacket					
		Insulation		Jacket			
mm	mils	mm	mils	mm	mils	mm	mils

Table 310.13(D)b Thickness … Rated 4160/2400 WYE …

Wet or Dry Locations, Single Conductor			
Insulation		Jacket	
mm	mils.	mm	mils.

Substantiation: For purposes of safety and reliability, thick, jacketed non-shielded cable should be allowed. Safety is enhanced because a live cable can easily be detected with a wide range of field effect voltage sensors, ensuring that a cable is dead before it is touched or cut into. Such sensors do not work on shielded cable. Reliability is enhanced because there are no stress cones/terminators to fail. These observances are based on 25 years of experience with both cables.
Panel Meeting Action: Reject
Panel Statement: The panel rejects the proposal because the submitter has not provided the information needed to construct the wall thickness table. The table printed is incomplete. While the intent of the submitter may be appropriate, we need to see a complete and unambiguous construction submitted. The submitter did not provide technical justification to support his changes.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-43 Log #1393 NEC-P06 **Final Action: Reject**
(Table 310.13(D))

Submitter: Gordon Robertson, American Petroleum Institute (API)
Recommendation: Revise table to read as follows:

Table 310.13(D) Thickness of Insulation and Jacket for Nonshielded Solid Dielectric Insulated Conductors Rated ~~2400~~ 2001-5000 Volts

	2001-2400 volt												2401-5000 volt					
	Dry Locations, Single Conductor						Wet or Dry Locations						Wet or Dry Locations					
	Without Jacket Insulation		With Jacket				Single Conductor				Multiconductor Insulation*		Single Conductor				Multiconductor Insulation*	
			Insulation		Jacket		Insulation		Jacket				Insulation		Jacket			
Conductor Size (AWG or kcmil)	mm	mils	mm	mils	mm	mils	mm	mils	mm	mils	mm	mils	mm	mils	mm	mils	mm	mils
8	2.79	110	2.29	90	0.76	30	3.18	125	2.03	80	2.29	90	4.57	180	2.03	80	4.57	180
6	2.79	110	2.29	90	0.76	30	3.18	125	2.03	80	2.29	90	4.57	180	2.03	80	4.57	180
4–2	2.79	110	2.29	90	1.14	45	3.18	125	2.03	80	2.29	90	4.57	180	2.41	95	4.57	180
1–2/0	2.79	110	2.29	90	1.14	45	3.18	125	2.03	80	2.29	90	4.57	180	2.41	95	4.57	180
3/0–4/0	2.79	110	2.29	90	1.65	65	3.18	125	2.41	95	2.29	90	4.57	180	2.79	110	4.57	180
213–500	3.05	120	2.29	90	1.65	65	3.56	140	2.79	110	2.29	90	5.33	210	2.79	110	5.33	210
501–750	3.30	130	2.29	90	1.65	65	3.94	155	3.18	125	2.29	90	5.97	235	3.18	125	5.97	235
751–1000	3.30	130	2.29	90	1.65	65	3.94	155	3.18	125	2.29	90	6.35	250	3.56	140	6.35	250
1001–1250	3.56	140	2.92	115	1.65	65	4.32	170	3.56	140	2.92	115						
1251–1500	3.56	140	2.92	115	2.03	80	4.32	170	3.56	140	2.92	115						
1501–2000	3.56	140	2.92	115	2.03	80	4.32	170	3.94	155	3.56	140						

*Under a common overall covering such as a jacket, sheath, or armor.

Substantiation: This proposal is a companion proposal to 310.6. It is required when the proposal for 310.6 is accepted. The figures used originate from the 2002 NEC, but were actually acceptable for up to 8000 volts in the 2002 NEC. Please note: the insulation level required for cable rated 5000 volts is twice the level required for cable rated 2400 volts.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is incorrect and does not match the 2002 text. See panel action on Proposal 6-44.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-44 Log #3489 NEC-P06 **Final Action: Accept in Principle in Part**
(Table 310.13(D))

TCC Action: The Technical Correlating Committee understands that in the panel statement the reference to Proposal 6-24 should be to Proposal 6-21b.
Submitter: Mark Rucker, Toyota Motor Mfg., Kentucky, Inc.
Recommendation: Table 310.13(D) Thickness of Insulation and Jacket for Nonshielded Solid Dielectric Insulated Conductors Rated ~~2400~~ 2001 to 8000 Volts

(Proposer's note: this table replaces the 2008 table and includes text lifted directly from NEC 2002, Table 310.63) **Table is shown on page 343.**
Substantiation: We possess ~25 4, 160V starters made during the 1980s and 1990s. All the starters used non-shielded 5kV cable to make internal connections. (Conductors leaving the starters to feed loads are shielded type.) The internal connections are numerous and do not allow room to make stress cones if shielded cable is used in place of non-shielded. We also possess 7.3kV capacitor/reactor banks that were made using non-shielded 8kV cable to make internal connections.

With NEC 2005, the provisions for non-shielded 5kV and 8kV conductors were dropped. Manufacturers of medium voltage cable now no longer make for open market purchase non-shielded cable rated above 2.4kV, requiring us to use the 2.4 kV rated cable made to the old 5kV specifications but listed for only 2.4kV to make repairs, or to buy a custom made, specially marked, non-listed cable by the 10,000 ft reel for a 10 ft piece.
Panel Meeting Action: Accept in Principle in Part

1. Delete entire column for '5001-8000 Volts 100 Percent Insulation'.
2. Revise table heading as follows: Table 310.13(D) Thickness of Insulation and Jacket for Nonshielded Solid Dielectric Insulated Conductors Rated ~~2400~~ 2001 to 5000 Volts.

Panel Statement: See panel action on Proposal 6-24 as this proposal limits the voltage to 5000 volts.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:

FRIEDMAN, S.: Panel proposal 6-21b accepting use of 5 KV unshielded cables for existing installations should not be accepted. This proposal is not enforceable and does not belong in the NEC. Without providing a date and defining "existing installations" for every possible occurrence this change will only add confusion. In addition, the panel has stated repeatedly that non-shielded cables are not safe. In the previous code cycle the panel consistently indicated that additional technical substantiation would be required to permit the use of non-shielded cables.

Table 310.13(D)

Conductor Size (AWG or Kcmil)	2001-5000 Volts: Dry Locations, Single Conductor: Without Jacket: Insulation mm	mils	With Jacket: Insulation mm	mils	Jacket mm	mils	Wet or Dry Locations: Single Conductor: Insulation mm	mils	Jacket mm	mils	Multiconductor Insulation* mm	mils	5001-8000 Volts 100 Percent Insulation Level Wet or Dry Locations: Single Conductor: Insulation mm	mils	Jacket mm	mils	Multiconductor Insulation* mm	mils
8	2.79	110	2.29	90	0.76	30	3.18	125	2.03	80	0.76	30	4.57	180	2.03	80	4.57	180
6	2.79	110	2.29	90	0.76	30	3.18	125	2.03	80	0.76	30	4.57	180	2.03	80	4.57	180
4-2	2.79	110	2.29	90	1.14	45	3.18	125	2.03	80	1.14	45	4.57	180	2.41	95	4.57	180
1-2/0	2.79	110	2.29	90	1.14	45	3.18	125	2.03	80	1.14	45	4.57	180	2.41	95	4.57	180
3/0-4/0	2.79	110	2.29	90	1.65	65	3.18	125	2.41	95	1.65	65	4.57	180	2.79	110	4.57	180
213-500	3.05	120	2.29	90	1.65	65	3.56	140	2.79	110	1.65	65	5.33	210	2.79	110	5.33	210
501-750	3.30	130	2.29	90	1.65	65	3.94	155	3.18	125	1.65	65	5.97	235	3.18	125	5.97	235
751-1000	3.30	130	2.29	90	1.65	65	3.94	155	3.18	125	1.65	65	6.35	250	3.56	140	6.35	250
1001-1250	3.56	140	2.92	115	1.65	65	4.32	170	3.56	140	1.65	65						
1251-1500	3.56	140	2.92	115	2.03	80	4.32	170	3.56	140	2.03	80						
1501-2000	3.56	140	2.92	115	2.03	80	4.32	170	3.94	155	2.03	80						

*Under a common overall covering such as a jacket, sheath, or armor.

ZIMNOCH, J.: See My Explanation of Negative on 6-21b.
Comment on Affirmative:
THOMPSON, J.: Panel Statement reference to 6-424a should be changed to 6-21b.

6-45 Log #610 NEC-P06 **Final Action: Reject**
(Table 310.13(E) Note (New))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new note to Table 310.13(E) after 100/133/173 percent insulation level categories to read:
<u>The cable insulation level shall be calculated with the system voltage at which the circuit operates, not the nominal voltage classification.</u>
Substantiation: It is fairly common to have a high resistance grounded 4.16 kV system in industrial applications. The initial ground fault may remain over one hour while maintenance crews locate the fault. It is indicated in these instances that 173% insulation level must be used. If 5/8 kV cable is used, then it will be acceptable if 4.16 kV is multiplied by 173% (4160V x 1.73 = 7197V). However, if the nominal voltage classification of the cable is used (5000V x 1.73 = 8650V) then 5/8 kV cable cannot be used. This note will clarify to users that the intention is to multiply the actual circuit voltage by the appropriate factor and not the nominal voltage classification.
Panel Meeting Action: Reject
Panel Statement: This text does not provide any additional clarification in the code. This issue is currently addressed in Section 110.4, and the proposed text is not needed.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
ZIMNOCH, J.: ICEA currently lists a 5 kV, 173% insulation level as 140 mils, thus a 5 kV 173% cable is already accepted by the industry. The submitter may want to submit a comment to add the 133 and 173% insulation levels to Table 310.13(E) for the 2001-5000v category.

6-46 Log #3770 NEC-P06 **Final Action: Reject**
(310.15(A)(2))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and on Proposal 6-47 to comply with 3.1.4 of the NEC Style Manual.
See the Technical Correlating Committee action on Proposal 6-47.
This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
(2) Selection of Ampacity. Where more than one calculated or tabulated ampacity could apply for a given circuit length <u>then</u>~~, the lowest value shall be used~~.
<u>(1) If the lower ampacity length of two ampacities is not greater than 3.0 m(10 ft) and not greater than 10 percent of the higher ampacity length, the higher ampacity shall be permitted to be used.</u>
<u>(2) For all other cases, the lowest ampacity shall be used.</u>
~~*Exception: Where two different ampacities apply to adjacent portions of a circuit, the higher ampacity shall be permitted to be used beyond the point of transition, a distance equal to 3.0 m (10 ft) or 10 percent of the circuit length figured at the higher ampacity, whichever is less.*~~
FPN: See 110.14(C) for conductor temperature limitations due to termination provisions.
Substantiation: This revision will change an exception into a positive rule and comply with the TCC request to convert exceptions into positive text wherever possible.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
ZIMNOCH, J.: The panel should reconsider this as it does convert exception into a positive statement in accordance with TCC guidelines.

6-47 Log #3902 NEC-P06 **Final Action: Accept**
(310.15(A)(2))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 6-46.
See the Technical Correlating Committee action on Proposal 6-46.
This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise the first paragraph as follows:
(2) Selection of Ampacity. Where more than one ~~calculated or tabulated~~ ampacity ~~could apply~~ <u>applies</u> for a given circuit length, the lowest value shall be used.
Substantiation: 310.15(A)(1) specifies that the ampacity can be obtained from the tables or calculated under engineering supervision and does not need to be repeated in (2).
Panel Meeting Action: Accept
Panel Statement: Accept the deletion of “calculated or tabulated” and the change from “could apply’ “to “applies”. This action modifies the action taken on Proposal 6-46.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-48 Log #277 NEC-P06 **Final Action: Reject**
(310.15(A)(2) Exception)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “figured” to “calculated”.
Substantiation: The term “calculated” more accurately describes the operation and agrees with the wording in 310.60(A)(2).
This is one of a series of proposals to provide consistent terminology throughout the code.
Panel Meeting Action: Reject
Panel Statement: The panel actions on Proposals 6-46 and 6-47 changed the text and removed the term ‘figured’ from the requirement.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-49 Log #666 NEC-P06 **Final Action: Reject**
(310.15(A)(2) Exception)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Revise text to read as follows:
Exception: Where different ampacities apply to adjacent portions of a circuit, the higher ampacity shall be permitted to be used beyond the point of transition, a distance equal to 3.0 m (10 ft) or 10 percent of the circuit length figured at the higher ampacity, whichever is less.
Substantiation: The present wording with the reference to the word "two" is unnecessary.
Panel Meeting Action: Reject
Panel Statement: The existing language that contains the word "two" is clearer and more precise. in addition, no technical substantiation was provided by the submitter. See panel action on Proposals 6-46 and 6-47.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-50 Log #2662 NEC-P06 **Final Action: Reject**
(310.15(A)(2) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
EXCEPT AS PROVIDED IN 334.80 WHERE TWO DIFFERENT AMPACITIES APPLY...(REMAINDER UNCHANGED).
Substantiation: Edit. Correlation with 334.80.
Panel Meeting Action: Reject
Panel Statement: This exception applies in general. Section 334.80 applies specifically to the use of Type NM cable. The scope of Article 310 is general requirements for conductors.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-51 Log #1646 NEC-P06 **Final Action: Accept in Principle**
(310.15(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add an additional paragraph at the end of 310.15(B) to read:
The temperature correction factors and the adjustment factors shall be permitted to be applied to the ampacity for the temperature rating of the conductor, provided the corrected and adjusted ampacity does not exceed the ampacity for the temperature rating of the termination.
Substantiation: This will clarify that the ampacity for the temperature rating of the conductor may be used for application of the temperature correction and adjustment factors but the lower of the corrected and adjusted ampacity or the ampacity for the temperature rating of the conductor must be used.
Panel Meeting Action: Accept in Principle
Add new text as follows:
The temperature correction and adjustment factors shall be permitted to be applied to the ampacity for the temperature rating of the conductor, provided the corrected and adjusted ampacity does not exceed the ampacity for the temperature rating of the termination in accordance with the provisions of 110.14(C).
Panel Statement: The added language will provide further information to the user. The actual temperature rating of the conductor can be used for ampacity adjustment or conductor correction factors. The resultant ampacity cannot exceed the temperature limitations of the termination.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-52 Log #1613 NEC-P06 **Final Action: Accept in Principle in Part**
(310.15(B) and Table 310.16 through Table 310.21)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panels 2, 7, and 8 for information relative to Proposals 2-377, 2-382, 2-384, 7-53, 7-54, 7-71, 8-172, and 8-173.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 310.15(B) as shown:
(B) Tables. Ampacities for conductors rated 0 to 2000 volts shall be as specified in the Allowable Ampacity ~~Table 310.16 through Table 310.19, and Ampacity Table 310.20 and Table 310.21~~ Table 310.15(B)(1) through 310.15(B)(4), and Ampacity Table 310.15(B)(5) and Table 310.15(B)(6) as modified by (B)(1) through (B)(6).
In the FPN, change "Table 310.16 through 310.19" to "Table 310.15(B)(1) through Table 310.15(B)(4)".
In 310.15(B)(2)(c), change "Table 310.16 and Table 310.18" to "Table 310.15(B)(1) and Table 310.15(B)(3)".
Renumber Table 310.16 as Table 310.15(B)(1).
Renumber Table 310.17 as Table 310.15(B)(2).
Renumber Table 310.18 as Table 310.15(B)(3).
Renumber Table 310.19 as Table 310.15(B)(4).
Renumber Table 310.20 as Table 310.15(B)(5).
Renumber Table 310.21 as Table 310.15(B)(6).
Substantiation: This revision will bring the Code into compliance with 2.3.1 of the NEC Style Manual which states "Tables and figures shall be referenced in the text and shall be designated by the number of the *NEC* rule in which they are referenced.
Proposals are also being submitted to correlate all the references to these Tables throughout the Code.
Panel Meeting Action: Accept in Principle in Part
1. Revise text as follows:
B) Tables. Ampacities for conductors rated 0 to 2000 volts shall be as specified in the Allowable Ampacity ~~Table 310.16 through Table 310.19, and Ampacity Table 310.20 and Table 310.21~~ Table 310.15(B)(16) through 310.15(B)(19), and Ampacity Table 310.15(B)(20) and Table 310.15(B)(21) as modified by (B)(16) through (B)(21).
In the FPN, change "Table 310.16 through 310.19" to "Table 310.15(B)(16) through Table 310.15(B)(19)".
In 310.15(B)(2)(c), change "Table 310.16 and Table 310.18" to "Table 310.15(B)(16) and Table 310.15(B)(18)".
2. Renumber tables as follows:
Renumber Table 310.16 as Table 310.15(B)(16).
Renumber Table 310.17 as Table 310.15(B)(17).
Renumber Table 310.18 as Table 310.15(B)(18).
Renumber Table 310.19 as Table 310.15(B)(19).
Renumber Table 310.20 as Table 310.15(B)(20).
Renumber Table 310.21 as Table 310.15(B)(21).
Panel Statement: The panel accepts the change to rename the tables in section 310 to Section 310.15. The panel rejects the numbering of 1 through 6 due to a conflict in the table numbering with existing tables. The panel has selected table numbers 16 through 21 to match the existing table numbers and improve usability. This is in compliance with the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
KENT, G.: The existing table should remain in parenthesis for at least one code cycle.

6-53 Log #628 NEC-P06 **Final Action: Accept**
(310.15(B)(2))

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: In 310.15(B), renumber (2) through (6) as (3) through (7) after making the following changes to the existing sections.
Revise 310.15(B): "…as modified by (B)(1) through ~~(B)(6)~~ (B)(7)."
In 310.15(B)(2)(a) and 310.15(B)(2)(a), Exception No 1, change "Table 310.15(B)(2)(a)" to "Table 310.15(B)(3)(a)"
Renumber Table 310.15(B)(2)(a) as Table 310.15(B)(3)(a).
In 310.15(B)(2)(c), change "Table 310.15(B)(2)(c)" to "Table 310.15(B)(3)(c)" and revise the last sentence as shown: "…to determine the applicable ambient temperature for application of the correction factors in ~~Table 310.16 and Table 310.18~~ Table 310.15(B)(2)(a) ~~and~~ or Table 310.15(B)(2)(b)."
Renumber Table 310.15(B)(2)(c) as Table 310.15(B)(3)(c) and change the two references in the FPN to agree.
In 310.15(B)(4)(a) and (b) and 310.15(B)(5), revise as shown: "…the provisions of ~~310.15(B)(2)(a)~~ 310.15(B)(3)(a)."
In 310.15(B)(5), change "310.15(B)(2)(a)" to "310.15(B)(3)(a)"
In 310.15(B)(6), change "Table 310.15(B)(6)" to "Table 310.15(B)(7)".
Renumber Table 310.15(B)(6) as Table 310.15(B)(7)
Add a new 310.15(B)(2) to read:
(2) Ambient Temperature Correction Factors. Ampacities for ambient temperatures other than those shown in the ampacity tables shall be corrected in accordance with Table 310.15(B)(2)(a), Table 310.15(B)(2)(b), or shall be permitted to be calculated using the following equation:

$$I' = I\sqrt{\frac{T_c - T_a'}{T_c - T_a}}$$

where:

I' =	ampacity corrected for ambient temperature
I =	ampacity shown in the tables
Tc =	temperature rating of conductor (ºC)
Ta' =	new ambient temperature (ºC)
Ta =	ambient temperature used in the table (ºC)

Table 310.15(B)(2)(a) Ambient Temperature Correction Factors Based on 30ºC (86ºF)

For ambient temperatures other than 30ºC (86ºF), multiply the allowable ampacities specified in the ampacity tables by the appropriate correction factor shown below.				
Ambient Temperature (ºC)	Temperature Rating of Conductor			Ambient Temperature (ºF)
	60ºC	75ºC	90ºC	
10 or less	1.29	1.20	1.15	50 or less
11-15	1.22	1.15	1.12	51-59
16-20	1.15	1.11	1.08	60-68
21-25	1.08	1.05	1.04	69-77
26-30	1.00	1.00	1.00	78-86
31-35	0.91	0.94	0.96	87-95
36-40	0.82	0.88	0.91	96-104
41-45	0.71	0.82	0.87	105-113
46-50	0.58	0.75	0.82	114-122
51-55	0.41	0.67	0.76	123-131
56-60	—	0.58	0.71	132-140
61-65	—	0.47	0.65	141-149
66-70	—	0.33	0.58	150-158
71-75	—	—	0.50	159-167
76-80	—	—	0.41	168-176
81-85	—	—	0.29	177-185

Add the following footnote: "** Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 30ºC (86ºF)."

Table B.310.3:

Add "**" at the end of the Table title.

Delete the Correction Factors portion of the table.

Relocate the existing footnote to follow the ampacity table.

Add the following footnote: "** Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 40ºC (104ºF)."

310.10 FPN No. 1:

Revise the second sentence as follows: "…the ambient temperature correction factors in 310.15(B)(2) ~~at the bottom of these tables~~…"

400.5(A):

Revise the third sentence as follows: "Where cords are used in ambient temperatures exceeding 30ºC (86ºF), the temperature correction factors from Table 310.15(B)(2)(a) ~~Table 310.16~~ that correspond to the temperature rating of the cord shall be applied to the ampacity in ~~from~~ Table 400.5(B)."

The following editorial correlation changes will also be required with the addition of this new section.

Change "310.15(B)(6)" to "310.15(B)(7)" in 110.14(C)(1); 215.2(A)(3); 230.90, Exception No. 5; and 550.33(B).

Change "310.15(B)(2)(a)" to "310.15(B)(3)(a)" in 310.4(D); 312.5(C)(g) FPN; 334.80 in two places; 366.22(A); 366.23(A) and (B); 376.22(B); 378.22; 384.22; 386.22; 392.11(A)(1); 392.11(B); 520.42; 675.5; 725.51(A) and (B); 725.130(A), Exception No. 1; 760.51(A) and (B); 760.130(A); Chapter 9, Table 1, Note 4; and Annex D, Example D3(a) in two places.

Table 310.15(B)(2)(b) Ambient Temperature Correction Factors Based on 40ºC (104ºF)

For ambient temperatures other than 40ºC (104ºF), multiply the allowable ampacities specified in the ampacity tables by the appropriate correction factor shown below.							
Ambient Temperature (ºC)	Temperature Rating of Conductor						Ambient Temperature (ºF)
	60ºC	75ºC	90ºC	150ºC	200ºC	250ºC	
10 or less	1.58	1.36	1.26	1.13	1.09	1.07	50 or less
11-15	1.50	1.31	1.22	1.11	1.08	1.06	51-59
16-20	1.41	1.25	1.18	1.09	1.06	1.05	60-68
21-25	1.32	1.20	1.14	1.07	1.05	1.04	69-77
26-30	1.22	1.13	1.10	1.04	1.03	1.02	78-86
31-35	1.12	1.07	1.05	1.02	1.02	1.01	87-95
36-40	1.00	1.00	1.00	1.00	1.00	1.00	96-104
41-45	0.87	0.93	0.95	0.98	0.98	0.99	105-113
46-50	0.71	0.85	0.89	0.95	0.97	0.98	114-122
51-55	0.50	0.76	0.84	0.93	0.95	0.96	123-131
56-60	—	0.65	0.77	0.90	0.94	0.95	132-140
61-65	—	0.53	0.71	0.88	0.92	0.94	141-149
66-70	—	0.38	0.63	0.85	0.90	0.93	150-158
71-75	—	—	0.55	0.83	0.88	0.91	159-167
76-80	—	—	0.45	0.80	0.87	0.90	168-176
81-90	—	—	—	0.74	0.83	0.87	177-194
91-100	—	—	—	0.67	0.79	0.85	195-212
101-110	—	—	—	0.60	0.75	0.82	213-230
111-120	—	—	—	0.52	0.71	0.79	231-248
121-130	—	—	—	0.43	0.66	0.76	249-266
131-140	—	—	—	0.30	0.61	0.72	267-284
141-160	—	—	—	—	0.50	0.65	285-320
161-180	—	—	—	—	0.35	0.58	321-356
181-200	—	—	—	—	—	0.49	357-392
201-225	—	—	—	—	—	0.35	393-437

For correlation with the addition of this section, the following changes are also required:

Tables 310.16 and 310.17:

Add "**" at the end of each Table title.

Delete the Correction Factors from the bottom of each table.

Relocate the existing footnote "* See 240.4(D)." to follow the ampacity table and revise it to read "* Refer to 240.4(D) for conductor overcurrent protection limitations."

Add the following footnote to the tables: "** Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 30ºC (86ºF)."

Tables 310.18, 310.19 and 310.20:

Add "**" at the end of each Table title.

Delete the Correction Factors table from the bottom of each table.

Add the following footnote to the tables: "** Refer to 310.15(B)(2) for the ampacity correction factors where the ambient temperature is other than 40ºC (104ºF)."

Table B.310.1:

Add "**" at the end of the Table title.

Delete the Correction Factors portion of the table.

Relocate the existing footnote to follow the ampacity table.

Change "310.15(B)(4)" to "310.15(B)(5)" in 366.23(A) and 376.22(B).

Change "310.15(B)(2)" to "310.15(B)(3)" in 372.17; 374.17; and 390.17.

Change "310.15(B)(4)(c)" to "310.15(B)(5)(c)" in Annex D, Example D3(a).

In Annex D, Example D4(a), revise last line as shown: "[See Table 310.16 through Table 310.21, and 310.15(B)(2), (B)(3) and (B)(5) ~~(B)(4)~~.]"

As information to NFPA staff, in the Index:

Change "310.15(B)(3)" to "310.15(B)(4)" for Bare Conductor Ampacities.

Change "310.15(B)(5)" to "310.15(B)(6)" for Conduit fill Grounding conductor.

Change "310.15(B)(4), 310.15(B)(6)" to "310.15(B)(5), 310.15(B)(7)" for **Neutral** Conductor.

Change "310.15(B)(2)(c)" to "310.15(B)(3)(c)" for Roofs, conduits exposed to sunlight on.

Substantiation: Acceptance of this new section will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC, consolidate the ampacity correction and adjustment factors into a single section [310.15(B)], and consolidate seven ambient temperature correction tables into two tables.

The equation proposed to be added is the same equation that is permitted in 310.60(C)(4) to calculate the ampacity correction factors for various ambient temperatures based on the conductor temperature ratings in the tables. The term

ÄTD was omitted from the equation since it is not necessary to include it for cables rated below 46kV as the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation also appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the lower and higher ambient temperatures were added to provide the appropriate ampacity correction factors for colder and warmer climates.

Some of the ambient temperature ranges were revised to 5ºC increments to harmonize with the proposal submitted for the CEC, to correlate with existing NEC Tables 310.20 and B310.3, and to provide consistency with the 30ºC table.

The ampacity correction factors for 85ºC (185ºF) that are included in Table B.310.3 were not included in the revised table since, due to environmental restrictions, paper and lead cable is no longer commonly used in applications covered by the NEC. The ampacities remain in Table B.310.3 for reference in existing installations and the ambient temperature correction factors can be calculated using the equation in 310.15(B)(2).

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:

LAIDLER, W.: We are voting against the panel's action to accept this proposal. The panel should have accepted this proposal in part only. We agree with relocating the correction factors to 310.15 (B)(2), but we do not think that the correction factors for ambient temperatures lower than 21 degrees (C) or 70 degrees (F) should be included in the table. If conductors are installed for an electrical installation in a large area where the temperature is going to be maintained and controlled below 21 degrees (C) or 70 degrees (F), such as a large warehouse, the temperature correction factors for the lower ambient temperature could be applied permitting the ampacity of a particular size conductor to be increased. That installation would be fine as long as that lower ambient temperature is maintained. However, the question remains what if it is not? What if the use of the area changes and we have undersized conductors? This could happen where we applied the correction factors for a high ambient temperature and were required to increase the conductor size but, in that case, we would have oversized conductors. I think the panel needs to look at this potential situation more closely.

6-54 Log #2172 NEC-P06 **Final Action: Accept**
(310.15(B)(2))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:

(2) Adjustment Factors.
(a) Text to remain unchanged
FPN No. 1: Text to remain unchanged
FPN No. 2: Text to remain unchanged

Exception No. 1: Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the adjustment ~~derating~~ factors shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).

Exception No. 2: Text to remain unchanged

Exception No. 3: Adjustment ~~Derating~~ factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).

Exception No. 4: Adjustment ~~Derating~~ factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.

Exception No. 5: Text to remain unchanged

Substantiation: The term "adjustment factor" should be used throughout this section. It appears that "adjustment factor" and "derating factor" mean the same thing, so only one term should be used.
Panel Meeting Action: Accept
Panel Statement: Change is intended to be editorial only. There is no technical change in the requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-55 Log #2987 NEC-P06 **Final Action: Accept**
(310.15(B)(2))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

(2) Adjustment Factors.
(a) Text to remain unchanged
FPN No. 1: Text to remain unchanged
FPN No. 2: Text to remain unchanged

Exception No. 1: Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the adjustment ~~derating~~ factors shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).

Exception No. 2: Text to remain unchanged

Exception No. 3: Adjustment ~~Derating~~ factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).

Exception No. 4: Adjustment ~~Derating~~ factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.

Exception No. 5: Text to remain unchanged.

Substantiation: The term "adjustment factor" should be used throughout this section. It appears that "adjustment factor" and "derating factor" mean the same thing, so only one term should be used.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-56 Log #476 NEC-P06 **Final Action: Reject**
(310.15(B)(2)(a))

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Revise text to read as follows:

Section 310.15(B)(2)(a) Adjustment Factors.

(a) More Than Three Current-Carrying Conductors in a Raceway or Cable. Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, [w]here there is no load diversity and the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). Each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.

FPN No. 1: See Annex B, Table B.310.11 for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.

FPN No. 2: See 366.23(A) for correction factors for conductors in sheet metal auxiliary gutters and 376.22 for correction factors for conductors in metal wireways.

Exception No. 1: Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the derating factors shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).

Exception No. 2: For conductors installed in cable trays, the provisions of 392.11 shall apply.

Exception No. 3: Derating factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).

Exception No. 4: Derating factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.

Exception No. 5: Adjustment factors shall not apply to Type AC cable or to Type MC cable without an overall outer jacket under the following conditions:

(1) Each cable has not more than three current-carrying conductors.
(2) The conductors are 12 AWG copper.
(3) Not more than 20 current-carrying conductors are bundled, stacked, or supported on "bridle rings."

A 60 percent adjustment factor shall be applied where the current-carrying conductors in these cables that are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing exceeds 20.

Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.

From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.

Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E.Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, “UF,” noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, “WW,” denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors’ insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The requirements found in Article 310 are general requirements. The test data provided is in support of requirements that are outside the scope of this panel and should be addressed by the appropriate code-making panel where special exception could be considered.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-57 Log #635 NEC-P06 **Final Action: Accept**
(Table 310.15(B)(2)(a))

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise first column heading in Table 310.15(B)(2)(a) from "Number of Current-Carrying Conductors" to "Number of Conductors (See Note 1.)".
Add a Note below the Table before FPN No. 1 to read:
[1] Number of Conductors is the total number of conductors in the raceway or cable adjusted in accordance with 310.15(B)(4) and (5).
Substantiation: A companion proposal is being submitted for Table B.310.11.
This Table was originally added to the Code in 1940 and the column heading remained as "Number of Conductors" until 1993. During the 1993 NEC revision cycle, the column headings in Table 310.15(B)(2)(a) and Table B.310.11 were editorially changed to "Number of Current-Carrying Conductors". There was no Proposal, Comment, or Panel Action to make the change. A chronological history of the changes in the Tables is attached for reference.
This reinstatement of the original column heading permits the user to take the total number of conductors in the cable or raceway and subtract the neutral conductors not required to be counted under 310.15(B)(4) and the grounding or bonding conductors not required to be counted under 310.15(B)(5). The result is the number of conductors that **may** be simultaneously energized and this number would be used to select the adjustment factor from the Table.
The Note is proposed for clarity since there has been some confusion that the column referred to the total number of conductors in the raceway or cable.
The correction to the column heading also correlates with the column headings in Table 400.5 in the NEC and Table 5C in the 2006 Canadian Electrical Code, Part I.
This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-58 Log #1614 NEC-P06 **Final Action: Accept in Principle**
(Table 310.15(B)(2)(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the heading for the second column, change "Tables 310.16 through 310.19" to "Tables 310.15(B)(1) through 310.15(B)(4)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept in Principle
In the heading for the second column, change "Tables 310.16 through 310.19" to "Tables 310.15(B)(16) through 310.15(B)(19)".
Panel Statement: See panel action on Proposal 6-52. This numbering matches panel action on Proposal 6-52.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-59 Log #3062 NEC-P06 **Final Action: Reject**
(310.15(B)(2)(a))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by the panel relative to the actions taken on Proposals 8-155, 8-194, and 8-204.
The Technical Correlating Committee directs the Chairs of Code-Making Panels 6 and 8 form a Task Group to correlate Proposals 6-59, 8-155, 8-194 and 8-204, and submit comments, if deemed appropriate.
This action will considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(2) Adjustment Factors.
(a) More Than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). Each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.
Fine print notes and exceptions are to remain unchanged in their content.
Substantiation: This proposal takes the code language out of 376.22(B), 366.22(A) and 378.22, and relocates it here, where it is more appropriate. Correlating proposals to those sections will also be made.
Panel Meeting Action: Reject
Panel Statement: While the reference phrase is contained in all of the sections referenced, the proposal would allow signaling and control cables to be loaded into circular raceways and in cables and not require adjustment. These conductors would take up space, reduce airflow, and reduce heat dissipation. The restrictive nature of circular raceways is different from auxiliary gutters, metallic, and non-metallic wireways. The proposed text should not apply as a general rule.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-60 Log #3771 NEC-P06 **Final Action: Accept**
(310.15(B)(2)(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
(2) Adjustment Factors.
(a) More than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.
~~Exception No. 1:~~ Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the derating factors shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).
FPN No. 1: See Annex B, Table B.310.11, for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.
FPN No. 2: See 366.23(A) for adjustment factors for conductors in sheet metal auxiliary gutters and 376.22(B) for adjustment factors for conductors in metal wireways.
The following adjustments shall be permitted for the conductors and installation methods listed in (1) through (4):
~~Exception No. 2:~~ (1) For conductors installed in cable trays, the provisions of 392.11 shall apply.
~~Exception No. 3:~~ (2) Derating factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).
~~Exception No. 4:~~ (3) Derating factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.
~~Exception No. 5:~~ (4) Adjustment factors shall not apply to Type AC cable or to Type MC cable without an overall outer jacket under the following conditions:
~~(1)~~ (a) Each cable has not more than three current-carrying conductors.
~~(2)~~ (b) The conductors are 12 AWG copper.
~~(3)~~ (c) Not more than 20 current-carrying conductors are bundled, stacked, or supported on "bridle rings."
A 60 percent adjustment factor shall be applied where the current-carrying conductors in these cables that are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing exceeds 20.
Substantiation: This revision will change the exceptions into positive rules and comply with the TCC request to convert exceptions into positive text

wherever possible.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-61 Log #3869 NEC-P06 **Final Action: Accept in Principle**
(310.15(B)(2)(a))

Submitter: Mike Weitzel, Bechtel
Recommendation: Insert one sentence of new text in just before the last sentence of the paragraph.

310.15(B)(2)(a)

(a) More than Three Current Carrying Conductors in a Raceway or Cable. Where the number of... existing text... shall be enclosed as shown in Table 310.15(B)(2)(a) The allowable ampacity of additional conductors installed in a raceway intended for future use shall be reduced in accordance with Table 310.15(B)(2)(a). Each current carrying conductor of a paralleled set of conductors shall be counted as a current carrying conductor.

Substantiation: Additional "spare" conductors in a raceway where more than three current carrying conductors are installed impede the dissipation of heat in the conductors as required in 300.17 and should be counted when adjusting the ampacity of the current carrying conductors. These conductors are not in use presently, but may be placed in use in the future and should be either counted as current carrying, have their future use identified with a tag that clarifies that they are for other use - such as remote-control or signaling per 725.58, for example, or be removed.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel has addressed the submitter's recommendation through Proposal 6-57, which addresses the total number of conductors in a raceway or cable without reference to "current carrying".
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-62 Log #4480 NEC-P06 **Final Action: Accept in Principle**
(310.15(B)(2)(a))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:

310.15 Ampacities for Conductors Rated 0–2000 Volts.

(B) Tables. *[main portion of 310.15(B) unchanged by this Proposal]*

(2) Adjustment Factors.

(a) *More Than Three Current-Carrying Conductors in a Raceway or Cable.* Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). Each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.

FPN No. 1: See Annex B, Table B.310.11, for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.

FPN No. 2: See 366.23(A) for adjustment factors for conductors in sheet metal auxiliary gutters and 376.22(B) for adjustment factors for conductors in metal wireways.

Exception No. 1: Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the ~~derating~~ adjustment factors shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).

Exception No. 2: *[unchanged by this Proposal]*

Exception No. 3: ~~Derating~~ Adjustment factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).

Exception No. 4: ~~Derating~~ Adjustment factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.

[remainder of 310.15(B) unchanged by this Proposal]

Table 310.15(B)(2)(a) Adjustment Factors for More Than Three Current-Carrying Conductors in a Raceway or Cable

[Table 310.15(B)(2)(a) title shown for CMP reference. Table 310.15(B)(2)(a) unchanged by this Proposal]

Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".

366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(2) Adjustment Factors.
(a) More than Three Current-Carrying Conductors in a Raceway or Cable. Where the number of current-carrying conductors in a raceway or cable exceeds three, or where single conductors or multiconductor cables are installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) and are not installed in raceways, the allowable ampacity of each conductor shall be reduced as shown in Table 310.15(B)(2)(a). Each current-carrying conductor of a paralleled set of conductors shall be counted as a current-carrying conductor.

Where conductors of different systems, as provided in 300.3, are installed in a common raceway or cable, the ~~derating~~ adjustment factors shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors (Articles 210, 215, 220, and 230).

FPN No. 1: See Annex B, Table B.310.11, for adjustment factors for more than three current-carrying conductors in a raceway or cable with load diversity.

FPN No. 2: See 366.23(A) for adjustment factors for conductors in sheet metal auxiliary gutters and 376.22(B) for adjustment factors for conductors in metal wireways.

The following adjustments shall be permitted for the conductors and installation methods listed in (1) through (4):

(1) For conductors installed in cable trays, the provisions of 392.11 shall apply.

(2) ~~Derating~~ Adjustment factors shall not apply to conductors in nipples having a length not exceeding 600 mm (24 in.).

(3) ~~Derating~~ Adjustment factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.

(4) Adjustment factors shall not apply to Type AC cable or to Type MC cable without an overall outer jacket under the following conditions:

(a) Each cable has not more than three current-carrying conductors.

(b) The conductors are 12 AWG copper.

(c) Not more than 20 current-carrying conductors are bundled, stacked, or supported on "bridle rings."

A 60 percent adjustment factor shall be applied where the current-carrying conductors in these cables that are stacked or bundled longer than 600 mm (24 in.) without maintaining spacing exceeds 20.

Panel Statement: The panel accepts the proposed text change of "derating" to "adjustment,"but the change should be made to the accepted text from Proposal 6-60.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-63 Log #3063 NEC-P06 **Final Action: Accept**
(310.15(B)(2)(a) Exception No. 3)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
Exception No. 3: Derating factors shall not apply to conductors in raceways ~~nipples~~ having a length not exceeding 600 mm (24 in.).
Substantiation: There is much debate as to whether or not a nipple can be a raceway that is not straight. This proposal clarifies that any raceway less than 24 in. is exempt from the ampacity adjustments required by this section.
Panel Meeting Action: Accept
Panel Statement: The panel accepts the proposed text change but the change should be incorporated to the changes made by proposal 6-60.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:

KENT, G.: I agree with the action, but would have preferred having left the word 'nipple' and added the words 'and raceways'.

6-64 Log #2312 NEC-P06 **Final Action: Reject**
(310.15(B)(2)(a), Exception No. 6)

Submitter: Mike Green, Municipality of Anchorage
Recommendation: Add Exception No. 6 to read as follows:

Exception No. 6: Where the load is divided among multiple conductors of the same circuit and phase supplying different loads, they shall be permitted to be counted as one conductor for derating purposes where all of the conductors are identified by circuit.

Substantiation: This proposal is based on the same principal that allows the neutral of single phase multi-wire branch circuits to be ignored when counting current carrying conductors.

Since the heat produced in a conductor is the square of the current, the total heat will always be reduced when the current is divided among multiple conductors. Requiring the conductors to be identified by circuit is necessary to verify the proper application of the exception.

Luminaires have become so efficient that dozens of them can be supplied by a single 20 amp branch circuit and new energy codes will require more appropriate control of individual areas resulting in control panels with many switch legs from the same circuit. This exception will reduce the unnecessary oversizing of conductors in raceways connected to those panels and to enclosures with multiple switches.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with the submitter's substantiation. There was no evidence of any need or problem addressed by the substantiation. Conductors connected to the same circuit and supplying different loads are, in fact, current-carrying conductors and need to be counted when applying 310.15(B)(2)(a).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-65 Log #2228 NEC-P06 **Final Action: Reject**

(Table 310.15(B)(2)(a), FPN No. 1, and Table 310.11)

Submitter: Stephen E. Ormsby, Ormsby Electric, Inc.

Recommendation: Revise text to read as follows:

Table 310.15(B)(2)(a) ~~FPN No. 1, Table B.310.11~~ (Annex B).

Substantiation: There is no definition of load diversity. The improper application of Table B.310.11 has caused many problems. Designers and installers are using this section of the code with their own interpretation of what load diversity is. Conduits and wireways are overfilled and extreme heating is taking place. With the higher insulation values of conductors and applying adjustment factors, it is not necessary to include load diversity in Annex B.

Panel Meeting Action: Reject

Panel Statement: The submitter provided no documented substantiation. The absence of a definition of load diversity is not adequate substantiation to remove the FPN.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-66 Log #2751 NEC-P06 **Final Action: Accept**

(310.15(B)(2)(c))

Submitter: Travis Lindsey, Travis Lindsey Consulting Services

Recommendation: Revise text to read as follows:

310.15(B)(2)(c) ~~Conduits~~ <u>Circular Raceways</u> Exposed to Sunlight on Rooftops

Where conductors or cables are installed in ~~conduits~~ <u>circular raceways</u> exposed to direct sunlight on or above rooftops, the adjustments shown in Table 310.15(B)(2)(c) shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.16 and Table 310.18.

Substantiation: This proposal is intended to clarify the use of the term "conduit", as used in the accepted 2008 NEC proposal, to include all types of circular raceways. Original testing was performed using electrical metallic tubing and other raceways. The term "conduit" is not defined in the NEC. This proposal will ensure that both of these constructions are understood to be included. The term circular raceways will cover all wiring methods tested.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

HUDDLESTON, JR., R.: The Panel should have rejected this Proposal. If changes were needed to include EMT as conduit, a Proposal should have been submitted to Panel 8 to mention the very common trade name of EMT (thinwall conduit).

HUNTER, R.: The research isn't complete and has had no insulation failures reported. It has not had third party substantiation, and has been very limited as to type of wiring methods tested. There are other wiring methods which may be used on rooftops that haven't been addressed. Inspectors who I checked with that work in the southwestern United States haven't witnessed any rooftop failures due to insulation deterioration.

Comment on Affirmative:

KENT, G.: The submitter needed a broader range of test to eliminate 'cables'

6-67 Log #2820 NEC-P06 **Final Action: Reject**

(310.15(B)(2)(c))

Submitter: Travis Lindsey, Travis Lindsey Consulting Services

Recommendation: Revise text to read as follows:

310.15(B)(2)(c) Conduits <u>and Cables</u> Exposed to Sunlight on Rooftops.

Where conductors <u>in conduits or cables are installed</u> ~~or cables are installed in conduits~~ exposed to direct sunlight on or above rooftops, the adjustments shown in Table 310.15(B)(2)(c) shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.16 and Table 310.18.

Substantiation: Recent research shows that where cables were installed over roof surfaces, these cables exhibited similar characteristics due to solar heat gain to that of Electrical Metallic Tubing and other raceways previously tested.

Please see the documentation I have provided.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The term "cables" is too general for this requirement. The testing described in the substantiation was performed using MC cable only, and not other types of cable. Testing on MC cables is not representative of all cables. In order for the term "cables" to be added at this stage, testing would have to be completed on all types of cables. Otherwise, the proposal would need to be more specific.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 9 Negative: 2

Explanation of Negative:

FRIEDMAN, S.: This proposal should have been "Accept". The submitter of this proposal is the same person that submitted the 2008 proposal to require ambient temperature correction for conductors in *conduits* on rooftops. The Panel accepted that proposal although not all conduits were tested. This cycle, the Panel rejected this proposal to include cables because not all cables were tested. The submitter's substantiation states that *"temperatures inside RNC raceways tend to be hotter than in EMT raceways and that black MC cables are comparable to RNC, except directly on the roof where the MC is hotter."* These two contrary actions improperly impose different restrictions on different types of wiring methods, which according to the substantiation, are subject to the same need for ambient temperature correction.

ZIMNOCH, J.: This should have been an Accept in Principle and changed to "Type MC cables" in lieu of "cables" since data was submitted for Type MC cables.

6-68 Log #3149 NEC-P06 **Final Action: Reject**

(Table 310.15(B)(2)(c))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered relative to the use of the terms "conduit" and "raceway" and correlated with the action taken on Proposal 6-66.

This action will be considered by the panel as a public comment.

Submitter: Richard E. Loyd, Sun Lakes, AZ

Recommendation: Revise as follows:

Table 310.15(b)(2)(c) Ambient Temperature Adjustment for <u>Conductors in</u> ~~Conduits~~ <u>Raceways or Cables</u> ~~E~~ exposed to Sunlight On or Above Rooftops

Distance Above Roof to Bottom of ~~Conduit~~ <u>raceway or cable</u>

Substantiation: The title indicates adjustment of the conduit, but it should apply to the enclosed conductors and not the wiring method. This proposal is to clarify the intent of the Table. I have added "cables" since the same problems from temperature increase exists in all raceways and cables as it does for conduits, direct sunlight will radiate the same temperature increase in all enclosures both metallic and nonmetallic.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: No technical substantiation was submitted to support the inclusions of "raceways'" as a general term versus 'conduits' nor to include "cables".

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

ZIMNOCH, J.: The panel was correct in rejecting the term "raceway as no data was submitted for this installation type.

6-69 Log #3334 NEC-P06 **Final Action: Reject**

(310.15(B)(2)(c))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered relative to the use of the terms "conduit" and "raceway" and correlated with the action taken on Proposal 6-66.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

Conduits Exposed to Direct Sunlight on Rooftops. Where ~~conductors or~~ cables or conductors ~~are~~ installed in ~~conduits~~ <u>raceways or other enclosures, or in cable trays</u>, exposed to direct sunlight on or above roof tops the adjustments shown in Table 310.15(B)(2)(c) shall be added...(remainder unchanged).

Substantiation: This provision should not be limited to conductors or cables installed in conduits. Conductors in other enclosures are also affected by direct sunlight.

Panel Meeting Action: Reject

Panel Statement: No technical substantiation was submitted to support the inclusions of "raceways" as a general term versus "conduits'" nor to include "enclosures" or "cable trays".

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-70 Log #4090 NEC-P06 **Final Action: Reject**
(310.15(B)(2)(c) and FPN, and Table 310.15(B)(2)(c) and FPN)

Note: This proposal is reported as "Reject" as it did not receive the 2/3 affirmative vote.
TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Delete Section 310.15(B)(2)(c) and associated FPN. Delete Table 310.15(B)(2)(c) and associated FPN.
Substantiation: The 2008 NEC adopted the text under (c) because of testing performed in the Nevada desert in the heat of the summer by the Copper Development Association, which indicated that wiring in conduits that run across rooftops can get warm. It mandates adjustments to the ambient temperature correction factors found at the bottom of Table 310.16. No actual field data was provided which indicated that wiring was being damaged due to rooftop conduit installations - only simulated test data was provided. The study was based on a limited range of conduit sizes and only included individual conductors inside the conduit - no multi-conductor cable was tested. Roof pitch and roof color were not considered. Despite the limitations of the testing that was conducted by an organization that directly benefitted form the results, the Proposal that the panel accepted in the 2005 cycle requires adjusting the ampacity of conductors within 1/2 in. of roofs to 33 percent of the Table 310.16 ampacity. 33 percent! This is despite the fact that no evidence was provided to indicate that this was a problem in the "real world". None of the tests were independently verified, so the organization that directly benefitted from larger copper conductors provided the testing data, and the Code Panel accepted it. In essence, the new text changes the long established definition of ambient temperature with no real justification, as there were no examples given to the Panel during the 2005 cycle where real world failures had occurred in roof top installations due to overheating.
Panel Meeting Action: Reject
Panel Statement: Technical substantiation was provided during the 2008 code cycle to support the ambient adjustment factors to conduit exposed on rooftops. This testing proved to the panel's satisfaction that the adjustments are required. The testing was based on the temperature readings, not on the location. The adjustment factors noted are based on raised ambient temperatures based on the tables. It is the elevated ambient temperature that affects the long-term aging of the conductor. Additional testing and technical substantiation has been provided in Proposal 6-67 during the 2011 cycle to support the application of the adjustment factors.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 7 Negative: 4
Explanation of Negative:
HUDDLESTON, JR., R.: The Panel should have accepted this Proposal, and realized that the decision in the last cycle to include additional temperature correction factors for conduits installed above rooftops was based on research paid for by the Copper Development Association, the organization who benefits most from the larger conductors it requires. Panel decisions should always be based on research performed by non-partial, independent laboratories and preferably Nationally Recognized Testing Laboratories.
HUNTER, R.: I agree with the submitter's substantiation.
MCCLUNG, L.: Oppose the Panel Action with the following comment:
Test data provided only a single data point and does not support industry experience.
Present wording in the Code is adequate to direct the qualified user to make appropriate adjustments to the ampacity for the temperature of its installation (for example, conduits on rooftops). Industrial users have been applying appropriate conductors safely and reliably for many years in these applications. No reputable field failure data was submitted to support the results of the experimental testing. The data submitted to the Panel covered one site specific application where it was recognized that the intense sunlight had immediate effect on the temperature rise in the conduit. Recognizing that the conductor temperature adders found in Table 310.15(B)(2)(c) are based on solar radiation of a single site tested condition, it is conceivable that impingement angle of the sun, roofing material and color, wind speed, atmosphere conditions, etc., will vary with location, thus directly affecting the ambient temperature and its associated ampacity. Additional site testing should be performed before making such a drastic change to the Code (i.e., a 60 A load that has normally been wired using a #6 AWG, 90 Deg C wire would require a #2 AWG, 90 Deg C wire). Such a drastic change would result in a mismatch of conductor and terminal sizing unless a reducer lug or splice is inserted at or prior to the termination
WALL, C.: I am voting negative. Based on the submitted substantiation, I would like to see peer review and tabulation or real world failures that justify the use of the temperature adjustment factors for conductors in conduit on roof tops.
Comment on Affirmative:
CLINE, S.: The work done in the past cycle by both the submitter and by the panel was lengthy and detailed, and the decision arrived at was carefully thought out. Nothing given by the submitter justifies changing it.
ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-71 Log #461 NEC-P06 **Final Action: Accept in Principle in Part**
(310.15(B)(2)(c) and Table 310.15(B)(2)(c))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 6-66.
This action will be considered by the panel as a public comment.
Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Revise text to read as follows:
(c) ~~Conduits~~Raceways and Cables Exposed to Sunlight on Rooftops. For~~Where~~ conductors ~~or cables are~~ installed in raceways and cables ~~conduits~~ exposed to direct sunlight on or above rooftops, the adjustments shown in Table 310.15(B)(2)(c) shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.16 and Table 310.18.
Note: The following changes are proposed to the Table:
Table 310.15(B)(2)(c) Ambient Temperature Adjustment for Raceways and Cables ~~Conduits~~ Exposed to Sunlight On or Above Rooftops
Distance Above Roof to Bottom of Raceways or Cables~~Conduit~~.
Substantiation: As presently worded, this section and Table only applies to conduits; however, the section mentions conductors and cables. The requirement should apply consistently to raceway and cable systems - not just conduits. At least that would appear to be the original intent of the proposal and the section. Since this code section was new to the '08 NEC, not including all raceways and cables was likely an oversight. Obviously, the ambient conditions on the conductor in the given location should be similar regardless of if the conductors are installed in a raceway or cable system. For consistency, the requirements of this section and Table should apply to all raceway and cable systems installed exposed to direct sunlight on or above rooftops.
Panel Meeting Action: Accept in Principle in Part
The panel accepts the deletion of "where" but makes a substitution of "when" rather than "for".
The panel rejects all other proposed changes.
Panel Statement: No technical substantiation was submitted to support the inclusions of "raceways and cables" as a general term versus "conduits" nor to include "cables". The change from "where" to "when" complies with the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-72 Log #462 NEC-P06 **Final Action: Accept in Principle in Part**
(310.15(B)(2)(c) and Table 310.15(B)(2)(c))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 6-66.
This action will be considered by the panel as a public comment.
Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Revise text to read as follows:
(c) ~~Conduits~~Raceways and Cables Exposed to Sunlight on ~~Rooftops~~Outdoor Surface. For~~Where~~ conductors ~~or cables are~~ installed in raceways and cables~~conduits~~ exposed to direct sunlight on ~~or above rooftops~~outdoor surfaces, the adjustments shown in Table 310.15(B)(2)(c) shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.16 and Table 310.18.
Table 310.15(B)(2)(c) Ambient Temperature Adjustment for Raceways and Cables~~Conduits~~ Exposed to Sunlight On ~~or Above Rooftops~~Outdoor Surfaces
Distance ~~Above Roof~~From Outdoor Surface to Bottom of Raceways or Cables~~Conduit~~.
Substantiation: As presently worded, this section and Table only applies to conduits; however, the section mentions conductors and cables. The requirement should apply consistently to all raceway and cable systems — not just conduits. At least that would appear to be the original intent of the proposal and the section. Since this code section was new to the '08 NEC, not including all raceways and cables was likely an oversight. Obviously, the ambient conditions on the conductor(s) in the given location should be similar regardless of if the conductors are installed in a raceway or cable system. For consistency, the requirements of this section and Table should apply to all raceway and cable systems installed exposed to direct sunlight on or above rooftops. An additional change to this section and table recommends that the requirement apply to all raceways and cables installed outdoors exposed to sunlight. Common sense would seem to dictate that a raceway or cable installed on the side of a building wall or on a concrete surface at grade level would be subject to similar ambient temperature conditions as those installed on a rooftop. The same justification that was used to require this change in the code for conduits on a rooftop location can be used for an outdoor location. Solar exposure basically has the same effect on a raceway or cable regardless of the location being a rooftop or exterior (outdoor) wall location. This change is also intended to promote consistency in the application of the requirement.

Panel Meeting Action: Accept in Principle in Part

The panel accepts the deletion of "where" but makes a substitution of "when" rather than "for". The panel rejects all other proposed changes.

Panel Statement: No technical substantiation was submitted to support the inclusions of "raceways and cables" as a general term versus "conduits" nor to include "cables" or "outdoor surfaces". The term 'outdoor surfaces' is too all-inclusive. The change from "where" to "when" complies with the NEC Style Manual.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-73 Log #2242 NEC-P06 **Final Action: Reject**

(310.15(B)(2)(c) and Table 310.15(B)(2)(c))

Submitter: Richard E. Loyd, Sun Lakes, AZ

Recommendation: Revise as follows:

(c) Conduits <u>or cables</u> ~~E~~ <u>exposed</u> to Sunlight on Rooftops. Where conductors are installed in conduits <u>or cables</u> exposed to direct sunlight on or above rooftops, the adjustments shown in Table 310.15(B)(2)(c) shall be added to the outdoor temperature to determine the applicable ambient temperature for application of the correction factors in Table 310.16 and Table 310.18, and, Table 310.15(B)(2)(c) Ambient Temperature Adjustment for Conduits <u>or cables</u> <u>E</u>-exposed to Sunlight On or Above Rooftops. Distance Above Roof to Bottom of Conduit <u>or Cable.</u>

Substantiation: The fire and safety issues related to exposure to direct sunlight are identical for both wiring methods. Cables exposed to sunlight on rooftops cannot dissipate heat as well as a conduit since the inside of conduit contains room for air movement whereas the cable does not. Also, many cables designed for outdoor use have an impervious nonmetallic jacket which will exacerbate the dissipation of heat further.

The change will eliminate an inconsistency in requirements and will assure safe performance of these circuits located on rooftops.

Panel Meeting Action: Reject

Panel Statement: No technical substantiation was submitted to support the inclusion of "cables" as a general term in addition to "conduits".

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-74 Log #2525 NEC-P06 **Final Action: Reject**

(310.15(B)(2)(c))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise wording as follows:

FPN to Table 310.15(B)(2)(c): The temperature adders in Table 310.15(B)(2)(c) are based on ~~the results of averaging~~ <u>the measured temperature rise above the local climatic ambient temperatures due to sunlight heating. These adders should be applied to the highest expected 3-hour operating temperature referenced in 310.15(B)(2)(c) FPN.</u>

Substantiation: The FPN to Table 310.15(B)(2)(c) inaccurately states that the table is based on the results of averaging ambient temperatures. In fact, the table simply establishes the temperature adder to be applied to the highest expected 3-hour operating temperature. A revised <u>310.15(B)(2)(c) FPN</u> clearly states a source for this very data. The FPN in 310.15(B)(2)(c) of the *2008 NEC* is one of the only references to a temperature data source. Unfortunately, the reference inaccurately specifies "the average ambient temperature," rather than a statically valid operating temperature. Of all the data provided by the tables in the ASHRAE Handbook—Fundamentals, the 2% Monthly Design Dry Bulb Temperature most closely matches the concerns of the *National Electrical Code* by establishing a statistically valid, 3-hour operating temperature value to use for any table that establishes high temperature correction factors.

Panel Meeting Action: Reject

Panel Statement: It is not the intent of the code wording that the ambient temperature adjustment be applied to the highest expected 3-hour operating temperature.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-75 Log #2526 NEC-P06 **Final Action: Reject**

(310.15(B)(2)(c), FPN)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise wording as follows:

FPN to 310.15(B)(2)(c): FPN: One source for the highest expected 3-hour average ambient temperatures in various locations is the highest month 2% Monthly Design Dry Bulb Temperature from the ASHRAE Handbook - Fundamentals.

Substantiation: The FPN to Table 310.15(B)(2)(c) inaccurately states that the table is based on the results of averaging ambient temperatures. In fact, the table simply establishes the temperature adder to be applied to the highest expected 3-hour operating temperature. A revised <u>310.15(B)(2)(c) FPN</u> clearly states a source for this very data. The FPN in 310.15(B)(2)(c) of the *2008 NEC* is one of the only references to a temperature data source. Unfortunately, the reference inaccurately specifies "the average ambient temperature," rather than a statistically valid highest expected 3-hour temperature. Of all the data provided by the tables in the ASHRAE Handbook—Fundamentals, the 2% Monthly Design Dry Bulb Temperature most closely matches the concerns of the *National Electrical Code* by establishing a statistically valid, 3-hour operating temperature value to use for any table that establishes high temperature correction factors.

Panel Meeting Action: Reject

Panel Statement: It is not the intent of the code wording that the ambient temperature adjustment be applied to the highest expected 3-hour operating temperature.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

ZIMNOCH, J.: See My Affirmative with Comment on 6-68.

6-76 Log #1641 NEC-P06 **Final Action: Accept**

(310.15(B)(2), FPN 1)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "Table B.310.11" to "Table B.310.15(B)(2)(11)".

Substantiation: This revision will correlate with the proposal to revise the table designation of Tables B.310.1 through B.310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and the figure designations of Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).

Panel Meeting Action: Accept

Change "Table B.310.11" to "Table B.310.15(B)(2)(11)".

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-77 Log #2531 NEC-P06 **Final Action: Accept**

(310.15(B)(2) Exception No. 1, 3, and 4)

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Revise text to read as follows:

[310.15(B)] "**(2) Adjustment Factors. (a) …**Exception No. 3: ~~Derating Factors~~ <u>Adjustment factors</u> shall not apply to conductors in nipples having a length not exceeding 600mm (24 in.)." -- **ALSO SEE--**

"Exception No. 4: ~~Derating factors~~ <u>Adjustment factors</u> shall not apply to underground conductors…" -- **SEE ALSO--**

"Exception No. 1: …, the ~~derating factors~~ <u>adjustment factors</u> shown in Table 310.15(B)(2)(a) shall apply only to the number of power and lighting conductors…".

Substantiation: The titles of section 310.15(B)(2) and of Table 310.15(B)(2)(a) use the term "**adjustment factors**," which is also repeated in this section in Exception No. 5 and elsewhere in the NEC. Since conductor sizing can be influenced by not only "adjustment" for conductor grouping but also "temperature correction" considerations and increases for voltage drop compensation, it would be helpful to maintain the same terminology throughout the NEC to ensure code users are applying the rules correctly in a relative absence of confusion due to inconsistent word use. Acceptance of this proposal will enhance code clarity for all code users, especially those new to the industry.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-78 Log #4742 NEC-P06 **Final Action: Accept in Part**

(310.15(B)(2) Exception No. 2)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 8 for information.

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

Exception No. 2: For conductors installed in cable trays, the provisions of 392.~~11~~ <u>64, and conductors with cablebus the provisions of 370.4(B)</u> shall apply.

Substantiation: This change of the reference 392.11 (ampacity) to 392.22 is due to a rewrite for he cable tray article and if accepted will be the new number identifier. For the change to add cablebus is a result if conductors that are supported on blocks and maintaining spacing the same rules for conductor ampacity can be applied that are allowed for cable tray installations. There would also be no necessity for derating due to design that maintains a minimum one conductor spacing from surrounding conductors.

Panel Meeting Action: Accept in Part

The panel accepts the change of reference 392.11 to 392.64 and rejects all other proposed changes.

Panel Statement: This panel action is subject to acceptance of the Section 392 rewrite by Panel 8. The additional phrase is unnecessary in the exception because the cablebus case is covered in 310.15(B)(2)(a).
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-79 Log #4743 NEC-P06 **Final Action: Reject**
(310.15(B)(2) Exception No. 4)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
Exception No. 4: Derating factors shall not apply to underground conductors entering or leaving an outdoor trench if those conductors have physical protection in the form of rigid metal conduit, intermediate metal conduit, or rigid polyvinyl chloride ~~nonmetallic~~ conduit (PVC), high density polyethylene conduit (HDPE), or reinforced thermosetting resin conduit (RTRC) having a length not exceeding 3.05 m (10 ft) and if the number of conductors does not exceed four.
Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of “nonmetallic” and add in each of the specific raceway types. Non-metallic conduit now has four different types of raceways and not all non-metallic raceway types would be acceptable in all locations.
Panel Meeting Action: Reject
Panel Statement: This section does not determine the type of conduit to be used. It references adjustments for the conductors within them. The present language deals with all types of rigid nonmetallic conduits and adding the specific types, as proposed by the submitter, is not necessary.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-80 Log #265 NEC-P06 **Final Action: Accept**
(310.15(B)(2)(a) Exceptions)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise the exceptions to 310.15(B)(2)(a) as shown:
In Exceptions No. 1, 3, and 4, change “derating” to “adjustment” with the appropriate capitalization.
Exception No. 5(3) Not more than 20 current-carrying conductors are installed without maintaining spacing, ~~bundled~~ stacked, or supported on “bridle rings.”
In the last paragraph of Exception No. 5, change as follows: “A 60 percent adjustment factor shall be applied where the current-carrying conductors in these cables that are stacked or ~~bundled~~ installed without maintaining spacing for a continuous length longer than 600 mm (24 in.) ~~without maintaining spacing~~ exceeds 20.”
Substantiation: Table 310.15(B)(2)(a) provides “adjustment” factors rather than “derating” factors and the change in terminology will provide consistency with the table titles.
This change in terminology from “bundled” clarifies the intent without changing any requirements and eliminates the confusion of multiple definitions of “bundled” used in other sections of the Code. It is also consistent with similar changes made in the 2008 Code.
Panel Meeting Action: Accept
Panel Statement: The changes are intended to be editorial only for clarification, without change to the requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-81 Log #3335 NEC-P06 **Final Action: Reject**
(310.15(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: except as otherwise provided in Table 310.21,
Substantiation: Correlation with Table 310.21.
Panel Meeting Action: Reject
Panel Statement: 310.15(B)(3) applies when bare or covered conductors are installed with insulated conductors. Table 310.21 applies to bare or covered conductors in free air and does not include insulated conductors.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-82 Log #415 NEC-P06 **Final Action: Reject**
(310.15(B)(3)(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “for each”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The panel does not understand the proposal since 310.15(B)(3)(b) does not appear in the 2008 NEC. The submitter agrees with this action.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-83 Log #999 NEC-P06 **Final Action: Reject**
(310.15(B)(3) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add Exception: This provision shall not apply to overhead spans of open individual conductors installed in accordance with minimum spacings between conductors specified in 225.14 or Table 230.5(C).
Substantiation: Open individual conductors in free air should be excluded.
Panel Meeting Action: Reject
Panel Statement: 310.15(B)(3) applies when bare or covered conductors are installed with insulated conductors and does not apply to overhead spans of open individual conductors. Specifically, open individual conductors in free air are already excluded in this section.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-83a Log #CP602 NEC-P06 **Final Action: Accept**
(310.15(B)(6))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action on Proposal 6-85.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 6,
Recommendation: Revise text as follows:
(6) 120/240-Volt, Single-Phase Dwelling Services and Feeders.
(a) For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, single-phase, service-entrance conductors and service-lateral conductors~~, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder between the main disconnect and the panelboard that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit~~.
(b) ~~The f~~Feeder conductors ~~to~~ for a dwelling unit, after adjustments and corrections, shall not be required to have an ~~allowable~~ ampacity rating greater than the Table 310.15(B)(16) allowable ampacity of ~~their~~ the service~~-entrance~~ conductors.
(c) The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, and 230.42 are met.
Substantiation: Based on the substantiations provided in proposals 6-88, 6-90, 6-91, and 6-92, the Panel developed this proposal to revise section 310.15(B)(6) and clarify the intent of the requirements for feeder sizing and improve readability. In addition, note that the table numbering in the new text reflects actions taken by the Panel on proposal 6-52.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
CLINE, S.: The Chairman realizes that he missed a catch he should have made:
The change of 6-83a, requires that the title and heading of Table 310.15(B)(6) be edited. The text of the change eliminates the direct connection of using Table 310.15(B)(6) to size feeders. Therefore the terms “ and Feeders” in the title, and “ or Feeder” in the heading should be deleted.
The end of the first sentence of the table title should read: “... Single-Phase Dwelling Services.”
The left-column heading of the table should read: “Service Rating (Amperes)”
In addition, since the connection from the text to the table is specific to new list item (a) {rather than the whole of 310.(B)(6)}, “(a)” should be added to the name to become: Table 310.15(B)(6)(a). This change requires that the table’s name in the text in (a) of the Proposal action itself also needs to be edited from Table 310.15(B)(6) to Table 310.15(B)(6)(a).
These changes are believed to be editorial only, and staff may be able to make the corrections on their own, but your evaluation is requested. Thank you.
THOMPSON, J.: Agree with the intent to resolve the concerns contained in proposals 6-88, 90, 91 and 92. However, it is not clear that 83a accomplishes the intention and should be further reviewed during the comment stage.

6-84 Log #226 NEC-P06 **Final Action: Reject**
(310.15(B)(6))

Submitter: Don A. Hursey, Durham County Inspections Department
Recommendation: Also include "120/208 volt, 4 wire three phase for single family dwelling services and feeders.
Substantiation: Many services for multifamily apartment buildings have 120/208 volt 3 phase services.
Panel Meeting Action: Reject
Panel Statement: The original data that was used to establish 310.15(B)(6), formally Note 3, was actual utility company data for 120/240 volt 3-wire single phase systems. It established that the conductors specified in the table could be used on a calculated dwelling unit load as shown. The submitter has not provided any technical data to show that this is true for 120/208 4-wire three phase systems.
Finally, the submitter did not follow the correct procedure and did not submit specific language to the Panel.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-85 Log #1695 NEC-P06 **Final Action: Accept in Principle in Part**
(Table 310.15(B)(6))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action on Proposal 6-83a.
This action will be considered by the panel as a public comment.
Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise text to read as follows:
310.15 Ampacities for Conductors Rated 0-2000 Volts.
(B) Tables.
(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and 4-wire Feeders. For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), are permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service-lateral conductors, and 4-wire feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with ~~or without~~ an equipment grounding conductor. [the remainder is unchanged].
Substantiation: By adding the term "4-wire" before the word "feeders" in the title and adding "4-wire" before the words "feeder conductors" in the first paragraph, it will be clear that feeders between a pole service and a dwelling are not permitted to be 3-wire.
Delete the words "or without" before the phrase "an equipment grounding conductor". This will correlate with the 4-wire reference added to the previous text.
Panel Meeting Action: Accept in Principle in Part
1. Revise text to read as follows:
310.15 Ampacities for Conductors Rated 0-2000 Volts.
(B) Tables.
(6) 120/240-Volt~~, 3-Wire,~~ Single-Phase Dwelling Services and Feeders. For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), are permitted as 120/240-volt~~, 3-wire,~~ single-phase service-entrance conductors, service-lateral conductors, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable ~~with or without an equipment grounding conductor.~~ [the remainder is unchanged].
2. Delete "3-wire" from title of Table 310.15(B)(6).
Panel Statement: The panel is of the opinion that it is not necessary to add the words "4-wire" before the word "feeder" in the paragraph because the requirements found in 250.32 mandate whether 3 or 4 wires are required to be installed. In addition, the phrase "3-wire" is not needed because it is not required to describe the service.
The panel does agree that the word "without" should be deleted. However, the panel believes the entire phrase "with or without an equipment grounding conductor" that appears after the word "cable" should be eliminated.
The title of Table 310.15(B)(6) removes the phrase "3-wire" to correlate with the changes in the section.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-86 Log #1732 NEC-P06 **Final Action: Reject**
(310.15(B)(6))

Submitter: Charles E. Beck, Affiliated Engineers NW, Inc.
Recommendation: Insert after the second sentence, which ends with "... associated with the dwelling unit." "Use of paralleled conductors as a substitute for the conductor sizes shown in this table, or to supply larger service or feeder loads than those shown in this table, shall not be permitted. The feeder conductors to a dwelling unit shall not be required...".
Substantiation: This change would clearly declare that Table 310.15(B)(6) cannot be adapted to suit the user's design preferences.
310.4 tells us that paralleling conductors is allowable, under certain conditions. But it does not tell us what changes take place, when we do so. It is commonly presumed that two parallel conductors (In separate raceways) will have twice the ampacity of either conductor alone. But, Table 310.15(B)(6) is not about ampacity. The values for amperes shown in the left-hand column are not ampacity values, but rather are load values.
Table 310.15(B)(6) allows for the use of conductors in situations that exceed their ampacity values as given in Table 310.16. For example, a 2/0 copper conductor with 75C insulation has an ampacity of 175 amps, yet it can be used for a 200 amp service. That represents a 25 amp difference between the conductor's ampacity and the load it will carry. That difference becomes 50 amps, when you use two in parallel. Absent any proof that the additional burden will not harm the conductor, and particularly noting that the user has no knowledge of the design basis that lies behind this Table, the user should not be allowed to presume that a pair of 2/0 conductors will be sufficient for a service of 400 amps.
Panel Meeting Action: Reject
Panel Statement: The submitter is incorrect in his assumption that the conductors in 310.15 (B)(6) are not permitted to be paralleled in accordance with 310.4. The conductor ampacities listed in 310.15(B)(6) are based on the diversity of the total load of an individual dwelling. This means that the conductors of a 120/240-volt, single-phase dwelling service or feeder with a calculated load of 200 amps will never carry 200 amps. Due to this fact, the language and table in 310.15(B)(6) will permit the use of a 2/0 conductor, which has an ampacity of 175 amps in the 75 degree C column. The same theory applies to the conductors of a service or feeder with a calculated load of 400 amps. Section 310.15(B)(6) will permit the use of a 400 kcmil conductor that would only have an ampacity of 335 amps in the 75 degree C column to be used for a 400 amp service or feeder. When two 2/0 conductors are installed in parallel for the same 400 amp installation the combined ampacity is 350 amps, which is 15 amps more than that of a 400 kcmil conductor.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-87 Log #2317 NEC-P06 **Final Action: Reject**
(310.15(B)(6))

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Delete subsection 310.15(B)(6) including the table.
Substantiation: The ampacities allowed in this subsection have become the general rule for conductor ampacity in most peoples minds and has been modified over the last several code cycles to clarify when table 310.15(B)(6) applies and when it doesn't. The source of confusion is the basic concept that a conductor can have two different ampacities based on load diversity. That idea defies physics and common sense. A conductor's ampacity should only be based on the temperature rating of the insulation and terminations and those conditions that affect heat dissipation. Load diversity affects the calculated load not the conductor ampacity. This proposal has a companion proposal to Article 220 which would reduce the load calculation by 10% as an alternative to this table.
Panel Meeting Action: Reject
Panel Statement: The language in this section, along with the table, has been in the code for many years and, as the submitter states, has been modified to provide more clarity over the past several cycles. When appropriately applied, there has been no evidence that the sizing of the conductors shown in the table creates a problem. Table 310.15(B)(6) deals with service loads, not with ampacities.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-88 Log #3064 NEC-P06 **Final Action: Accept in Principle**
(310.15(B)(6))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service-lateral conductors, and feeder conductors that serve as the main power feeder(s) to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder between the main disconnect and the panelboard(s) ~~that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit~~. The feeder conductors to a dwelling unit shall not be required to have an allowable ampacity rating greater than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, and 230.42 are met.
Substantiation: This proposal changes this section back to the 2005 code language. Requiring the feeder to serve the entire load in order to use this section simply does not make sense. For example, consider a 200A service for a dwelling. If the installation consists of a single 200A breaker, 200A feeder and 200A panel, the user can use this section. If the air conditioners for this house are removed from the 200A panel and put outside at the service equipment, there is now less load on the feeder conductors, yet the according to the 2008 revision to this rule, I must now make the conductors larger to serve a smaller load! Obviously this doesn't make sense.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-83a.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-89 Log #3493 NEC-P06 **Final Action: Reject**
(Table 310.15(B)(6))

Submitter: Mike Theisen, Midwestern Electrical Seminars
Recommendation: Delete Type SE cable and USE from the heading of the table in order to correlate with the 2008 NEC changes to Article 338.

Table 31015(B)(6) Conductor Types and Sizes for 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. Conductor Types RHH, RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, XHHW, XHHW-2, ~~SE, USE, USE 2.~~

Substantiation: In Table 310.16, the 60 degree “C” ampacity of Type SE cables and USE conductors is substantially lower than the ampacities permitted when applying Table 310.15(B)(6). Considering that interior feeders can be routed within insulating material, just makes a bad situation worse. 338.10(B)(4) requires interior installation of Type SE cable to comply with Part II of Article 334, which limits the ampacity of the cable to the 60 degree “C” column in Table 310.16. 338.12(B)(1) prohibits USE for interior wiring and where USE cable is installed underground they must comply with Part II of Article 340, which limits the ampacity of the USE cable to the 60 degree “C” column in Table 310.16.
Panel Meeting Action: Reject
Panel Statement: Service-entrance cables are listed and designed for the types that are proposed to be rejected. The substantiation for this proposal is incorrect and is not justified.
SE, USE, -2 are rated based on the insulation of the internal conductors. The internal conductors are rated a minimum of 75C. The surface of the SE is marked with the type letter NEC designations of the individual conductors so that they will always be either 75C or 90C (USE-2 is 90C minimum) (SE and USE is 75C minimum).
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-90 Log #3920 NEC-P06 **Final Action: Accept in Principle**
(310.15(B)(6))

Submitter: George M. Stolz, II, Pierce, CO
Recommendation: Revise text as follows:

Conductors shall be permitted to be connected to equipment rated according to Table 310.15(B)(6) when the installation complies with all of the following conditions:

(a) The supply is a single phase, 120/240 Volt, 3 wire system.

(b) The conductors are installed for one-family, two-family, and multifamily dwellings.

(c) The conductors are either service laterals, service entrance conductors, or feeders.

(d) The conductors serve as the main power supply of an individual dwelling unit.

(e) If the conductors are a feeder, the feeder shall exist between the main disconnect and the panelboard that supplies 100% of the load of the dwelling unit. This panelboard may supply that load either by branch circuits or by feeders, or both,

The feeder conductors to a dwelling unit shall not be required to have an allowable ampacity greater than their service entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, 230.42 are met.

Substantiation: As the text currently stands, the first sentence of this section is very difficult to read, containing 56 words separated by no less than nine commas. This section is packed with various requirements. It would be much clearer to understand, and more readily and accurately applied in a list format. It is very easy to misapply this section as it currently stands. In addition: All circuits on the planet have “either an equipment grounding conductor or no equipment grounding conductor”, so mentioning an EGC is just filler, unless the panel is aware of a third option I’m missing. All chapter 3 wiring methods are either raceways or cables, so that language adds nothing to this requirement either, and has been intentionally omitted. The term “main power feeder” hit the dumpster when grouped with service conductors in list item (c) to reduce confusion. “All” was replaced by “100%” to strengthen the sentiment of the panel in the last cycle. “...are part or associated with...” was not really necessary, in that the dwelling unit is what is diversifying our load - if a dwelling unit serves an ancillary structure, it really has no bearing on the application of this section. Please accept this proposal at least in part, as a list form will greatly clarify this section.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-83a.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-91 Log #4478 NEC-P06 **Final Action: Accept in Principle**
(310.15(B)(6))

Submitter: Christel K. Hunter, Alcan Cable
Recommendation: Revise text to read as follows:
~~(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service-lateral conductors, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder between the main disconnect and the panelboard that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit. The feeder conductors to a dwelling unit shall not be required to have an allowable ampacity rating greater than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, and 230.42 are met.~~
(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders.

For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors as listed in Table 310.15(B)(6), shall be permitted for the following installations:

a) 120/240-volt, 3-wire, single-phase service-entrance conductors, service-lateral conductors, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor.

b) For application of this section, the main power feeder shall be the feeder between the main disconnect and the panelboard that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit.

c) Feeder conductors associated with a dwelling unit that do not meet the definition of a main power feeder shall not be required to have an allowable ampacity rating greater than the service-entrance or service lateral conductors serving the dwelling.

d) The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, and 230.42 are met.

Substantiation: The changes in 310.15(B)(6) in the 2008 NEC, combined with new ampacity restrictions for service-entrance cable used as interior wiring, have led to a great deal of confusion among installers and inspectors. Much larger wire sizes are being required for single family dwelling feeders than have ever been needed, with no evidence of increased safety. This includes installations with multiple panels, feeders to accessory buildings, etc. This language would make it clear that these feeders do not have to be larger than the service-entrance conductors, which some inspectors have been requiring based on the new language.
Panel Meeting Action: Accept in Principle
Panel Statement: See Panel action on Proposal 6-83a.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-92 Log #3480 NEC-P06 **Final Action: Accept in Principle**
(310.15(B)(6) Exception (New))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Add text to read as follows:

(6) 120/240-Volt, 3-Wire, Single-Phase Dwelling Services and Feeders. For individual dwelling units of one-family, two-family, and multifamily dwellings, conductors, as listed in Table 310.15(B)(6), shall be permitted as 120/240-volt, 3-wire, single-phase service-entrance conductors, service-lateral conductors, and feeder conductors that serve as the main power feeder to each dwelling unit and are installed in raceway or cable with or without an equipment grounding conductor. For application of this section, the main power feeder shall be the feeder between the main disconnect and the panelboard that supplies, either by branch circuits or by feeders, or both, all loads that are part or associated with the dwelling unit. The feeder conductors to a dwelling unit shall not be required to have an allowable ampacity rating greater than their service-entrance conductors. The grounded conductor shall be permitted to be smaller than the ungrounded conductors, provided the requirements of 215.2, 220.61, and 230.42 are met.

<u>Exception: The sizing of conductors for this feeder shall be permitted to be used if a specific load is removed from the main power feeder and connected to its own overcurrent protective device within the service equipment or sub-panel where the main power feeder is supplied from.</u>

Substantiation: As 310.15(B)(6) reads right now I can take a specific load such as an air conditioner, heat, well pump, or other equipment off of the main power feeder and connect this equipment to its own overcurrent device and not be allowed to use Table 310.15(B)(6), which would actually reduce the load on this feeder.

If this equipment were required to be connected to its own overcurrent protective device where the main power feeder is supplied from, then that would ensure that we do not have multiple power feeders.
Panel Meeting Action: Accept in Principle

Panel Statement: See Panel action on 6-83a.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-93 Log #2465 NEC-P06 **Final Action: Reject**
(310.15(B)(7))

Submitter: Paul G. Cardinal, Shell
Recommendation: Add new text to read as follows:
(7) Ampacity for kcmil Conductor Sizes Not In Tables. Ampacities for conductors with kcmil sizes other than those shown in the tables may be interpolated based on ampacities of kcmil sizes numerically preceding and following intermediate kcmil size by means of the following general formula:

$I_n = I_p + ((k_n - k_p)*((I_f-I_p)/(k_f-k_p)))$

Where:
I_n = conductor ampacity in Amps
I_p = ampacity in Amps of conductor that would precede intermediate kcmil size in table
I_f = ampacity in Amps of conductor that would follow intermediate kcmil size in table
k_n = kcmil size of conductor for which ampacity will be determined
k_p = kcmil size of conductor that would precede intermediate kcmil size in table
k_f = kcmil size of conductor that would follow intermediate kcmil size in table
Substantiation: Ampacities for cables with intermediate kcmil sizes based on standards from Sub Sea or the railroad industry are absent from NEC tables. Manufacturers typically provide ampacity ratings based on interpolation of NEC tables, however, the only NEC compliant method of determining ampacity for conductor sizes not in tables is under engineering supervision in 310.15(C). The proposed code change will allow electricians to use intermediate kcmil sizes per manufacturers recommendation without need for engineering support.
Cables with flexible stranding that might generically be referred to as DLO cables are UL listed with the Type Name of RHW-2 enabling use under Article 310, Conductors for General Wiring. Cable flexibility is beneficial for connection of large diameter cables in such applications such as Uninterruptible Power Supplies (UPS), backup generators, isolation switches and wind turbines. Ease of bending avoids scrapes and cuts to hands that inevitably occur during the installation of large diameter cables with standard stranding.
The kcmil sizes of these cables follow guidelines of the American Association of Railroads (AAR). The sizes such as 535 kcmil, fail to match sizes shown in NEC tables such as Table 310.16. At the present time, the only option for determination of cable ampacity is under engineering supervision using the calculation in 310.15(C). Rather than forcing the calculation of 310.15(C), many AHJs already allow ampacity calculation as suggested in this proposal. Those who govern by the letter of the law, however, make it very difficult for electricians to take advantage of the safety benefits of flexible cable.
Panel Meeting Action: Reject
Panel Statement: Article 310 deals with conductors for general wiring, not conductors or cables for specific use as described in the proposal. If a manufacturer recommends a specific type of cable, they most likely have an engineer on staff that could calculate the ampacity of that size conductor. An AHJ could also grant special permission based on information supplied by the manufacturer.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-94 Log #3684 NEC-P06 **Final Action: Reject**
(310.15(B)(7))

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Add the following new text:
310.15(B)(7) Derated conductors shall be so identified in the enclosure from which the branch circuit originates. Marking shall be by marking, tagging or other approved methods.
Substantiation: Once a branch circuit is de-rated and installed, personnel who follow up will and have erroneously installed a larger OCPD to solve a tripping problem.
Panel Meeting Action: Reject
Panel Statement: It must be assumed that persons who perform maintenance on electrical systems are qualified to do so and follow code requirements. Identification of specific ampacity by means of marking, tagging, or other methods is not required.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-95 Log #288 NEC-P06 **Final Action: Accept**
(310.15(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “formula” to “equation” in the first sentence and in the FPN.
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-96 Log #629 NEC-P06 **Final Action: Accept**
(310.15(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the first paragraph, change “formula” to “equation”.
Immediately following the square root in the equation, add “x 103 amperes”. Delete ΔTD from the equation and the explanation of terms.
The specific descriptive variables in the equation and the explanation of terms should be changed from upper case to lower case subscripts as shown:

from:	to:
TC	*Tc*
TA	*Ta*
RDC	*Rdc*
YC	*Yc*
RCA	*Rca*

The equation should be revised to read:

$$I = \sqrt{\frac{T_c - T_a}{R_{dc}\left(1+Y_c\right)R_{ca}}} \times 10^3 \text{amperes}$$

Delete: “FPN: See Annex B for example of formula applications.”
Substantiation: This proposal will provide correct terminology and accuracy in the equation and be consistent with industry usage of the equation. Similar proposals are being submitted for 310.60(C)(4) and 310.60(D).
The term “formula” normally refers to a chemical composition whereas the term “equation” refers to a mathematical expression.
The variables should appear in regular size text accompanied by subscripts that identify the specific variable. For example, “*T*” designates a temperature variable and the subscripts “*c*” and “*a*” designate whether it is the conductor temperature or the ambient temperature.
This equation originally appeared in the *Transactions of the American Institute of Electrical Engineering, Vol. 76, 1957* and the result of the equation provides kiloamperes. Adding the 103 multiplier will provide an ampacity value rather than a kiloampere value and be consistent with the use of amperes throughout the Code. This equation also appears as Equation 9 on page Intro-39 of *IEEE STD 835 – 1994, IEEE Standard Power Cable Ampacity Tables*.
The dielectric loss temperature rise (ΔTD) was deleted since the dielectric loss is negligible for single circuit extruded dielectric cables rated below 46kV (see page Intro-2 of *IEEE STD 835 – 1994, IEEE Standard Power Cable Ampacity Tables*) and this NEC section is only applicable to conductors rated 0-2000 Volts.
The FPN was deleted since Annex B does not contain any application examples of the equation in 310.15(C). The only equations and examples in Annex B are associated with Table B.310.11 and relate to adjustment factors for more than three conductors in a raceway or cable with load diversity. FPN No. 1 to Table 310.15(B)(2)(a) correctly directs the user to Annex B.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-97 Log #2457 NEC-P06 **Final Action: Accept**
(310.15(C))

Submitter: Peter Pollak, Pollak & Associates
Recommendation: Delete:
1. Delta TD from the equation
2. Delta TD = dielectric loss temperature rise
Substantiation: The dielectric loss temperature rise is not a factor for the cable insulation materials and voltages permitted in the Code. It is only a factor in high voltage utility power cable, which is why it was covered in the IEEE paper published by Messrs. Neher –McGrath in 1957. Delta TD should never have been included when the Neher-McGrath approach to calculating ampacities was adopted by the Code since the Code does not apply to electric utility cables.

Panel Meeting Action: Accept
Panel Statement: See panel action on Proposal 6-96.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-98 Log #325 NEC-P06 **Final Action: Reject**
(310.15(D))

Submitter: Alireza Daneshpooy, Exponent
Recommendation: Proposal to include a table of allowable continuous ampacity for copper/aluminum busbar. No such table is currently included in the NEC. Similar tables are suggested by DIN 43 671 and IEC. This requires much effort once such a need is accepted by NFPA. In that case, I am willing to participate in its development.
Substantiation: Busbar allowable current is not addressed even marginally in the NEC code, which leaves their rating open to interpretation especially in the switchgear industry. The existing code only requires rigid and firm installation, and protection from physical damage.
Panel Meeting Action: Reject
Panel Statement: Article 310 addresses conductors for general wiring and does not cover busbar. No specific recommendation was provided by the submitter as required by NFPA regulations.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-99 Log #633 NEC-P06 **Final Action: Accept**
(Table 310.16)

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting relative to the proposed column headings for (4) and (7).
This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise Table 310.16 only as shown below. The remainder of the Table remains unchanged.

Table 310.16

Size AWG or kcmil	60ºC (140ºF)	75ºC (167ºF)	90ºC (194ºC)	60ºC (140ºF)	75ºC (167ºF)	90ºC (194ºC)
	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM		
14	~~20~~ 15					
12	~~25~~ 20			~~20~~ 15		
8				~~30~~ 35		
6						~~60~~ 55
3			~~110~~ 115			
1			~~150~~ 145			
300				~~190~~ 195		~~255~~ 260
600	~~355~~ 350					
700				~~310~~ 315		~~420~~ 425
800						~~450~~ 445
1500	~~520~~ 525					
2000	~~560~~ 555					

Substantiation: Acceptance of this proposal will harmonize the ampacity values between NEC Table 310.16 and CEC Tables 2 and 4 with technically substantiated values.

The ampacities for both copper and aluminum conductors with a conductor temperature rating of 75ºC are identical between the NEC and CEC.

The ampacities for conductors with temperature ratings of 60ºC and 90ºC were calculated from the 75ºC values using the equation shown on the pages provided as supporting material that also contain supporting tables. The equation is defined in the following standards:

IEEE Std 835-1994, IEEE Standard Power Cable Ampacity Tables, Section 3.4.2 Adjustment for change in maximum conductor temperature or temperature due to dielectric loss.

AIEE-IPCEA Power Cable Ampacities, 1962 (AIEE Pub. No. S-135-1 / IPCEA Pub. No. P-46-426) Volume 1 – Copper Conductors, Adjustment for Change in Parameters, page III.

60ºC copper conductor temperature – There are only two differences (5 amps) in ampacities between the NEC and the CEC and the CEC matches the rounded calculated values on these two conductor sizes. There are three values where the NEC and CEC agree but all three differ from the rounded calculated values by 5 amps. A proposal is also being submitted to correct the CEC on the five minor deviations.

90ºC copper conductor temperature – There are only two differences (5 amps) in ampacities between the NEC and the rounded calculated ampacities. The CEC is lower on all values and a proposal is being submitted to correct the CEC to agree with the rounded calculated values and the revised NEC. The CEC agrees with the values in the 1978 NEC.

60ºC aluminum conductor temperature – There are three differences (5 amps) in ampacities between the rounded calculated ampacities, and the NEC and the CEC have the same values for these three sizes (8 & 4/0 AWG and 700 kcmil). On 12 AWG, the NEC is 5 amps higher (20 vs 15 amps) than the rounded calculated value and the CEC. A proposal is also being submitted to revise the CEC on the four sizes to agree with the rounded calculated values and the revised NEC.

90ºC aluminum conductor temperature – There are four differences (5 amps) in ampacities between the NEC and the rounded calculated ampacities. The CEC is lower on all values and a proposal is being submitted to correct the CEC to agree with the rounded calculated values and the revised NEC. The CEC agrees with the values in the 1978 NEC.

The 5 amp differences in ampacities between the rounded calculated values and the NEC are most likely due to rounding when the NEC table was revised in 1981. The supporting material for that revision no longer exists.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:
WALL, C.: I am voting negative. The proposed ampacity for types TW and UF, AWG 14 and 12 copper, 60o C in table 310.16 are 25% and 20% less, respectively, than those presently in the table, which has been in use for years without documented problems. Application of adjustment and correction factors to these lower ampacities might require larger conductors and is an unjustified change in requirements only for harmonization. The substantiation was based solely on calculations; there have been no reports of problems in the field that would justify these ampacity reductions. Adjustment Factors in Table 310.15(B)(2)(a) and Correction Factors in Table 310.16 already limit the ampacity for conditions of use; additionally, 240.4(D) limits the ampacity of AWG 14 and 12 copper by limiting the maximum overcurrent protection for these conductors. Without documented field verification of issues with the present conductor ratings, the substantiation submitted does not justify this drastic reduction in ampacity.

Additionally, there are typo-graphical errors in the proposed table heading. Columns 4 and 7 show 194o C and should show 194o F.

6-100 Log #636 NEC-P06 **Final Action: Accept in Principle**
(Table 310.16)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the Correction Factors Table at the bottom of Table 310.16 to read as shown below. The added or revised rows are underlined.

Substantiation: Correlation issue. 18 AWG Copper and 16 AWG Copper were added for the 2008 *NEC*® to 240.4(D) fixed amperages for small conductor sizes corresponding to use based on *NFPA 79* and *NEC*® Article 670, *UL508*, *UL508A* (*NEC*® Article 409) and circuits in *NEC*® Articles 725 and 760.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

CORRECTION FACTORS

Ambient Temperature (ºC)	For ambient temperatures other than 30ºC (86ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.						Ambient Temperature (ºF)
10 or less	1.29	1.20	1.15	1.29	1.20	1.15	50 or less
11-15	1.22	1.15	1.12	1.22	1.15	1.12	51-59
16-20	1.15	1.11	1.08	1.15	1.11	1.08	60-68
21-25	1.08	1.05	1.04	1.08	1.05	1.04	69-77
26-30	1.00	1.00	1.00	1.00	1.00	1.00	78-86
31-35	0.91	0.94	0.96	0.91	0.94	0.96	87-95
36-40	0.82	0.88	0.91	0.82	0.88	0.91	96-104
41-45	0.71	0.82	0.87	0.71	0.82	0.87	105-113
46-50	0.58	0.75	0.82	0.58	0.75	0.82	114-122
51-55	0.41	0.67	0.76	0.41	0.67	0.76	123-131
56-60	—	0.58	0.71	—	0.58	0.71	132-140
61-65	—	0.47	0.65	—	0.47	0.65	141-149
66-70	—	0.33	0.58	—	0.33	0.58	150-158
71-75	—	—	0.50	—	—	0.50	159-167
76-80	—	—	0.41	—	—	0.41	168-176
81-85	—	—	0.29	—	—	0.29	177-185

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).

Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.

The equation in 310.60(C)(4) was used to calculate the ampacity temperature correction factors for various ambient air temperatures based on the conductor temperature ratings in the table. The term Δ*TD* was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the lower three ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions and the 81C-85C range was added to complete the table and address high ambient temperature applications. The temperature ranges for 61C-80C were changed from 10C to 5C since the differences in the correction factors are significant and it provides consistent temperature ranges throughout the Table. The correction factors for the ambient temperature ranges in the existing table remain the same.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
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Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-101 Log #738 NEC-P06 **Final Action: Accept**
(Table 310.16)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add one asterisk following EACH of "18" and "16" in the leftmost column to the footnote at the bottom of the Table referencing 240.4(D)

Partial Table shown:

Size AWG or kcmil	
18*	
16*	
14*	
12*	
10*	
8	
6	
71–80	

* See 240.4(D).

6-102 Log #1491 NEC-P06 **Final Action: Accept**
(Table 310.16)

Submitter: Darryl Hill, Wichita Electrical JATC / Rep. IBEW LU #271
Recommendation: Add an asterisk next to 18 AWG and 16 AWG in the first column of this table.

18*
16*

Substantiation: Currently, there are asterisks next to 14, 12 and 10 AWG conductors which refer the user to Section 240.4(D) for small conductors for the requirements on the overcurrent protection that shall not be exceeded. Due to the code change that occurred in the 2008 cycle that added 18 and 16 AWG conductors to small conductors, this was not reflected back on Table 310.16. This change would add clarity and uniformity to these requirements that now exist for 14 through 10 AWG conductors for 18 and 16 AWG conductors also.
Panel Meeting Action: Accept
Panel Statement: The panel action is the same as Proposal 6-101.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-103 Log #2959 NEC-P06 **Final Action: Accept in Principle in Part**
(Table 310.16)

Submitter: Paul A. Keleher, Paul Keleher Electrical Services
Recommendation: Revise text of Table 310.16 as follows:

See Table 310.16 on page 360

Substantiation: This proposal adds 4 new rows (new data entries underlined) to the top of the CORRECTION FACTOR section of Table 310.16 so the CORRECTION FACTOR table extends the covered range of temperatures downward to freezing (0 degrees C (32 deg F)).

The explanatory information at the top of Table 310.16 explains that the ampacities shown in the Table are based on an ambient temperature of 30 C (86 F). The CORRECTION FACTOR section of Table 310.16 recognizes the established ambient by displaying the unity value of "1.00" indicating no compensation required for all temperature ratings in the row designated in the end columns as including 30C (86 F) ambient temperature. The Table presently recognizes that increased ambient temperature reduces conductor ampacity by the factors shown. The Table also recognizes the relative gain in ampacity for ambient temperatures lower than the ambient, but only as far as 21C (70F).

This proposal will modify the CORRECTION FACTOR section of the Table to recognize the further increase in ampacity created by even lower ambient temperatures. The proposed modification assumes that the further incremental increases in ampacity being proposed will be valid if the proposed increases are in the same proportion as the Table in its present form calculates incremental increases or decreases in ampacity for the ambient temperatures presently covered by the Table.

This modification to the Table will recognize the cooling effect of the earth on underground conductors, for example, or the similar effect of other conditions of installation where a lower ambient temperature will have a cooling effect on the operating temperature of conductors.
Panel Meeting Action: Accept in Principle in Part
The panel accepts the addition of three additional lower temperature rows but does not accept the proposed first row. The panel accepts in principle the correction factors.

Table 310.16							
TEMPERATURE RATING OF CONDUCTOR							
	60C	75C	90C	60C	75C	90C	
	COPPER			ALUMINUM or COPPER-CLAD ALUMINUM			
Ambient Temp. (deg C)	For ambient temperatures other than 30 degrees C (86 deg F), multiply the allowable ampacities shown by the appropriate factor shown below.						Ambient Temp. (deg F)
1-5	1.40	1.25	1.20	1.40	1.25	1.20	32-41
6-10	1.32	1.20	1.16	1.32	1.20	1.16	42-50
11-15	1.24	1.15	1.12	1.24	1.15	1.12	51-60
16-20	1.16	1.10	1.08	1.16	1.10	1.08	61-69
21-25	1.08	1.05	1.04	1.08	1.05	1.04	70-77
26-30	1.00	1.00	1.00	1.00	1.00	1.00	78-86
31-35	0.91	0.94	0.96	0.91	0.94	0.96	87-95
36-40	0.82	0.88	0.91	0.82	0.88	0.91	96-104
41-45	0.71	0.82	0.87	0.71	0.82	0.87	105-113
46-50	0.58	0.75	0.82	0.58	0.75	0.82	114-122
51-55	0.41	0.67	0.76	41.00	0.67	0.76	123-131
56-60	-	0.58	0.71	-	0.58	0.71	132-140
61-70	-	0.33	0.58	-	0.33	0.58	141-158
71-80	-	-	0.41	-	-	0.41	159-176

Panel Statement: The panel accepts in principle the addition of correction factors for lower temperatures. See Panel action on Proposal 6-100.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-104 Log #3775 NEC-P06 **Final Action: Accept in Part**
(Table 310.16)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:

"Allowable Ampacities of Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts, 60°C Through 90°C (140°F Through 194°F), Not More Than three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on an Ambient Temperature Range of 26°C (78°F) to 30°C (86°F)".

Substantiation: a) No insulated cable is rated at zero (0) volts.

b) The temperature "Correction Factors" at the bottom of Table 310.16 in the range of 26°C (78°F) to 30°C (86°F) each have a multiplier for table ampacity of 1.00.

Panel Meeting Action: Accept in Part

The panel accepts the deletion of "0 through" and the addition of "Up to and Including" but does not accept the other proposed changes.

Revise text to read as follows:

"Allowable Ampacities of Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts, 60°C Through 90°C (140°F Through 194°F), Not More Than three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)".

Panel Statement: The panel agrees with (a) in the substantiation. The second revision would not add any additional clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-105 Log #3766 NEC-P06 **Final Action: Accept in Principle**
(Table 310.16 and 310.17)

Submitter: Ted "Smitty" Smith, Electrical Experts Consulting
Recommendation: Add new text to read as follows:

**See 110.14(C)

Add double asterisk to top of tables immediately after table titles and then add the proposed text to the bottom of both tables.

Substantiation: 110.14(C) temperature limitations for terminations has requirements for determining which conductor we can use and also which temperature column on the table must be used to determine ampacity. As an instructor of journeyman, master electricians and apprentices I can tell you that many electricians, including electrical inspectors, are not aware of or using these requirements. Just as we added the asterisk to make sure everyone followed 240.4(D) I believe we need to draw attention to 110.14(C) so that the conductors are protected from long term temperature exposure at their terminations.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel agrees with the submitter that some electricians are not aware of the requirements of 110.14(C) when it comes to applying the ampacities of the tables. The panel is of the opinion that the action taken in Proposal 6-51 meets the submitter's intent.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-106 Log #634 NEC-P06 **Final Action: Accept**
(Table 310.17)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise Table 310.17 only as shown below. The remainder of the Table remains unchanged.

	60ºC (140ºF)	75ºC (167ºF)	90ºC (194ºC)	60ºC (140ºF)	75ºC (167ºF)	90ºC (194ºC)
Size AWG or kcmil	COPPER			ALUMINUM OR COPPER-CLAD ALUMINUM		
10						~~40~~ 45
6						~~80~~ 85
4						~~110~~ 115
3/0						~~275~~ 270
300			~~505~~ 500			
600					~~540~~ 545	
700			~~855~~ 850			~~675~~ 670
900			~~985~~ 980			~~785~~ 790
1250						~~960~~ 965
1500						~~1075~~ 1070
2000						~~1335~~ 1295

Substantiation: Acceptance of this proposal will harmonize the ampacity values between NEC Table 310.17 and CEC Tables 1 and 3 with technically substantiated values.

The ampacities for copper conductors with conductor temperature ratings of 60ºC and 75ºC are identical between the NEC and CEC for sizes 6 AWG and larger. The proposed revisions in the 90C copper column are based on the rounded calculated values and will provide consistency with all the other values in the Table. The differences in ampacity between the two Codes for 10 AWG and smaller is due to the fact that the CEC includes in the table the values that the NEC includes in a footnote.

The change in the ampacity from 540 to 545 amps for 600 kcmil aluminum at 75C is a correction. In the 1978 and previous editions of the Code, the ampacity was 545. It appears that a typographical error occurred in the 1981 Code where the value was changed from 545 to 540 amps. There was no proposal, comment or panel action to make such a change. All of the other ampacities for 6 AWG and larger are identical between the 1978 and 1981 Codes. This error was never discovered and has been perpetuated in subsequent Codes.

The ampacities for 60ºC and 75ºC are identical except for sizes 14, 12, and 8 AWG. No changes are proposed for NEC Table 310.17. A proposal will be submitted to revise the ampacities for these three sizes, where necessary, in CEC Table 1.

The ampacities for conductors with a temperature rating of 90ºC were calculated from the 75ºC values using the equation shown on the attached page, also see supporting tables. The equation is defined in the following standards:

IEEE Std 835-1994, IEEE Standard Power Cable Ampacity Tables, Section 3.4.2 Adjustment for change in maximum conductor temperature or temperature due to dielectric loss.

AIEE-IPCEA Power Cable Ampacities, 1962 (AIEE Pub. No. S-135-1 / IPCEA Pub. No. P-46-426) Volume 1 – Copper Conductors, Adjustment for Change in Parameters, page III.

90ºC copper conductor temperature – There are only three differences (5 amps) in ampacities between the NEC and the rounded calculated ampacities. The CEC is lower on all values and a proposal is being submitted to correct the CEC to agree with the rounded calculated values and the revised NEC. The existing CEC ampacities agree with the values in the 1978 NEC.

90ºC aluminum conductor temperature – There are eight differences (5 amps) in ampacities between the NEC and the rounded calculated ampacities. In addition, the value for 2000 kcmil is inconsistent with all the other rounded calculated values in the table and the proposed revision will make the value consistent with all of the other sizes. The CEC is lower on all values and a proposal is being submitted to correct the CEC to agree with the rounded calculated values and the revised NEC. The existing CEC ampacities agree with the values in the 1978 NEC.

The 5 amp differences in ampacities between the rounded calculated values and the NEC are most likely due to rounding when the NEC table was revised in 1981. The supporting material for that revision no longer exists.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
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Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-107 Log #637 NEC-P06 **Final Action: Accept in Principle**
(Table 310.17)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group

Recommendation: Revise the Correction Factors Table at the bottom of Table 310.17 to read as shown below. The added or revised rows are underlined.

CORRECTION FACTORS

Ambient Temperature (ºC)	For ambient temperatures other than 30ºC (86ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.						Ambient Temperature (ºF)
10 or less	1.29	1.20	1.15	1.29	1.20	1.15	50 or less
11-15	1.22	1.15	1.12	1.22	1.15	1.12	51-59
16-20	1.15	1.11	1.08	1.15	1.11	1.08	60-68
21-25	1.08	1.05	1.04	1.08	1.05	1.04	69-77
26-30	1.00	1.00	1.00	1.00	1.00	1.00	78-86
31-35	0.91	0.94	0.96	0.91	0.94	0.96	87-95
36-40	0.82	0.88	0.91	0.82	0.88	0.91	96-104
41-45	0.71	0.82	0.87	0.71	0.82	0.87	105-113
46-50	0.58	0.75	0.82	0.58	0.75	0.82	114-122
51-55	0.41	0.67	0.76	0.41	0.67	0.76	123-131
56-60	—	0.58	0.71	—	0.58	0.71	132-140
61-65	—	0.47	0.65	—	0.47	0.65	141-149
66-70	—	0.33	0.58	—	0.33	0.58	150-158
71-75	—	—	0.50	—	—	0.50	159-167
76-80	—	—	0.41	—	—	0.41	168-176
81-85	—	—	0.29	—	—	0.29	177-185

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).

Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.

The equation in 310.60(C)(4) was used to calculate the ampacity correction factors for various ambient air temperatures based on the conductor temperature ratings in the table. The term Δ*TD* was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This formula appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the lower three ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions and the 81C-85C range was added to complete the table and address high ambient temperature applications. The temperature ranges for 61C-80C were changed from 10C to 5C since the differences in the correction factors are significant and it provides consistent temperature ranges throughout the Table. The correction factors for the ambient temperature ranges in the existing table remain the same.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
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Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-108 Log #739 NEC-P06 **Final Action: Accept**
(Table 310.17)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add one asterisk following EACH of "18" and "16" in the leftmost column to the footnote at the bottom of the Table referencing 240.4(D)

Partial Table shown:

Size AWG or kcmil	
18*	
16*	
14*	
12*	
10*	
8	
6	
71–80	

* See 240.4(D).

Substantiation: Correlation issue. 18 AWG Copper and 16 AWG Copper were added for the 2008 *NEC*® to 240.4(D) fixed amperages for small conductor sizes corresponding to use based on *NFPA 79* and *NEC*® Article 670, *UL508*, *UL508A* (*NEC*® Article 409) and circuits in *NEC*® Articles 725 and 760.

Panel Meeting Action: Accept
Panel Statement: The action taken is consistent with panel actions on Proposals 6-101 and 6-102.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-109 Log #1113 NEC-P06 **Final Action: Reject**
(Table 310.17)

Submitter: Jim Egan, Kyocera Solar Inc
Recommendation: Revise text to read as follows:
Extend / continue the "correction factors" for 90°C conductor ampacity in ambient temperature to reflect the temperature rating of the conductor. Currently, the 90°C column has a correction factor that stops at 80°C; leaving a 9 degree discrepancy. A 90°C conductor does, in fact, have ampacity between 81°C through 90°C.
Substantiation: There is no clarification or note in the NEC to address the 9 degree discrepancy or omission in the ampacity table(s). Since ***Table 310.17*** stops at 80°C, the 9 degree temperature omission is left up to inspectors and contractors to interpret and argue this issue in the field. This issue has arisen primarily due to photovoltaic module installation. Photovoltaic modules are sold with factory installed 90°C USE-2 or RHHW-2 single insulated conductors. These modules are sometimes installed close to roof surfaces with little airflow (Building Integrated Photovoltaics), trapping heat under the module where the conductors are located. Therefore the conductor may be exposed to ambient temperatures in excess of 80°C. Article 690 doesn't address this issue either. Table 310.16 has the same issue although it is for cables or conductors installed in raceways.
Using information supplied by two separate cable manufacturers and the formula located in ***310.15(C) Engineering Supervision,*** conductors rated at 90°C have been calculated to have current carrying capacity up to 115°C. By extending ***Table 310.17 Correction Factors*** to include ambient temperature between 81°C through 90°C, the NEC can prevent many uncertain scenarios in the photovoltaic industry for inspectors, manufacturers and installers.
Panel Meeting Action: Reject
Panel Statement: No specific values were proposed by the submitter. This is against 4.3.3 of the Regulations Governing Committee Projects.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-110 Log #1492 NEC-P06 **Final Action: Accept**
(Table 310.17)

Submitter: Darryl Hill, Wichita Electrical JATC / Rep. IBEW LU #271
Recommendation: Add an asterisk next to 18 AWG and 16 AWG in the first column of this table.
18*
16*
Substantiation: Currently, there are asterisks next to 14, 12 and 10 AWG conductors which refer the user to Section 240.4(D) for small conductors for the requirements on the overcurrent protection that shall not be exceeded. Due to the code change that occurred in the 2008 cycle that added 18 and 16 AWG conductors to small conductors, this was not reflected back on Table 310.17. This change would add clarity and uniformity to these requirements that now exist for 14 through 10 AWG conductors for 18 and 16 AWG conductors also.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-111 Log #3776 NEC-P06 **Final Action: Accept in Part**
(Table 310.17)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Allowable Ampacities of Single-Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts in Free Air, Based on an Ambient Air Temperature Range of 26°C (78°F) to 30°C (86°F)".
Substantiation: a) No insulated cable is rated at zero (0) volts.
b) The temperature "Correction Factors" at the bottom of Table 310.17 in the range of 26°C (78°F) to 30°C (86°F) each have a multiplier for table ampacity of 1.00.
Panel Meeting Action: Accept in Part
Panel accepts the deletion of '0 through' and the addition of 'Up to and Including', but does not accept the other proposed changes.
Revise text to read as follows:
"Allowable Ampacities of Single-Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts in Free Air, Based on Ambient Temperature of 30°C (86°F)".
Panel Statement: The Panel agrees with (a) in the substantiation. The other revisions would not add any additional clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-112 Log #4753 NEC-P06 **Final Action: Reject**
(Table 310.17)

Submitter: Charles M. Trout, Maron Electric Company
Recommendation: Delete Table 310.17 in it's entirety
Substantiation: Section 110.14(C)(1) requires that equipment termination provisions shall be based on Table 310.16. All conductors must be terminated on equipment whether it's in a splicing device or some other equipment. There is no practical use for Table 310.17
Panel Meeting Action: Reject
Panel Statement: Table 310.17 provides the allowable ampacities of insulated conductors in free air. These ampacities would be permitted if the conductors are terminated on busbar or if a transition splice to a larger conductor is made prior to the termination.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-113 Log #638 NEC-P06 **Final Action: Accept in Principle**
(Table 310.18)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the Correction Factors Table at the bottom of Table 310.18 by adding 4 rows at the top of the table so the table reads as shown below. All of the other factors remain as shown in the 2008 NEC.

CORRECTION FACTORS

Ambient Temperature (ºC)	For ambient temperatures other than 40ºC (104ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.				Ambient Temperature (ºF)
10 or less	1.13	1.09	1.07	1.13	50 or less
11-20	1.09	1.06	1.05	1.09	51-68
21-30	1.04	1.03	1.02	1.04	69-86
31-40	1.00	1.00	1.00	1.00	87-104
41-50	0.95	0.97	0.98	0.95	105-122
51-60	0.90	0.94	0.95	0.90	123-140
61-70	0.85	0.90	0.93	0.85	141-158
71-80	0.80	0.87	0.90	0.80	159-176
81-90	0.74	0.83	0.87	0.74	177-194
91-100	0.67	0.79	0.85	0.67	195-212
101-120	0.52	0.71	0.79	0.52	213-248
121-140	0.30	0.61	0.72	0.30	249-284
141-160	—	0.50	0.65	—	285-320
161-180	—	0.35	0.58	—	321-356
181-200	—	—	0.49	—	357-392
201-225	—	—	0.35	—	393-437

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).
Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.
The equation in 310.60(C)(4) was used to calculate the ampacity correction factors for various ambient air temperatures based on the conductor temperature ratings in the table. The term ΔTD was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.
Since the NEC is used internationally, the lower four ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions. The correction factors for the ambient temperature ranges in the existing table remain the same.
This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-114 Log #3777 NEC-P06 **Final Action: Accept**
(Table 310.18)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Allowable Ampacities of Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts, 150°C through 250°C (302°F through 482°F)... "
Substantiation: No insulated cable is rated at zero (0) volts.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-115 Log #639 NEC-P06 **Final Action: Accept in Principle**
(Table 310.19)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the Correction Factors Table at the bottom of Table 310.19 by adding 4 rows at the top of the table so the table reads as shown below. All of the other factors remain as shown in the 2008 NEC.

CORRECTION FACTORS

Ambient Temperature (ºC)	For ambient temperatures other than 40ºC (104ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.				Ambient Temperature (ºF)
10 or less	1.13	1.09	1.07	1.13	50 or less
11-20	1.09	1.06	1.05	1.09	51-68
21-30	1.04	1.03	1.02	1.04	69-86
31-40	1.00	1.00	1.00	1.00	87-104
41-50	0.95	0.97	0.98	0.95	105-122
51-60	0.90	0.94	0.95	0.90	123-140
61-70	0.85	0.90	0.93	0.85	141-158
71-80	0.80	0.87	0.90	0.80	159-176
81-90	0.74	0.83	0.87	0.74	177-194
91-100	0.67	0.79	0.85	0.67	195-212
101-120	0.52	0.71	0.79	0.52	213-248
121-140	0.30	0.61	0.72	0.30	249-284
141-160	—	0.50	0.65	—	285-320
161-180	—	0.35	0.58	—	321-356
181-200	—	—	0.49	—	357-392
201-225	—	—	0.35	—	393-437

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).

Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.

The equation in 310.60(C)(4) was used to calculate the ampacity correction factors for various ambient air temperatures based on the conductor temperature ratings in the table. The term Δ*TD* was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation also appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the lower four ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions. The correction factors for the ambient temperature ranges in the existing table remain the same.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-116 Log #3778 NEC-P06 **Final Action: Accept**
(Table 310.19)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Allowable Ampacities of Single-Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts, 150°C Through 250°C (302°F through 482°F),... "
Substantiation: No insulated cable is rated at zero (0) volts.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-117 Log #640 NEC-P06 **Final Action: Accept in Principle**
(Table 310.20)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the Correction Factors Table at the bottom of Table 310.20 as shown:

CORRECTION FACTORS

Ambient Temperature (ºC)	For ambient temperatures other than 40ºC (104ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.				Ambient Temperature (ºF)
10 or less	1.36	1.26	1.36	1.26	50 or less
11-15	1.31	1.22	1.31	1.22	51-59
16-20	1.25	1.18	1.25	1.18	60-68
21-25	1.20	1.14	1.20	1.14	~~70~~ 69-77
26-30	1.13	1.10	1.13	1.10	~~79~~ 78-86
31-35	1.07	1.05	1.07	1.05	~~88~~ 87-95
36-40	1.00	1.00	1.00	1.00	~~97~~ 96-104
41-45	0.93	0.95	0.93	0.95	~~106~~ 105-113
46-50	0.85	0.89	0.85	0.89	~~115~~ 114-122
51-55	0.76	0.84	0.76	0.84	~~124~~ 123-131
56-60	0.65	0.77	0.65	0.77	~~133~~ 132-140
~~61-70~~	~~0.38~~	~~0.63~~	~~0.38~~	~~0.63~~	~~142-158~~
61-65	0.53	0.71	0.53	0.71	141-149
66-70	0.38	0.63	0.38	0.63	150-158
~~71-80~~	—	~~0.45~~	—	~~0.45~~	~~160-176~~
71-75	—	0.55	—	0.55	159-167
76-80	—	0.45	—	0.45	168-176
81-85	—	0.32	—	0.32	177-185

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).

Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.

The equation in 310.60(C)(4) was used to calculate the ampacity correction factors for various ambient air temperatures for the conductor temperature ratings in the table. The term Δ*TD* was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation also appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the three lower ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions and the 81-85C range was added to complete the table and address high ambient temperature applications. Except as noted in the next paragraph, the correction factors for the ambient temperature ranges in the existing table remain the same.

The Ambient Temperature (ºC) column ranges for 61C-80C were revised from 10C to 5C to provide consistent temperature ranges throughout the Table. The Ambient Temperature (ºF) column was revised to be continuous and consistent with Tables 310.16 through 310.19.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-118 Log #3779 NEC-P06 **Final Action: Accept**
(Table 310.20)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal related to the word "allowable".
This action will be considered by the panel as a public comment.
Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Allowable Ampacities of Not More Than Three Single-Insulated Conductors Rated ~~0 Through~~ Up to and Including 2000 Volts, Supported on a Messenger, Based on... "
Substantiation: No insulated cable is rated at zero (0) volts.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

(Note: Sequence 6-119 and 6-120 were not used)

6-121 Log #276 NEC-P06 **Final Action: Accept**
(310.60(B)(1) Exception)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "figured" to "calculated".
Substantiation: The term "calculated" more accurately describes the operation and agrees with the wording in 310.60(B)(1).
This is one of a series of proposals to provide consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-122 Log #630 NEC-P06 **Final Action: Accept**
(310.60(C))

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the second sentence in 310.60(C) as follows:
"Ampacities for ~~at~~ ambient temperatures other than those specified ~~shown~~ in the ampacity tables shall be ~~determined by the formula~~ corrected in accordance with 310.60(C)(4)."
Revise 310.60(C)(4) as indicated, revise the equation and explanation of terms to read as shown, and add a new Table 310.60(C)(4).
(4) Ambient Temperature Correction ~~Ambients Not in Tables~~. Ampacities ~~at~~ for ambient temperatures other than those specified ~~shown~~ in the ampacity tables shall be corrected in accordance with Table 310.60(C)(4) or shall be permitted to be calculated using ~~determined by means of~~ the following equation ~~formula~~:

$$I' = I\sqrt{\frac{T_c - T_a'}{T_c - T_a}}$$

where:
I' = ampacity corrected for ambient temperature
I = ampacity shown in the table
Tc = temperature rating of the conductor (ºC)
Ta' = new ambient temperature (ºC)
Ta = ambient temperature used in the table (ºC)

Table 310.60(C)(4) Ambient Temperature Correction Factors

For ambient temperatures other than 40ºC (104ºF), multiply the allowable ampacities specified in the ampacity tables by the appropriate factor shown below.			
Ambient Temperature (ºC)	Temperature Rating of Conductor 90ºC	Temperature Rating of Conductor 105ºC	Ambient Temperature (ºF)
10 or less	1.26	1.21	50 or less
11-15	1.22	1.18	51-59
16-20	1.18	1.14	60-68
21-25	1.14	1.11	69-77
26-30	1.10	1.07	78-86
31-35	1.05	1.04	87-95
36-40	1.00	1.00	96-104
41-45	0.95	0.96	105-113
46-50	0.89	0.92	114-122
51-55	0.84	0.88	123-131
56-60	0.77	0.83	132-140
61-65	0.71	0.78	141-149
66-70	0.63	0.73	150-158
71-75	0.55	0.68	159-167
76-80	0.45	0.62	168-176
81-85	0.32	0.55	177-185
86-90	—	0.48	186-194
91-95	—	0.39	195-203
96-100	—	0.28	204-212

For correlation with the addition of this table, the following changes are required:

In Tables 310.67 through 310.76, add an asterisk at the end of the each table title and add the following footnote to each Table:
"* Refer to 310.60(C)(4) for the ampacity correction factors where the ambient air temperature is other than 40ºC (104ºF)."
Substantiation: Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC and will not prevent any user from continuing to calculate the ampacities.
This proposal will provide correct terminology in the equation and be consistent with industry usage of the equation.
The term "formula" normally refers to a chemical composition whereas the term "equation" refers to a mathematical expression.
The variables in the equation should appear in regular size text accompanied by subscripts that identify the specific variable. For example, "*T*" designates a temperature variable and the subscripts "*c*" and "*a*" designate whether it is the conductor temperature or the ambient temperature.
The revised equation in the Proposal was used to calculate the ampacity correction factors for various ambient air temperatures for the conductor temperature ratings in the tables. The dielectric loss temperature rise variable ΔTD was deleted from the equation since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation also appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.
Since the NEC is used internationally, the lower ambient temperatures were included to provide the appropriate ampacity correction factors for colder regions.
This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
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Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-123 Log #1629 NEC-P06 **Final Action: Accept in Principle**
(310.60(C) and Tables 310.67 through 310.86)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Table 310.67 through Table 310.86" to "Table 310.60(C)(1) through Table 310.60(C)(10)".
In 310.60(C)(1), change "Table 310.69, Table 310.70, Table 310.81, and Table 310.82" to "Table 310.60(C)(3), Table 310.60(C)(4), Table 310.60(C)(15), and Table 310.60(C)(16)".
In the title of Figure 310.60, change "Table 310.77 Through Table 310.86" to "Table 310.60(C)(11) Through Table 310.60(C)(20)".
Change title of "Table 310.67" to "Table 310.60(C)(1)".
Change title of "Table 310.68" to "Table 310.60(C)(2)".
Change title of "Table 310.69" to "Table 310.60(C)(3)".
Change title of "Table 310.70" to "Table 310.60(C)(4)".
Change title of "Table 310.71" to "Table 310.60(C)(5)".
Change title of "Table 310.72" to "Table 310.60(C)(6)".
Change title of "Table 310.73" to "Table 310.60(C)(7)".
Change title of "Table 310.74" to "Table 310.60(C)(8)".
Change title of "Table 310.75" to "Table 310.60(C)(9)".
Change title of "Table 310.76" to "Table 310.60(C)(10)".
Change title of "Table 310.77" to "Table 310.60(C)(11)".
Change title of "Table 310.78" to "Table 310.60(C)(12)".
Change title of "Table 310.79" to "Table 310.60(C)(13)".
Change title of "Table 310.80" to "Table 310.60(C)(14)".
Change title of "Table 310.81" to "Table 310.60(C)(15)".
Change title of "Table 310.82" to "Table 310.60(C)(16)".
Change title of "Table 310.83" to "Table 310.60(C)(17)".
Change title of "Table 310.84" to "Table 310.60(C)(18)".
Change title of "Table 310.85" to "Table 310.60(C)(19)".
Change title of "Table 310.86" to "Table 310.60(C)(20)"
Substantiation: This revision will bring the Code into compliance with 2.3.1 of the NEC Style Manual which states "Tables and figures shall be referenced in the text and shall be designated by the number of the *NEC* rule in which they are referenced.
Proposals are also being submitted to correlate all the references to these Tables throughout the Code.

Panel Meeting Action: Accept in Principle

Change “Table 310.67 through Table 310.86” to “Table 310.60(C)(67) through Table 310.60(C)(86)”.

In 310.60(C)(1), change “Table 310.69, Table 310.70, Table 310.81, and Table 310.82” to “Table 310.60(C)(69), Table 310.60(C)(70), Table 310.60(C)(81), and Table 310.60(C)(82)”.

In the title of Figure 310.60, change “Table 310.77 Through Table 310.86” to “Table 310.60(C)(77) Through Table 310.60(C)(86)”.

Change title of “Table 310.67” to “Table 310.60(C)(67)”.
Change title of “Table 310.68” to “Table 310.60(C)(68)”.
Change title of “Table 310.69” to “Table 310.60(C)(69)”.
Change title of “Table 310.70” to “Table 310.60(C)(70)”.
Change title of “Table 310.71” to “Table 310.60(C)(71)”.
Change title of “Table 310.72” to “Table 310.60(C)(72)”.
Change title of “Table 310.73” to “Table 310.60(C)(73)”.
Change title of “Table 310.74” to “Table 310.60(C)(74)”.
Change title of “Table 310.75” to “Table 310.60(C)(75)”.
Change title of “Table 310.76” to “Table 310.60(C)(76)”.
Change title of “Table 310.77” to “Table 310.60(C)(77)”.
Change title of “Table 310.78” to “Table 310.60(C)(78)”.
Change title of “Table 310.79” to “Table 310.60(C)(79)”.
Change title of “Table 310.80” to “Table 310.60(C)(80)”.
Change title of “Table 310.81” to “Table 310.60(C)(81)”.
Change title of “Table 310.82” to “Table 310.60(C)(82)”.
Change title of “Table 310.83” to “Table 310.60(C)(83)”.
Change title of “Table 310.84” to “Table 310.60(C)(84)”.
Change title of “Table 310.85” to “Table 310.60(C)(85)”.
Change title of “Table 310.86” to “Table 310.60(C)(86)”.

Panel Statement: The panel accepts the identification change with the modification that the end parenthetic number is to match the existing suffix number of the table.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-124 Log #351 NEC-P06 **Final Action: Accept**
(310.60(C)(2)(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “for each”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-125 Log #286 NEC-P06 **Final Action: Accept**
(310.60(C)(4))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “formula” to “equation” in the first sentence.
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression, which follows.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-126 Log #291 NEC-P06 **Final Action: Reject**
(310.60(C)(4))

TCC Action: The Technical Correlating Committee directs that this proposal be reported as “Reject” as there is no second sentence.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “formula” to “equation” in the second sentence.
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression and 310.60(C)(4) contains a mathematical expression.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-127 Log #631 NEC-P06 **Final Action: Accept**
(310.60(C)(4))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 310.60(C)(4) as follows:
(4) ~~Ambients Not in Tables~~ Ambient Temperature Correction. Ampacities for ~~at~~ ambient temperatures other than those shown in the ampacity tables shall be ~~determined by means of~~ permitted to be calculated using the following ~~formula~~ equation:
Revise the equation and the explanation of terms to read as follows:

$$I' = I\sqrt{\frac{T_c - T_a'}{T_c - T_a}}$$

where:
I’ = ampacity corrected for ambient temperature
I = ampacity shown in the table for Tc and Ta.
Tc = temperature rating of conductor (ºC)
Ta’ = actual ambient temperature (ºC)
Ta = ambient temperature used in the table (ºC)

Substantiation: This proposal will provide correct terminology in the equation, be consistent with industry usage of the equation and correlate with other industry standards. Similar proposals are being submitted for 310.15(C) and 310.60(D).
The equation in 310.60(C)(4) may be used to calculate the ampacity for various ambient temperatures other than those specified in the Ampacity Tables. This equation appears in 3.4.1 on page Intro-10 of *IEEE STD 835 – 1994, IEEE Standard Power Cable Ampacity Tables*.
The dielectric loss temperature rise (ΔTD) was deleted since the dielectric loss is negligible for single circuit extruded dielectric cables rated below 46kV (see page Intro-2 of *IEEE STD 835 – 1994, IEEE Standard Power Cable Ampacity Tables*). 310.60 is applicable to conductors rated 2001-35,000 Volts and adjusts the ampacity for ambient temperatures other than those shown in the Tables for conductors rated up to 35,000 V.
The term “formula” normally refers to a chemical composition whereas the term “equation” indicates a mathematical expression.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-128 Log #264 NEC-P06 **Final Action: Accept**
(310.60(D))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “formula” to “equation” in the first sentence and in the FPN.
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematic expression, which is included in the section.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-129 Log #632 NEC-P06 **Final Action: Accept**
(310.60(D))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise the first paragraph in 310.60(D) as shown:
(D) Engineering Supervision. Under engineering supervision, conductor ampacities shall be permitted to be calculated ~~by means of~~ using the following general ~~formula~~ equation:
Immediately following the square root in the equation, add “x 103 amperes”.
The specific descriptive variables in the equation and the explanation of terms should be changed from upper case to lower case subscripts as shown:

from:	to:
TC	*Tc*
TA	*Ta*
ΔTD	*ΔTd*
RDC	*Rdc*
YC	*Yc*
RCA	*Rca*

The equation and explanation of terms will then read as follows:

$$I = \sqrt{\frac{T_c - (T_a + \Delta T_d)}{R_{dc}(1 + Y_c)R_{ca}}} \times 10^3 \text{amperes}$$

where:
Tc = conductor temperature in °C
Ta = ambient temperature in °C
ΔTd = dielectric loss temperature rise
Rdc = dc resistance of conductor at temperature Tc
Yc = component ac resistance resulting from skin effect and proximity effect
Rca = effective thermal resistance between conductor and surrounding ambient

Delete "FPN: See Annex B for examples of formula applications."

Add FPN following the explanation of terms to read:

"FPN: The dielectric loss temperature rise (ΔTd) is negligible for single circuit extruded dielectric cables rated below 46 kV."

Substantiation: This proposal will provide correct terminology and accuracy in the equation and be consistent with industry usage of the equation. Similar proposals are being submitted for 310.15(C) and 310.60(C)(4).

The term "formula" normally refers to a chemical composition whereas the term "equation" refers to a mathematical expression.

The variables should appear in regular size text accompanied by subscripts that identify the specific variable. For example, "*T*" designates a temperature variable and the subscripts "*c*" and "*a*" designate whether it is the conductor temperature or the ambient temperature.

This equation originally appeared in the *Transactions of the American Institute of Electrical Engineering, Vol. 76, 1957* and the result of the equation provides kiloamperes. Adding the 103 multiplier will provide an ampacity value rather than a kiloampere value and be consistent with the use of amperes throughout the Code. This equation also appears as Equation 9 on page Intro-39 of *IEEE STD 835 – 1994, IEEE Standard Power Cable Ampacity Tables*.

The existing FPN was deleted since Annex B does not contain any application examples of the equation in 310.60(D). The only equations and examples in Annex B are associated with Table B.310.11 and relate to adjustment factors for more than three conductors in a raceway or cable with load diversity. FPN No. 1 to Table 310.15(B)(2)(a) correctly directs the user to Annex B.

The new FPN was added to advise the user that the dielectric loss temperature rise (ΔTd) is negligible for single circuit extruded dielectric cables rated below 46kV (see page Intro-2 of *IEEE STD 835 – 1994, IEEE Standard Power Cable Ampacity Tables*). 310.60 is applicable to conductors rated 2001-35,000 Volts. The variable ΔTd is included in the equation for those large industrial and institutional users who may use the equation to calculate ampacities for 46 kV, 69 kV, or 138 kV.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-130 Log #421 NEC-P06 **Final Action: Accept**
(Table 310.77)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"(Three Conductors in an ~~per~~ Electrical Duct)" and "Electrical Duct Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-131 Log #422 NEC-P06 **Final Action: Accept**
(Table 310.78)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"(Three Conductors in an ~~per~~ Electrical Duct)" and "Electrical Duct Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-132 Log #423 NEC-P06 **Final Action: Accept**
(Table 310.79)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"(One Cable in an ~~per~~ Electrical Duct)" and "Electrical Duct Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-133 Log #424 NEC-P06 **Final Action: Accept**
(Table 310.80)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"(One Cable in an ~~per~~ Electrical Duct)" and "Electrical Duct Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-134 Log #425 NEC-P06 **Final Action: Accept**
(Table 310.81)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-135 Log #426 NEC-P06 **Final Action: Accept**
(Table 310.82)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-136 Log #427 NEC-P06 **Final Action: Accept**
(Table 310.83)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-137 Log #428 NEC-P06 **Final Action: Accept**
(Table 310.84)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-138 Log #429 NEC-P06 **Final Action: Accept**
(Table 310.85)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title revise as shown:
"Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-139 Log #430 NEC-P06 **Final Action: Accept**
(Table 310.86)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Table title, revise as shown:
"Arrangement in Accordance with ~~per~~ Figure 310.60".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 312 — CABINETS, CUTOUT BOXES, AND METER SOCKET ENCLOSURES

9-24 Log #2988 NEC-P09 **Final Action: Reject**
(312)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Rename and relocate the title of Part I as follows:
ARTICLE 312 Cabinets, Cutout Boxes, and Meter Socket Enclosures
I. Scope and General
312.1 Scope.
This article covers the installation and construction specifications of cabinets, cutout boxes, and meter socket enclosures.
~~I. Installation.~~
Substantiation: 312.1 doesn't fall under any Part of the Article. The proposed renaming and relocation of Part I provides consistency with Article 314, and puts the scope in Part I.
Panel Meeting Action: Reject
Panel Statement: CMP-9 acknowledges the anomaly of a scope statement outside of any enumerated part of a multipart article, but does not believe the proposal contributes to usability or clarity. CMP-9 recognizes that scope provisions, as well as style issues, are the province of the TCC and requests advice from the TCC as to whether a scope section outside of any enumerated article part should be relocated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-25 Log #4496 NEC-P09 **Final Action: Reject**
(312.2, FPN (New))

Submitter: Andrew C. Shinn, Randolph Community College
Recommendation: Add new FPN as follows: For conductors and cables installed, see 310.8
Substantiation: This new Fine Print Note should refer the installer to the proper conductors and cables to be used for wet locations.
Panel Meeting Action: Reject
Panel Statement: CMP-9 is unaware of any lack of understanding in the field as to the requirements for conductor installations in wet locations, particularly in light of recent clarifications made in Article 300, such as 300.9.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-26 Log #3478 NEC-P09 **Final Action: Reject**
(312.5(C))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Revise text to read as follows:
(C) Cables. Where cable is used, each cable shall be secured to the cabinet, cutout box, or meter socket enclosure.
Exception: Cables with entirely nonmetallic sheaths shall be permitted to enter the top or bottom of a surface-mounted enclosure through one or more nonflexible raceways not less than 450 mm (18 in.) and not more than 3.0 m (10 ft) in length, provided all of the following conditions are met:
Substantiation: Entering the bottom of a surface-mounted enclosure has been a common practice for many years when upgrading an electrical service for an existing house. The electrician is able to bring the branch-circuit cables out much easier from the crawl space of a dwelling rather than from the attic. There are other code rules that would protect non-metallic raceways from physical damage if this became an issue.
Panel Meeting Action: Reject
Panel Statement: The exception was written to allow such installations only at the top of the enclosure as the panel noted this limitation would assure that the outer raceway termination wouldn't be readily accessible (A98 ROC – 9-44). A rule written to address this concern, along with revision to part (b), penetration of a structural framing member, may be considered.
CMP-9 notes that a substantially equal installation to that cited in the substantiation can be performed under current NEC provisions using a raceway through the floor and terminating at a pull or junction box in the crawl space with the branch circuits entering through that pull box.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BELISLE, R.: The panel substantiation hinges on the probability of the raceway terminating in a readily accessible location. There is no proof provided by the CMP that every raceway leaving the bottom of an enclosure would terminate in a readily accessible location. The rules that are currently in effect for a raceway going up would also apply in the case of a downward installation, therefore no justification to reject this proposal was provided. The panel also cited concerns over penetrating a structural framing member, while current NEC text only disallows penetrating a structural ceiling, not stating concern with all structural members. Entry into a crawl space would most likely not penetrate a structural ceiling.

9-27 Log #352 NEC-P09 **Final Action: Reject**
(312.6 Exception)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise Exception as follows:
Exception: Wire-bending space in enclosures for motor controllers with provisions for one or two wires attached to a ~~per~~ terminal shall comply with 430.10(B).
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The preposition "per" in the English language carries the precise meaning of "for each" in the context in which it is used. The use has been consistent for many centuries because it is carried over from Latin. It is not subject to misunderstanding, and there is no substantiation available that it is being misapplied in the field. The NEC Style Manual does not list this word in "Table 3.2.1, Possibly Unenforceable and Vague Terms." Section 3.3.4 of the same document requires that "NEC language shall be brief, clear, and emphatic." Its use in this section and elsewhere is just so. Its use is not proscribed by the NFPA Style Manual and even appears in that manual as an example of properly worded text. Refer to A.2.3.5.2, which cites the following example: "Where joist channels are wider than 0.6 m (2 ft), more than one discharge device shall be required per channel."
CMP-9 recognizes that this is a style question that should be uniform across the NEC, and therefore within the province of the TCC. CMP-9 recommends that the word "per" remain in the NEC in its present usage, and as clearly allowed in all other NFPA standards as exemplified in the NFPA Manual of Style. CMP-9 is also concerned that subtle unintended differences may creep in through the revision process. This proposal is a case in point. It addresses the minimum sizing of motor terminal housings, which must be determined at the time of manufacture, and not at the time of field installation. The wording of the proposal, however, by using the verb "attached", suggests this to be a field issue and not a manufacturing issue. The proposal could be reworded to eliminate this possible misinterpretation, but it is far better to leave the existing wording in place.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-28 Log #431 NEC-P09 **Final Action: Reject**
(Table 312.6(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Revise multi-column heading from "Wires per Terminal" to "Number of Wires Attached to the Terminal".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-29 Log #432 NEC-P09 **Final Action: Reject**
(Table 312.6(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Revise multi-column heading from "Wires per Terminal" to "Number of Wires Attached to the Terminal".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-30 Log #947 NEC-P09 **Final Action: Reject**
(312.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Cabinets and cutout boxes shall have ~~sufficient~~ free space in accordance with Table 314.16(B) and to accommodate all conductors installed in them without damage to the conductors ~~crowding~~.
Substantiation: Edit. Proposal is more specific. "Crowding" is subjective as is "sufficient" which is a term to be avoided per the Style Manual. Conductors larger than 6 AWG are covered by 312.6.
Panel Meeting Action: Reject
Panel Statement: This rule does not reference 314.16 because the majority of applications do not involve wiring (6 AWG and smaller) covered by the prescriptive requirements in that section. Although 312.6 has a major impact on enclosure sizes, it is directly related to terminations and not numbers of conductors at a particular cross-section. This rule provides a basis for enforcement by an AHJ in the event that the dimensions met the prescriptive requirements of 312.6 and yet the fill was judged excessive in a particular case. CMP-9 would need to see actual substantiation of field problems with this wording to justify changing it.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-31 Log #327 NEC-P09 **Final Action: Reject**
(312.8)

Submitter: Joe Tedesco, Tedesco Electrical Code Consultants, Inc.
Recommendation: Add the following sentence:
Utilization equipment shall be permitted to be installed in a cabinet by special permission where it does not make contact with any of the branch circuit, feeder, or service conductors.
Substantiation: This will permit utilization equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting or similar purposes to be installed in the cabinet.
Panel Meeting Action: Reject
Panel Statement: The installations that would be permitted by this proposal would result in obstructions within cabinets that could not be evaluated by qualified testing laboratories in the process of evaluating equipment, such as panelboards, that would be installed in the associated cabinet. Pull boxes are available for these purposes, and when terminations are made, 312.6 and its associated tables provide the required dimensions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-32 Log #331 NEC-P09 **Final Action: Accept in Principle**
(312.8)

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
312.8 ~~Enclosures for switches or overcurrent devices.~~ Conductors, splices and taps within enclosures for switches or overcurrent devices.
Substantiation: The existing heading does not effectively describes the content of the article.
Panel Meeting Action: Accept in Principle
Refer to the action on Proposal 9-34 for the final wording of the title, which fully addresses the concerns of this proposal.
Panel Statement: CMP-9 agrees that the section should be retitled.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-33 Log #332 NEC-P09 **Final Action: Accept in Principle in Part**
(312.8)

TCC Action: The Technical Correlating Committee understands that the panel action does not accept the proposed wording.
Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
Enclosures for switches or overcurrent devices shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices, unless associated with the enclosure and adequate space for this purpose is provided.
Substantiation: Too often you can shut down the power to an enclosure with switches or overcurrent devices to comply with NFPA 70E only to find live wiring not associated with said control panel occupying the same space.
Panel Meeting Action: Accept in Principle in Part
Accept the principle that energized conductors within such an enclosure and unassociated with its principal function are a potential hazard. Reject the limitation presented in this proposal that prohibits any such conductors.
Panel Statement: The final wording to address the concern is found in the panel action on Proposal 9-34.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-34 Log #3758 NEC-P09 **Final Action: Accept in Principle**
(312.8)

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise 312.8 to read as follows:
312.8 Enclosures for Switches or Overcurrent Devices. The wiring space of enclosures for switches or overcurrent devices shall ~~not be used as junction boxes, auxiliary gutters, or raceways~~ be permitted for conductors feeding through, spliced, or tapping off to other enclosures, switches or overcurrent devices where both of the following conditions are met: ~~, unless adequate space for this purpose is provided. The conductors shall not fill the wiring space at any cross section to more than 40 percent of the cross-sectional area of the space, and the conductors, splices, and taps shall not fill the wiring space at any cross section to more than 75 percent of the cross-sectional area of that space.~~
1. The total of all conductors installed at any cross section of the wiring space does not exceed 40 percent of the cross-sectional area of that space.
2. The total area of all conductors, splices, and taps installed at any cross section of the wiring space does not exceed 75 percent of the cross-sectional area of that space.
Substantiation: This revision is suggested for usability. The current text has a first sentence that says you cannot use the space unless adequate space is provided and then the adequate space is described in the second sentence.
It would appear to be much more straightforward to simply state the rule to indicate that you can do feed-thru conductors, splices or taps if you meet specific requirements. The recommended revision changes the main paragraph to state that you can feed-thru, splice or tap provided you meet the two conditions. The two conditions specified are the two conditions from the existing text, but stated as a list.
Two minor editorial tweaks are made in the first sentence by adding the word "spliced" between "feeding through" and "or tapping off" and by adding the word "enclosures" before "switches or overcurrent devices". Adding "spliced" makes the text consistent with the area requirement that talks about conductors, splices and taps. Adding "enclosures" simply recognizes that the feed-thru or tap conductor may go to another switch or overcurrent device inside the same enclosure or it may go to another enclosure.
Panel Meeting Action: Accept in Principle
Revise 312.8 to read as follows:
312.8 ~~Enclosures for Switches or Overcurrent Devices.~~ Switch and Overcurrent Device Enclosures with Splices, Taps, and Feed-Through Conductors. The wiring space of enclosures for switches or overcurrent devices shall ~~not be used as junction boxes, auxiliary gutters, or raceways~~ be permitted for conductors feeding through, spliced, or tapping off to other enclosures, switches, or overcurrent devices where all of the following conditions are met: ~~, unless adequate space for this purpose is provided. The conductors shall not fill the wiring space at any cross section to more than 40 percent of the cross-sectional area of the space, and the conductors, splices, and taps shall not fill the wiring space at any cross section to more than 75 percent of the cross-sectional area of that space.~~
(1) The total of all conductors installed at any cross section of the wiring space does not exceed 40 percent of the cross-sectional area of that space.
(2) The total area of all conductors, splices, and taps installed at any cross section of the wiring space does not exceed 75 percent of the cross-sectional area of that space.
(3) A warning label is applied to the enclosure that identifies the closest disconnecting means for any feed-through conductors.
Panel Statement: The panel action accepts the proposal and also addresses the recommendations contained in Proposals 9-32 and 9-33.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-35 Log #3862 NEC-P09 **Final Action: Reject**
(312.8)

Submitter: Mike Theisen, Midwestern Electrical Seminars
Recommendation: Revise text as follows:
312.8 Enclosures for Switches or Overcurrent Devices.
Enclosures for switches or overcurrent devices shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices, unless adequate space for this purpose is provided. The conductors, splices, and taps shall not fill the wiring space at any cross section to more than 40 percent of the cross-sectional area of the space~~, and the conductors, splices, and tape shall not fill the wiring space of any cross section to more than 75 percent of the cross sectional area of that space.~~
Substantiation: Conduit fill is limited to 40% of the conduit area where more than list 2 conductors are installed. These same over heating issues are applicable to the wiring space inside enclosures that house switches or overcurrent devices.
Panel Meeting Action: Reject
Panel Statement: The 40 percent limitation for wire fill in a raceway or for wiring space within these enclosures does not address heating and is excessive for tap devices that can be serviced in place. No substantiation has been presented that demonstrates that the current 75 percent limitation is technically incorrect or is causing difficulties in the field.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-36 Log #4610 NEC-P09 **Final Action: Accept**
(312.10(B) (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following new subsection to 312.10, renumbering the present 312.10(B) and 312.10(C) as 312.10(C) and 312.10(D) respectively:
(B) Enclosure Edges. All sharp edges of metal enclosures within the scope of this article that are subject to hand contact during customary installation activity shall, at the time of manufacture, be protected or shall be de-burred and rounded to minimize the risk of injury.
Substantiation: This proposal incorporates by this reference all technical substantiation provided in the 2008 cycle relative to Proposal 9-81 and Comment 9-42. The proposal is being made to rebut the position of the TCC that resulted in the rejection of this action in the 2008 cycle on the basis that it contained "unenforceable and vague terminology, such as "during customary installation activity" and "at the time of manufacture, be protected."
This action is to occur in Part II of the article, covering construction specifications. Parts of articles that include these parts are collections of policy statements by the NEC Committee that provide the basis for specific requirements developed as part of the product standard development process. We need go no further than the other lettered paragraphs in the proposed section to illustrate this principle. Current Part (A) requires protection against corrosion inside and out; how is this more enforceable? Current Part (B) requires "ample strength and rigidity"; how is this less vague? The phrase "at the time of manufacture" effectively mandates that this become a subject for the product standard. The fact is that without product standards the North American safety system falls apart.
It would indeed be possible to write very specific rules, and they would not be pretty. We could access CPSC medical research and discover what radius (in microns, of course) of curvature on a raw edge of what degree of angle constitutes a cut hazard, and perhaps even make a stab at refining that number to account for the fact that most electricians have pretty tough skin on their hands. Where in the NEC does such a rule exist in a construction specification part of an article? Nowhere. The submitter has great confidence that if this policy direction becomes part of the NEC, the standards developers and the manufacturers will come up with something appropriate.
This issue has come up many times over the years, and CMP 9 has deferred to the product standards over and again, and nothing has taken place. This submitter is the senior member on CMP 9, and during the proposal period warned the NEMA and UL representatives that this was a recurring issue and that patience was running out. Nothing happened. The submitter of Comment 9-42, in his activities with the JATC, noted at the comment meeting that the problem among his members was so routine and severe that they were issuing gloves to avoid cuts on the metal edges. Enough is enough. This submitter, a working electrician 40 hours a week, wears the substantiation for this proposal in the form of scar tissue on his hands.
This proposal has no delayed effective date. The manufacturers have had their three years; if they promise to take this seriously then a date can be set as part of the comment period. The policy decision should stand.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 12
Ballot Results: Affirmative: 8 Negative: 4
Explanation of Negative:
BREITKREUTZ, B.: UL already has a manufacturing standard for sharp edges. Also, sharp edges may be de-burred or rounded in the field if desired. Installers should wear gloves when handling metal enclosures.
COGHILL, P.: Product Standards have requirements which address sharp edges. This matter should be raised to the STP for the appropriate product standard.
OSBORNE, R.: Panel members agree that the concern with sharp edges is one to be addressed by the product standards. Requirements exist in the Standards, and members of the panel were encouraged to participate in the Standards process if they believed requirements were in need of revision. As a result of discussions during the last Code cycle, all members were extended an invitation to join Standards Technical Panels, and encouraged to file field complaints so problems could be identified and addressed. No members choose to accept this invitation, and, no field reports related to this issue have been filed. Properly documented field complaints can be used to identify whether a problem is specific to an industry, a manufacturer, or a specific factory. Multiple field complaints for a specific category and/or specific issue can be used to identify a systemic problem and may used to develop proposals to a standard or revisions to a certification program.
It should also be noted that what constitutes a sharp edge is subjective, and with any subjective requirement, the code user is placed at a disadvantage when applying the requirements. Additionally, the ability of the AHJ to decide on the approval of equipment is already provided in 90.4. Should inspectors conclude that sufficiently sharp edges exist on equipment, they can reject the installation citing 90.4.
It is suggested that panel members refocus their efforts and address this concern in the proper forum rather than introducing requirements that are misplaced.
RUPP, B.: The substantiation for this proposal states that this issue has come up repeatedly over the years yet NEMA manufacturers of this equipment and UL representatives have no documented incidents or field complaints dealing with this issue. This lack of evidence and factual substantiation supports NEMA's position that this requirement is adequately addressed in the standards covering these products and is not needed within the installation code. In addition, the submitter's substantiation states that "The proposal is being made to rebut the position of the TCC…" yet none of the objectionable wording previously identified by the TCC has been changed in this proposal.
NEMA manufacturers continue to encourage their customers to provide feedback when their products cause injuries. Also, UL actively solicits participation on the technical panels of the product standards to affect changes where necessary.
Comment on Affirmative:
BELISLE, R.: It is essential that it be noted in accepting this proposal, that a clarification be made regarding product standards. Current product standards only address that sharp edges shall not be sufficiently sharp to cause a risk of injury in normal "*maintenance or use*." This proposal intentionally identifies the edges of concern as those that are "subject to hand contact during customary **installation** activities." This is clearly different than the requirements in existing standards and most definitely needed to address the status of the current industry problems regarding injuries.
HARTWELL, F.: Although the issues raised in this proposal are frequently reserved for product standards, the NEC does enter this arena if the product standards consistently fail to adequately address a safety concern. The boilerplate about no sharp edges in UL67 is not adequate, as a generation of electricians will attest. In the 1996 NEC cycle (Proposal 9-55) CMP 9 rejected a proposal on this subject, saying "This is an issue better left to product standards and testing laboratories." In the 2002 NEC cycle CMP 9 rejected another proposal on this subject, saying "Product standards provide requirements and test for sharp edges. Problems should be directed to manufacturers or follow-up service departments of the various testing laboratories." There have been general discussions during other cycles as well. CMP 9 has shown great patience for the usual process, and the voices of the panel members who actually install this equipment clearly support the argument that electricians are still getting injured in significant numbers. This proposal should remain accepted in order to add the voice of the NFPA process to the standard manufacturing protocols. No harm should befall equipment manufacturers, who will all be impacted equally because the relevant enclosures differ little across the various brands. If this adds even a dollar to the cost of an enclosure (likely a high number), it will be money well spent, and an expense the industry can and should afford.
YOUNG, R.: The ACC supports having enclosures with no sharp edges; however, it will be difficult for inspectors and users to determine edges are too sharp without a reference to a product standard or listing or other specific testing means that defines a test method and pass/fail requirements.

ARTICLE 314 — OUTLET, DEVICE, PULL, AND JUNCTION BOXES, CONDUIT BODIES; FITTINGS; AND MANHOLES

9-37 Log #3065 NEC-P09 **Final Action: Accept**
(314.5)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Delete the following text:
~~314.5 Short-Radius Conduit Bodies.~~
~~Conduit bodies such as capped elbows and service-entrance elbows that enclose conductors 6 AWG or smaller, and are only intended to enable the installation of the raceway and the contained conductors, shall not contain splices, taps, or devices and shall be of sufficient size to provide free space for all conductors enclosed in the conduit body.~~
Substantiation: This is a companion proposal to move this text to section 314.16(C)(2). This proposal should only be accepted if that proposal is accepted as well.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-38 Log #2961 NEC-P09 **Final Action: Reject**
(314.15)

Submitter: Paul A. Keleher, Paul Keleher Electrical Services
Recommendation: Revise text as follows:
In damp or wet locations, boxes, conduit bodies and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body or fitting. Boxes, conduit bodies and fittings installed in wet locations shall be listed as watertight ~~for use in wet locations~~.
Substantiation: The requirements of sections 230.54(C), 230.54(F) and 230.54(G), are all intended to keep water from entering an overhead service at the service head. In their present wording, these sections rely on the positioning and arrangement of conductors, fittings and attachments to prevent the entry of water into a service raceway or cable. There is evidence to indicate that these requirements are not sufficient not sufficient to keep water from penetrating service raceways and cables at the service head.
Photographs taken by the submitter of installations that are fully compliant with these requirements are attached to this proposal as evidence of their failure to keep water from entering service equipment. The pictures illustrate a fully compliant installation which, when discovered 5 years after installation, had active water flowing inside the raceway onto the service terminals as shown in the pictures.
Service head fittings generally available for installation under these sections, when installed per their listing instructions, do not provide any seal against water penetration between the individual service conductors where the service conductors protrude from the service head to the point-of-attachment, or in the case of service cables, where the jacketed cable enters the service head.
Since Sections 230.54(A) and 230.54(B) require service heads for raceways and cable to comply with the requirement for fittings in 314.15, the proposed change to 314.15 would require the listing requirements of products intended for installation under these sections to include testing that meets the definition in Section 100 of "watertight" (Constructed so that water will not enter the enclosure under specified test conditions.).
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: CMP-9 is not convinced that the supplemental information provided with this proposal adequately substantiates the proposed requirement, which would compel changes to certain product standards. The service head in the photograph does not point down and is therefore improperly installed. In addition, the LB below the meter socket does not appear to have a weep hole (although this is not completely clear) and if this is the case, the installation is in violation of 230.53. Had the raceway been arranged to drain, the water would never have reached the panel.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-39 Log #3648 NEC-P09 **Final Action: Reject**
(314.16)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
314.16 Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies.
Boxes and conduit bodies enclosing conductors 4 AWG or larger shall ~~also~~ comply with the provisions of 314.28.
Substantiation: There are no volumes 314.16 that let you apply the in this section to conductors #4 and larger. The only rules that apply to these larger conductors are the ones found in 314.28.
Panel Meeting Action: Reject
Panel Statement: Although there are no prescriptive requirements in this section that apply to large conductors, the parent language about sufficient size does apply.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-40 Log #433 NEC-P09 **Final Action: Reject**
(Table 314.16(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise Table title as follows:
Table 314.16(B) Volume Allowance Required for Each ~~per~~ Conductor
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
This revision will also correlate with the heading over the last two columns in the Table.
The Index will need to be corrected to reflect this change.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-41 Log #3910 NEC-P09 **Final Action: Reject**
(314.16(B)(2))

Submitter: Andrew Darois, David Kramer Electric
Recommendation: Revise text as follows:
Clamps in molded plastic boxes that are built in shall not be counted.
Substantiation: These boxes are made with the clamps. Their volume is calculated taking into account the clamps. Some inspectors will have you count the clamps.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is inaccurate. The total cubic inches for nonmetallic boxes is determined with the internal cable clamps removed prior to the determination by the third-party testing agency. The requirement to take a single volume allowance for cable clamps is based on the fact that the clamps reduce the usable volume in the box when the box is wired. A molded clamp will reduce the usable volume when it is employed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-42 Log #179 NEC-P09 **Final Action: Reject**
(314.16(B)(4))

Submitter: Eric W. Dougan, Louis Perry and Associates
Recommendation: Add new text to read as follows:
"For GFCI receptacles or dimmer switches a triple volume allowance, in accordance with Table 314.16(B), shall be made for each device based on the largest conductor connected to the device."
Substantiation: If the minimum calculated box size (based on existing volume allowances per NEC) is used for GFCIs and dimmers installation is difficult trying to push device back into box after wiring.
Panel Meeting Action: Reject
Panel Statement: The volume requirements were increased years ago to accommodate larger devices because the decision as to what actual device would be used in a particular box was frequently made long after the rough inspection and the walls being closed in. The substantiation for this proposal could be considered in the context of partially reversing that former change and only applying a double allowance to GFCIs and dimmers, but it is not sufficient to require a triple allowance for these devices.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-43 Log #241 NEC-P09 **Final Action: Reject**
(314.16(B)(4))

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Revise as follows:
A device or utilization equipment wider than a single 50 mm (2 in.) ~~device box as described in Table 314.16(A)~~ shall have double volume allowances provided for each gang of box required for mounting.
Substantiation: The change to the 2008 NEC, requiring additional device or equipment fill allowances, appears to be related to the width of the device or utilization equipment rather than the width of the box. While the width of the box can be used to determine the width of the device or equipment, a direct reference to the device or equipment seems less complicated.
Panel Meeting Action: Reject
Panel Statement: The requirement is based whether the device will fit in a single-gang device box with a nominal dimension of 50 mm (2 in.). Therefore, the rule does relate to the width of the installed devices, but in the context of how many gangs are required to accommodate them. If a two-gang box is required to support the device, then a fill allowance based on two devices is to be applied. Since some nonmetallic boxes are just enough larger to cause questions on certain devices, CMP-9 decided to specify the metal boxes covered in the table as the reference. These boxes are not exactly 50 mm (2 in.) wide, which is why the metric linear dimensions in the table are hard conversions. Since this rule concerns a linear measurement, the reference to the table is the only appropriate measurement. Note that the volumes in the table

are exact, and those metric conversions are soft conversions accordingly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-44 Log #723 NEC-P09 **Final Action: Reject**
(314.16(B)(4))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
314.16 Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies.
Boxes and conduit bodies shall be of sufficient size to provide free space for all enclosed conductors. In no case shall the volume of the box, as calculated in 314.16(A), be less than the fill calculation as calculated in 314.16(B). The minimum volume for conduit bodies shall be as calculated in 314.16(C).
The provisions of this section shall not apply to terminal housings supplied with motors or generators.
FPN: For volume requirements of motor or generator terminal housings, see 430.12.
Boxes and conduit bodies enclosing conductors 4 AWG or larger shall also comply with the provisions of 314.28.
(B) Box Fill Calculations. The volumes in paragraphs 314.16(B)(1) through (B)(5), as applicable, shall be added together. No allowance shall be required for small fittings such as locknuts and bushings.
(4) Device or Equipment Fill. For each yoke or strap containing one or more devices or equipment, a double volume allowance in accordance with Table 314.16(B) shall be made for each yoke or strap based on the largest conductor connected to a device(s) or equipment supported by that yoke or strap. A device or utilization equipment wider than a single 50 mm (2 in.) device box as described in Table 314.16(A) shall have double volume allowances provided for each gang required for mounting. <u>No additional volume allowance shall be required for connectorized terminations where those connectorized terminations for each device are terminated at that device. Where a device intended for connectorized terminations has yet to be installed or has been removed but its connectorized terminations are installed within the box, a double volume allowance shall be provided in anticipation of the device to be installed.</u>
[remainder of 314.16 unchanged by this Proposal]
Substantiation: A number of Listed devices are being provided with connectorized termination to speed installation (and subsequent replacement) and to minimize exposure to damage by the work of other trades during construction. Some examples are SNAPconnect™ by Hubbell, Quick-Tech™ by Bryant Electric, PlugTail™ by Pass & Seymour, and Lev-Lok by Leviton. There has been confusion by some electrical inspectors trying to treat the connectorized termination as YET ANOTHER device WITHIN the same device box gang in terms of volume allowances. The connectorized termination is to be regarded as part of the device when the device is installed and the connectorized termination is terminated in the device, since the mated combination consumes equivalent wiring volume to a typical terminated device having more traditional terminals (wire-binding screws, wiring clamp terminals, push-in pressure terminals, etc.). When the installed connectorized termination is left unterminated to a device and available for future termination, it should be regarded as consuming the wiring volume equivalent to the mated combination of the device and connectorized termination that could be eventually installed.
Although the examples of devices cited all employ a single connectorized termination for each device, it's readily foreseeable that some of such devices could employ multiple or modularly interlocked connectorized terminations for each device.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: CMP-9 agrees with the submitter that no additional volume allowances need be provided for this method beyond the double allowance now in the NEC. The terminating equipment is no different than a twist-on wire connector or a locknut or bushing [see 314.16(B)], and the wiring tails are plainly exempt by 314.16(B)(1). No change in the NEC is required.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-45 Log #3798 NEC-P09 **Final Action: Reject**
(314.16(B)(4))

Submitter: Ted "Smitty" Smith, Electrical Experts Consulting
Recommendation: Add text to read as follows:
Device or Equipment Fill. For each yoke or strap containing one or more devices or equipment, a double volume allowance in accordance with Table 314.16(B) shall be made for each yoke or strap based on the largest conductor connected to a device(s) or equipment supported by that yoke or strap. A device or utilization equipment wider than a single 50 mm (2 in) device as described in Table 314.16(A) shall have double volume allowances provided for each gang required for mounting. <u>A GFCI or AFCI duplex receptacle shall have three volume allowances provided for each GFCI or AFCI duplex receptacle installed in a box.</u>
Substantiation: With the new exceptions to 210.12 AFCI receptacles are now becoming available and GFCI receptacles of course have been in use for many years. The AFCI and GFCI receptacles are significantly larger than a standard device that is mounted on a single yoke. All field electricians have recognized this for many years and yet the CMP has been reluctant to allow changes to box fill requirements based on this. By requiring one additional volume allowance for these larger than normal receptacles we will be making the installations a little safer by giving these larger receptacles the room they need, we will be sizing the boxes larger, thereby reducing the damage to conductors and devices and reducing the heat in the box.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-42.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-46 Log #3799 NEC-P09 **Final Action: Reject**
(314.16(B)(4))

Submitter: David Filipiak, Sky Electric, Inc.
Recommendation: Add text to read as follows:
"...each gang required for mounting. <u>If a device is larger than 4.5 cubic in. (i.e., GFCI receptacles) in overall size a triple volume allowance in accordance with Table 314.16(B) shall be made for each yoke or strap based on the largest conductor connected to a device."</u>
Substantiation: Duplex GFCI receptacles on average are 1.85 times the size of a standard NEMA 5-15 duplex receptacle thus the need for a larger device box. A larger device box will allow the conductors attached to a GFCI receptacle the ability to be installed in a neat and workmanlike manner
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-42.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-47 Log #3496 NEC-P09 **Final Action: Reject**
(314.16(B)(4) Exception)

Submitter: Jeff Iott, Masco Corp.
Recommendation: Add an Exception to 314.16(B)(4):
<u>Exception: Listed devices and equipment wider than a single 50 mm (2 in.) device box that are marked with the cubic in. volume that they occupy within device boxes shall have their volume deducted based on their markings.</u>
Substantiation: None given.
Panel Meeting Action: Reject
Panel Statement: Current product standards do not require the devices to be marked with their volume. Without substantiation, it is difficult to determine the intent of the submitter. Technical substantiation is required by the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-48 Log #3066 NEC-P09 **Final Action: Accept**
(314.16(C)(2))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Relocate the existing text of 314.5 to 314.16(C)(2) as follows.
(2) With Splices, Taps, or Devices. Only those conduit bodies that are durably and legibly marked by the manufacturer with their volume shall be permitted to contain splices, taps, or devices. The maximum number of conductors shall be calculated in accordance with 314.16(B). Conduit bodies shall be supported in a rigid and secure manner.
<u>Short radius conduit bodies such as capped elbows and service-entrance elbows that enclose conductors 6 AWG or smaller, and are only intended to enable the installation of the raceway and the contained conductors, shall not contain splices, taps, or devices and shall be of sufficient size to provide free space for all conductors enclosed in the conduit body.</u>
Substantiation: The rules for splicing conductors in conduit bodies should be in one section, not scattered throughout the article. A companion proposal to delete 314.5 will be made for correlation.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-49 Log #3887 NEC-P09 **Final Action: Reject**
(314.17(A))

Submitter: Jose Casillas, E Light Electric Services
Recommendation: Revise text as follows:
(A) Openings to be closed. Openings through which conductors enter shall be adequately (~~closed~~) (sealed).
Substantiation: Closed can mean anything, but sealed gives a better understanding and is safer as far as fire dangers. You can open and close a door, but to seal it is a lot better.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been provided to actually seal such an opening around a wiring entry. Boxes frequently have mounting holes or weep holes and these are not required to be sealed. Additional substantiation would need to be provided to support the argument that wiring entries should require

more complete closures.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-50 Log #2070 NEC-P09 **Final Action: Reject**
(314.17(B))

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text to read as follows:

(B) Metal boxes, <u>enclosures</u>, and conduit bodies. Where raceway or cable is installed with metal boxes, <u>enclosures</u>, or conduit bodies, <u>not extending more than 3/4 in. beyond the fitting</u>, the raceway or cable shall be secured to such boxes, <u>enclosures</u>, and conduit bodies.

Substantiation: The NM cable sheath is being left more than 3 in. beyond the fittings, clamps, and the like, at different lengths in all types of equipment and enclosures leaving an unprofessional installation, adding heat, smoke, fuel to these enclosures increasing a type of fireload.
Panel Meeting Action: Reject
Panel Statement: The solution is in the wording of 300.14, because the 6-in. rule only begins where at the point where the sheath of a cable ends. The additional sheath as described in the substantiation, together with the conductors, may well overcrowd the box and as such would violate the first sentence of 314.16. CMP-9 prefers to not set a specific limit on permitted sheath length. At 314.17(B), this would only apply to metal boxes. Type NM cable is used quite often with nonmetallic boxes.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-51 Log #4612 NEC-P09 **Final Action: Reject**
(314.17(D))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete the existing text and replace it with the following:

(D) Protection During Construction. Where outlet or device boxes are secured in place prior to the application of the surface finish and arranged for flush mounting in drywall, the open fronts shall be covered to prevent conductor damage during the surface application construction activities with protective plates identified for this purpose and marked “Not for Permanent Installation.”

Substantiation: The existing text, covering 4 AWG and larger conductors, add nothing to NEC requirements and can be deleted. The new text responds to an informal reconsideration of Proposals 3-32, 3-35, 3-36, and 9-38, and also Comments 3-8, 3-11, 3-13, 3-14, 3-15, 3-16, and 3-17 by a task group. The public is invited to review that material as part of its review of any action taken on this proposal. The intent is to respond to the prior substantiation with a requirement that reaches the source of the problem, and goes no further.

The reported problems that are of concern to this submitter focus on actual damage to conductors inflicted by pin routers run to let boxes into the finished dry wall sheet. The operator cannot see conductors within the box during the application of this tool. If the wires are anywhere near the forward edge of the box they will be damaged as the drywall sheet assumes its final position and the router plunges ahead. Other substantiation pointed to mud in boxes requiring time to clean out, but these problems are not safety issues; a little patience at the finish wiring stage will correct the problems.

A cut conductor, however, is another matter. The economic incentive for avoiding/disguising compliance with 300.14, which could often involve removing numerous sheets of drywall to rewire the box if enough additional cable is not available outside the box, is often extremely significant. If it occurs there is a genuine safety concern. We are long past the days when dry wall installers cut box openings by marking the location and cutting away from the box.

This proposal is limited to flush drywall applications where the box is secured as a rough opening. It does not apply to any other wall treatment. It does not apply to old work boxes. It does not apply to surface installations. The submitter intends this requirement to apply only to those instances where actual and not easily correctable damage to wiring occurs. The proposal also does not specify the material from which the protective plates must be made, or the thickness of the materials chosen. If reports come in of routers routinely penetrating nonmetallic covers, then CMP 9 would need to consider limiting the choice of materials, but that would drive up costs and should await actual loss reports. For now, whatever products a manufacturer is comfortable putting out on a cut sheet is sufficient. A listing requirement seems excessive at this time.

Panel Meeting Action: Reject
Panel Statement: No substantiation was provided to delete the existing text other than the submitter’s personal opinion that the existing text “add nothing to NEC requirements.”

Protection of all electrical equipment is important during construction. The panel agrees that electrical equipment of all types (i.e., including the various boxes covered by Article 314) are vulnerable as noted in the substantiation. The use of protective cover plates is permitted today, but is not the sole method for ensuring damage is not encountered and that the integrity of the electrical equipment and connections are maintained in accordance with 110.12(B). Prescriptive requirements should not be imposed, but rather a focus on compliance of the final installation.

While these covers may provide an alternative method to protecting conductors from damage and foreign material, they could create an enforcement and inspection problem by possibly requiring an additional rough inspection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-52 Log #1535 NEC-P09 **Final Action: Reject**
(314.17(E) or 314.26)

Submitter: Carlo Compagnone, Jr., Compa Covers, Inc.
Recommendation: Add new text as follows:

The open front of both metal and nonmetallic electrical device boxes shall be temporarily covered to protect insulated electrical conductors from physical damage or deterioration due to power routers, plaster, paint spray guns, spray foam insulation, and other potential damage during construction. The covers shall be clearly marked “Not For Permanent Installation”.

Substantiation: Leaving the front end of an electrical box open during the preliminary stages of construction results in exposed wires. This allows electrical wiring to be vulnerable to be cut or damaged during construction with power routers along with plaster filled boxes and overspray from paint guns and spray foam insulation guns, which in the end will leave a poor and unsafe working environment. Having a temporary cover on an electrical box is most of all a safety factor. Such covers will prevent build up of debris and puts a stop to unauthorized personnel tampering with wiring during the time of construction.

I have also submitted this proposal to Code-Making Panel 3 for 300.4(G).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-51.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-53 Log #304 NEC-P09 **Final Action: Accept in Principle**
(314.21)

Submitter: Alan Chech, Alan Chech Electrical Seminars
Recommendation: Revise text to read as follows:
314.21 Repairing ~~plaster and drywall or plasterboard.~~ <u>Non-combustible surfaces</u>.
Substantiation: Make same as 312.4, p. 164.
Panel Meeting Action: Accept in Principle

See the action on Proposal 9-54.

Panel Statement: The action on Proposal 9-54 meets the submitter’s intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-54 Log #3797 NEC-P09 **Final Action: Accept**
(314.21)

Submitter: Ted “Smitty” Smith, Electrical Experts Consulting
Recommendation: Revise text to read as follows:

Repairing ~~Plaster and Drywall or Plasterboard~~ <u>Noncombustible Surfaces</u>. ~~Plaster, drywall, or plasterboard~~ <u>Noncombustible</u> surfaces that are broken or incomplete around boxes employing a flush-type cover or faceplate shall be repaired so there will be no gaps or open spaces greater than 3 mm (1/8 in.) at the edge of the box.

Substantiation: The revised text makes this required for junction boxes and outlet boxes the same as required for cabinets, cutout boxes and meter socket enclosures as revised in the 2008 NEC. The requirements should be the same as the safety hazards are the same for all of these types of boxes and the code should be consistent in its requirements.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-55 Log #4806 NEC-P09 **Final Action: Reject**
(314.22)

Submitter: Leo F. Martin, Jr., Martin Electrical Code Consultants
Recommendation: Revise text to read as follows:

314.22 Add an additional sentence to read <u>Length of free conductor shall be in accordance with 300.14.</u>

Substantiation: It is necessary for maintenance that sufficient access to splices be permitted without dismantling the wiring system to gain access.
Panel Meeting Action: Reject
Panel Statement: Nothing in this rule makes 300.14 inapplicable, and therefore the applicability of 300.14 need not be restated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-56 Log #4744 NEC-P09 **Final Action: Accept in Principle**
(314.23(E) Exception)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
(E) Raceway Supported Enclosure, Without Devices, Luminaires, or Lampholders. An enclosure that does not contain a device(s) other than splicing devices or support a luminaire(s), lampholder, or other equipment and is supported by entering raceways shall not exceed 1650 cm3 (100 in.3) in size. It shall have threaded entries or have hubs identified for the purpose. It shall be supported by two or more conduits threaded wrenchtight into the enclosure or hubs. Each conduit shall be secured within 900 mm (3 ft) of the enclosure or within 450 mm (18 in.) of the enclosure if all conduit entries are on the same side.
Exception: Rigid metal, intermediate metal, or rigid polyvinyl chloride nonmetallic conduit (PVC), reinforced thermosetting resin conduit (RTRC) or electrical metallic tubing shall be permitted to support a conduit body of any size, including a conduit body constructed with only one conduit entry, provided the trade size of the conduit body is not larger than the largest trade size of the conduit or electrical metallic tubing.
Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of "nonmetallic" and add in each of the specific raceway types. Non-metallic conduit now has four different types of raceways and not all non-metallic raceway types would be acceptable in all locations.
Panel Meeting Action: Accept in Principle
Revise the exception to read as follows:
Exception: The wiring methods listed in (1) through (5) shall be permitted to support a conduit body of any size, including a conduit body constructed with only one conduit entry, provided the trade size of the conduit body is not larger than the largest trade size of the conduit or tubing.
(1) Intermediate metal conduit, Type IMC
(2) Rigid metal conduit, Type RMC
(3) Rigid polyvinyl chloride conduit, Type PVC
(4) Reinforced thermosetting resin conduit, Type RTRC
(5) Electrical metallic tubing, Type EMT.
Panel Statement: CMP-9 agrees with the technical merit of the proposal. However, the resulting sentence will be too long to be easily understood. The panel action creates a list format, presented in the Chapter 3 article order.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-56a Log #CP900 NEC-P09 **Final Action: Accept**
(314.24)

Submitter: Code-Making Panel 9,
Recommendation: Revise 314.24 to read as follows:
314.24 Depth of Boxes. Outlet and device boxes shall have sufficient depth to allow equipment installed within them to be mounted properly and without likelihood of damage to conductors within the box.
(A) Outlet Boxes Without Enclosed Devices or Utilization Equipment. Outlet boxes that do not enclose devices or utilization equipment shall have a minimum internal depth of 12.7 mm (½ in.).
(B) Outlet and Device Boxes With Enclosed Devices or Utilization Equipment. Outlet and device boxes that enclose devices or utilization equipment shall have a minimum internal depth that accommodates the rearward projection of the equipment and the size of the conductors that supply the equipment. The internal depth shall include, where used, that of any extension boxes, plaster rings, or raised covers. The internal depth shall comply with all applicable provisions of (1) through (5).
(1) Large Equipment. Boxes that enclose devices or utilization equipment that projects more than 48 mm (1 7/8 in.) rearward from the mounting plane of the box shall have a depth that is not less than the depth of the equipment plus 6 mm (1/4 in.).
(2) Conductors Larger Than 4 AWG. Boxes that enclose devices or utilization equipment supplied by conductors larger than 4 AWG shall be identified for their specific function.
Exception to (2): Devices or utilization equipment supplied by conductors larger than 4 AWG shall be permitted to be mounted on or in junction and pull boxes larger than 1650 cm3 (100 in.3) provided the spacing at the terminals meets the requirements of 312.6.
(3) Conductors 8, 6, or 4 AWG. Boxes that enclose devices or utilization equipment supplied by 8, 6, or 4 AWG conductors shall have an internal depth that is not less than 52.4 mm (2 1/16 in.).
(4) Conductors 12 or 10 AWG. Boxes that enclose devices or utilization equipment supplied by 12 or 10 AWG conductors shall have an internal depth that is not less than 30.2 mm (1 3/16 in.). Where the equipment projects rearward from the mounting plane of the box by more than 25 mm (1 in.), the box shall have a depth not less than that of the equipment plus 6 mm (¼ in.).
(5) Conductors 14 AWG and Smaller. Boxes that enclose devices or utilization equipment supplied by 14 AWG or smaller conductors shall have a depth that is not less than 23.8 mm (15/16 in.).
Exception to (1) through (5): Devices or utilization equipment that is listed to be installed with specified boxes shall be permitted.
Substantiation: CMP 9 agrees with the many proposals submitted to add devices to the requirements in this section. This proposal returns this language (with the order changed slightly to agree with the current organization of the section) to that accepted by CMP 9 during the proposal stage of the 2008 NEC cycle as submitted by its task group (see Proposal 9-52 for that cycle). Upon reconsideration, CMP 9 finds no reason to exclude devices from the requirements presented here. A conductor pinned against the back wall of a box, particularly if forced against an inwardly-punched knockout or a poorly finished mounting hole, will be subject to insulation failure just as surely as if it were pinched by utilization equipment.
CMP 9 notes that its task group that generated the original 2008 proposal included a device manufacturer representative. That task group took care to review the box depths provided and compare them with wire dimensions in Table 5 of Chapter 9 and many actual representative device sizes. CMP 9 now concludes that the dimensions chosen will not adversely impact customary installation practice.
CMP 9 solicits industry comments that provide specific evidence of specific installation problems related to these dimensions for review at its December meeting.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-57 Log #1824 NEC-P09 **Final Action: Accept in Principle in Part**
(314.24)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: MINIMUM DEPTHS and WIDTHS OF BOXES. Boxes shall have a depth and width to allow conductors and other equipment to be installed in them without damage, and shall comply with applicable provisions of 314.16.
(A) BOXES WITHOUT ENCLOSED EQUIPMENT (other than splicing devices. No box shall have an internal depth of less than 23.8 mm (15/16 in.) and not less than 6 mm (1/4 in.) greater than the device or equipment contained. The internal depth shall be permitted to include that of any extension box, plaster ring, or raised cover. The internal depth shall comply with all applicable provisions of (C)(1) through (C)(5).
(1) CONDUCTORS LARGER THAN 4 AWG. Boxes that enclose conductors larger than 4 AWG shall comply with applicable provisions of 314.16 and 314.28.
(2) CONDUCTORS of 8, 6, or 4 AWG. Boxes that enclose conductors of 8,6, or 4 AWG shall have an internal depth that is not less than 52.4 mm (2-1/16 in.).
(3) CONDUCTORS 10 awg OR SMALLER. Boxes that enclose conductor 10 AWG or smaller shall have an internal depth of not less than 30.2 mm (1 3/16 in). Where the box also encloses equipment (other than splicing devices) the box shall have an internal depth not less than the equipment plus 6 mm (1/4 in.).
Substantiation: Edit. "Sufficiently: and "properly" are subjective and terms to be avoided per the Style Manual. Applicable provisions of 314.16 apply. "Outlet" and "device" are superfluous, covered in the title of this article. "Boxes" covers various uses and types. Splicing devices should be excluded. Equipment may be other than utilization equipment (that which does not utilize power) such as a switching device. The 1/4 in. clearance should also apply to width and whether or not equipment projects 1-7/8 in. rearward. Boxes that enclose 4 AWG or larger conductors whether or not connected to equipment within the box should comply with 314.16 and 314.28, which apply. (C)(5) should include all conductors smaller than 10 AWG.
Panel Meeting Action: Accept in Principle in Part
Accept in principle the concept of adding devices to the coverage provided by this section, as addressed in panel proposal 9-56a. Reject the depth modifications from current requirements.
Panel Statement: The depth modifications oversimplify the requirements and eliminate ceiling pans entirely.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-58 Log #3637 NEC-P09 **Final Action: Reject**
(314.24(B))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Revise text to read as follows:
314.24(B) Outlet and Device Boxes with Enclosed Devices. Boxes intended to enclose ~~flush~~ devices shall have an internal depth of not less than the depth of the device plus 6 mm (1/4 in.). ~~23.8 mm (15/16 in.).~~
Substantiation: The rules adopted in 314.24(C) in the previous cycle are of absolutely no field use to a journeyman or AHJ. If the concern is truly pinching a conductor between the back of the device and box, then simply require a minimum 6 mm (1/4 in.) for all boxes that enclose devices and delete the cacophony that is in 314.24(C). I really wish that this Code Making Panel could stand in front of an audience with me and see the looks of shock, dismay, anger, and amazement when I explain 314.24(C) to them.
Panel Meeting Action: Reject

Panel Statement: The proposal is excessive for 14 AWG conductors. Refer to the panel proposal 9-56a for other changes that bring devices within the scope of these requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-59 Log #2794 NEC-P09 **Final Action: Accept in Principle**
(314.24(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(C) Utilization Equipment or Devices. Outlet and device boxes that enclose utilization or devices shall have a minimum internal depth that accommodates the rearward projection of the equipment and the size of the conductors that supply the equipment. The internal depth shall include, where used, that of any extension boxes, plaster rings, or raised covers. The internal depth shall comply with all the applicable provisions of (C)(1) through (C)(5).
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Proposal 9-56a.
Panel Statement: CMP-9 has rewritten the section to include devices. See panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-60 Log #3638 NEC-P09 **Final Action: Reject**
(314.24(C))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Delete the following text:
~~314.24(C) Utilization Equipment. Outlet and device boxes that enclose utilization equipment shall have a minimum internal depth that accommodates the rearward projection of the equipment and the size of the conductors that supply the equipment. The internal depth shall include, where used, that of any extension boxes, plaster rings, or raised covers. The internal depth shall comply with all applicable provisions of (C)(1) thorough (C)(5).~~
~~(1) Large Equipment. Boxes that enclose utilization equipment that projects more than 48 mm (17/8 in.) rearward from the mounting plane of the box shall have a depth that is not less than the depth of the equipment plus 6 mm (1/4 in.).~~
~~(2) Conductors Larger Than 4 AWG. Boxes that enclose utilization equipment supplied by conductors larger than 4 AWG shall be identified for their specific function.~~
~~(3) Conductors 8, 6, or 4 AWG. Boxes that enclose utilization equipment supplied by 8, 6, or 4 AWG conductors shall have an internal depth that is not less than 52.4 mm (21/16 in.).~~
~~(4) Conductors 12 or 10 AWG. Boxes that enclose utilization equipment supplied by 12 or 10 AWG conductors shall have an internal depth that is not less than 30.2 mm (13/16 in.). Where teh equipment projects rearward from the mounting plane of the box by more than 25 mm (1 in.), the box shall have a depth not less than that of the equipment plus 6 mm (1/4 in.).~~
~~(5) Conductors 14 AWG and Smaller. Boxes that enclose equipment supplied by 14 AWG or smaller conductors shall have a depth that is not less than 23.8 mm (15/16 in.).~~
Substantiation: The rules adopted in 314.24(C) in the previous cycle are of absolutely no field use to a journeyman or AHJ. If the concern is truly pinching a conductor between the back of the device and box, then simply require a minimum 6 mm (1/4 in.) for all boxes that enclose devices and delete the cacophony that is in 314.24(C). I really wish that this Code Making Panel could stand in front of an audience with me and see the looks of shock, dismay, anger, and amazement when I explain 314.24(C) to them.
Panel Meeting Action: Reject
Panel Statement: A blanket ¼-inch rule is not appropriate for all applications and could compromise some currently acceptable applications. CMP-9 has added devices to the section coverage in response to field proposals.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-61 Log #4154 NEC-P09 **Final Action: Accept in Principle**
(314.24(C))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(C) Utilization Equipment or Devices. Outlet and device boxes that enclose utilization equipment or devices shall have a minimum internal depth that accommodates the rearward projection of the equipment and the size of the conductors that supply the equipment. The internal depth shall include, where used, that of any extension boxes, plaster rings, or raised covers. The internal depth shall comply with all applicable provisions of (C)(1) through (C)(5).
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-62 Log #2788 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(1))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(1) Large Equipment. Boxes that enclosure utilization equipment or devices that projects more than 48 mm (1 in.) rearward from the mounting plane of the box shall have a depth that is not less than the depth of the equipment plus 6 mm (1/4 in.).
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-63 Log #4155 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(1))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(1) Large Equipment. Boxes that enclose utilization equipment or devices that projects more than 48 mm (1 in.) rearward from the mounting plane of the box shall have a depth that is not less than the depth of the equipment plus 6 mm (1/4 in.).
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-64 Log #2789 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(2))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(2) Conductors Larger than 4 AWG. Boxes that enclosure utilization equipment or devices supplied by conductors larger than 4 AWG shall be identified for their specific function.
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as a utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-65 Log #4156 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(2))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(2) Conductors Larger Than 4 AWG. Boxes that enclose utilization equipment or devices supplied by conductors larger than 4 AWG shall be identified for their specific function.
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-66 Log #2790 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(3))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(3) Conductors 8, 6, or 4 AWG. Boxes that enclose utilization equipment or devices supplied by 8, 6, or 4 AWG conductors shall have an internal depth that is not less than 52.4 mm (2 in.).
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-67 Log #4157 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(3))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(3) Conductors 8, 6, or 4 AWG. Boxes that enclose utilization equipment or devices supplied by 8, 6, or 4 AWG conductors shall have an internal depth that is not less than 52.4 mm (2 in.).
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-68 Log #2791 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(4))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(4) Conductors 12 or 10 AWG. Boxes that enclose utilization equipment or devices supplied by 12 or 10 AWG conductors shall have an internal depth that is not less than 30.2 mm (1 3/16 in.). Where the equipment projects rearward from the mounting plane of the box by more than 25 mm (1 in.), the box shall have a depth not less than that of the equipment plus 6 mm (1/4 in.).
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-69 Log #4158 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(4))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(4) Conductors 12 or 10 AWG. Boxes that enclose utilization equipment or devices supplied by 12 or 10 AWG conductors shall have an internal depth that is not less than 30.2 mm (1 in.). Where the equipment projects rearward from the mounting plane of the box by more than 25 mm (1 in.), the box shall have a depth not less than that of the box shall have a depth not less than that of the equipment plus 6 mm (1/4 in.).
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are a likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-70 Log #2792 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(5))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(5) Conductors 14 AWG and Smaller. Boxes that enclose equipment or devices supplied by 14 AWG or smaller conductors shall have a depth that is not less than 23.8 mm (15/16 in.).
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-71 Log #4159 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(5))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(5) Conductors 14 AWG and Smaller. Boxes that enclose equipment or devices supplied by 14 AWG or smaller conductors shall have a depth that is not less than 23.8 mm (15/16 in.).
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-72 Log #4160 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(5) Exception)

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
Exception to (C)(1) through (C)(5): Utilization equipment or devices that ~~is~~ are listed to be installed with specified boxes shall be permitted.
Substantiation: The addition of or devices allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstance a is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-73 Log #2793 NEC-P09 **Final Action: Accept in Principle**
(314.24(C)(5) Exception to (C)(1) through (C)(5))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
Exception to (C)(1) through (C)(5): Utilization equipment or devices that ~~is~~ are listed to be installed with specific boxes shall be permitted.
Substantiation: The addition of "or devices" allows the user to apply the same criteria to devices which are as likely to encounter the prescribed circumstances as is utilization equipment.
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: CMP-9 agrees that devices should be added to the requirements. Refer to panel Proposal 9-56a for the final wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-74 Log #690 NEC-P09 **Final Action: Reject**
(314.26 (New))

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: Add new text to read as follows:

314.26 Conductors Inside Electrical Boxes. Conductors inside electrical boxes, subject to physical damage from router bits, sheetrock saws, and knives, and nonconductive coatings, such as drywall mud, paint, lacquer and enamel shall be protected during the construction process by means of a rigid cover, plate, or insert of a thickness and strength as to prohibit penetration by the above mentioned items.

Substantiation: This proposal is the revised language from Comment 3-8, Log #1837 as accepted in principle by CMP-3 during the 2008 NEC cycle. This comment had been held by direction of the TCC pending review and correlation by a Task Group. The Task Group consisting of Robert McCulllough, Chair CMP-9, Fred Hartwell CMP-9, Rod Belisle CMP-9, Louis Barrios CMP-1, Ken Boyce CMP-1, Sandy Egesdal CMP-3, and Ray Keden CMP-3, concluded that jurisdiction of this issue should rest with CMP-9. Accordingly, this is being submitted to CMP-9 as a proposal so the technical merits can be afforded full public review.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-51.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-75 Log #3121 NEC-P09 **Final Action: Reject**
(314.27)

TCC Action: The Technical Correlating Committee directs Code-Making Panel 9 to reconsider the proposal and act on its merits.

The Technical Correlating Committee directs that the Chairs of Code-Making Panels 9 and 18 establish a Task Group to review Proposals 9-75 and 18-130 with regard to application within their respective articles.

This action will be considered by Code-Making Panel 9 as a public comment.
Submitter: Patricia Barron, Safety Quick Light
Recommendation: Revise text as follows:
(A) At every outlet used exclusively for lighting, the box shall be designed or installed <u>supplied with a receptacle, specifically designed for luminaires, allowing for mechanical support and providing electrical connection to the branch circuit</u> so that a luminaire may be attached

(D) <u>Outlet boxes shall be supplied with a receptacle specifically designed for ceiling-suspended (paddle) fans allowing for mechanical support and providing electrical connection to the branch circuit so that a ceiling-suspended fan may be attached.</u>
Substantiation: <u>Statement Of Problem</u> – There are many cases of electrocutions and accidents that occur during installations of luminaires and ceiling fans, that result in a significant amount of **injuries, including death**.
<u>Substantiation for Proposal</u> - There is a receptacle and plug system available designed for **safe** installation of luminaires and ceiling fans that enables luminaires to be simply plugged "in" or "out" **without touching any wires.** This type of system will **save lives** and substantially **reduce or eliminate electrocutions or accidents** caused during installation of light fixtures or even when replacing light bulbs. If the outlet box is supplied with the safety receptacle, luminaires for ceiling or wall become plug "in" to install and "out" to remove **safely and simply** without touching wires. Luminaires can be unplugged from the branch circuit when changing bulbs or maintenance and plugged in safely when done. **There are cases of death and severe injury even** when changing light bulbs. This type of luminaire receptacle and plug system will **save lives and prevent injuries and needs** to be implemented into the code. Please refer to attached report outlining cases of electrocution.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The installation of luminaires and ceiling suspended paddle fans is not under the jurisdiction of CMP-9. Article 314 covers the specification and installation of outlet boxes for support of fixtures and ceiling-suspended paddle fans.

Luminaires installed in accordance with the NEC do not pose a safety hazard. The product is currently permitted by the code; however, insufficient technical substantiation has been provided to warrant mandatory use in all occupancies and applications.

Principal responsibility for this concept rests with CMP-18 and Article 410.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-76 Log #3346 NEC-P09 **Final Action: Reject**
(314.27)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (A) and substitute:

Boxes in or on a ceiling or other overhead structure used as support for luminares, lampholders, or other equipment shall be identified for the purpose and for a maximum weight of 23 kg (50 lbs). Boxes on a wall or other vertical member and used for support luminares, lampholders or other equipment shall be identified for the purpose and marked to indicate the maximum weight that is to be supported if more than 23 kg (50 lbs). Every box used for such support shall have provisions for attachment and support of the equipment.

Exception: A luminaire, lampholder, or other equipment weighing not more than 3 kg (6 lbs) shall be permitted to be supported by a box in or on a vertical member provided the equipment is secured to the box or plastering with no fewer than two No. 6 or larger machine screws.
Substantiation: Boxes that are overhead but not in a ceiling should be included. Present literal wording requires the box to (actually) support a luminaire weighing 50 lbs. Only boxes used for support should be covered by these provisions, and equipment other than luminaries and lampholders should be included in the rule and exception, such as CCTV cameras, signaling apparatus, occupancy sensors, exit signs, etc.

If this proposal is accepted (E) becomes superfluous.
Panel Meeting Action: Reject
Panel Statement: Most wall-mounted fixtures do not require a box rated for 23 kg (50 lb). Therefore, there is no reason to increase the requirements. Present text requires the boxes to be marked to indicate the maximum weight of the luminaire that is permitted to be supported if other than 23 kg (50 lb). Boxes with a 23 kg (50 lb) rating are required to have the marking on the smallest unit carton by the product standard. The requirement in the exception to only mount the box on a framing member is unsubstantiated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-77 Log #3905 NEC-P09 **Final Action: Accept in Principle**
(314.27)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by providing more description of "designed for the purpose."

This action will be considered by the panel as a public comment.
Submitter: Bradford D. Rupp, Allied Moulded Products, Inc.
Recommendation: Revise text as follows:

(A) Boxes at Luminaire Outlets. Outlet boxes or fittings designed for the support of luminaires and installed as required by 314.23 shall be permitted to support a luminaire ~~weighing 23 kg (50 lb) or less. Boxes used at luminaire or lampholder outlets in a ceiling shall be designed for the purpose and shall be required to support a luminaire weighing a minimum of 23 kg (50 lb)~~.
<u>(1) Luminaire Outlets in the Wall.</u> Boxes used at luminaire or lampholder outlets in a wall shall be designed for the purpose and shall be marked to indicate the maximum weight of the luminaire that is permitted to be supported by the box in the wall, if other than 23 kg (50 lb). ~~At every outlet used exclusively for lighting, the box shall be designed or installed so that a luminaire may be attached.~~

<u>Exception: A wall-mounted luminaire weighing not more than 3 kg (6 lb) shall be permitted to be supported on other boxes or plaster-rings that are secured to other boxes provided the luminaire or its supporting yoke is secured to the box with no fewer than two No. 6 or larger screws.</u>

<u>(2) Luminaire Outlets in the Ceiling.</u> At every outlet used exclusively for lighting, the box shall be designed or installed so that a luminaire may be attached. Boxes ~~used at luminaire or lampholder outlets in a ceiling shall be designed for the purpose and~~ shall be required to support a luminaire weighing a minimum of 23 kg (50 lb). A luminaire that weighs more than 23 kg (50 lb) shall be supported independently of the outlet box unless the outlet box is listed and marked for the maximum weight to be supported.

~~(B) Maximum Luminaire Weight. Outlet boxes or fittings designed for the support of luminaires and installed are required by 314.23 shall be permitted to support a luminaire weighing 23 kg (50 lb) or less. A luminaire that weighs more than 23 kg (50 lb) shall be supported independently of the outlet box unless the outlet box is listed and marked for the maximum weight to be supported.~~
Substantiation: This proposal is not intended to change the requirements for outlet boxes that support luminaires. It is only attempting to clarify the text by aligning the requirements with the specific applications and eliminating the redundancy within the text. This change also eliminates 314.27(B) Maximum Luminaire Weight, which is confusing since the requirements in the section do not address the subject of the title.
Panel Meeting Action: Accept in Principle

Revise text to read as follows and re-letter subsequent paragraphs accordingly:

(A) Boxes at Luminaire Outlets. Outlet boxes or fittings designed for the support of luminaires and installed as required by 314.23 shall be permitted to support a luminaire.
(1) Luminaire Outlets in the Wall. Boxes used at luminaire or lampholder outlets in a wall shall be designed for the purpose and shall be marked on the interior of the box to indicate the maximum weight of the luminaire that is permitted to be supported by the box in the wall, if other than 23 kg (50 lb).
Exception: A wall-mounted luminaire weighing not more than 3 kg (6 lb) shall be permitted to be supported on other boxes or plaster-rings that are secured to other boxes provided the luminaire or its supporting yoke is secured to the box with no fewer than two No. 6 or larger screws.

(2) Luminaire Outlets in the Ceiling. At every outlet used exclusively for lighting, the box shall be designed or installed so that a luminaire may be attached. Boxes shall be required to support a luminaire weighing a minimum

of 23 kg (50 lb). A luminaire that weighs more than 23 kg (50 lb) shall be supported independently of the outlet box unless the outlet box is listed and marked for the maximum weight to be supported.

Panel Statement: The panel action reinserts language that was included in the CMP 9 action on the 2008 cycle Proposal 9-56 but that was omitted from the first printing of the 2008 NEC in error. If the marking were on the outside of the box, it would be impossible to judge on a final inspection if a wall finish is applied. Luminaire selections are frequently made after the rough inspection is performed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-78 Log #1783 NEC-P09 **Final Action: Reject**

(314.27(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete text and substitute: Boxes installed on a horizontal support and used for the support of luminaires, lampholders, or the equipment shall be identified for the purpose and for support of a weight of 23 kg (50 lb). Boxes installed on a vertical support and used for the support of luminaries, lampholders or other equipment shall be identified for the purpose and marked to indicate the maximum weight to be supported if greater than 23 kg (50 lb).

Substantiation: The provisions should only apply where boxes are used for the support of equipment. Luminaires and other equipment may be supported independently and connected to the outlet by flexible cord, cable, or raceway. "Identified for the purpose" makes the last sentence superfluous. Anecdote: I once had the Los Angeles City Electrical Testing Laboratory test the support strength of a steel box cover attached to a 4 in. steel octagon box with two 8-32 machine screws. The cover bent and pulled off one screw at the screw slot at a weight of 353 lb but the screws remained intact. This indicated to me that support of the box itself is the critical factor.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 9-76.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-79 Log #4823 NEC-P09 **Final Action: Reject**

(314.27(A))

Submitter: David Zinck, Newburyport, MA Wiring Inspector

Recommendation: Revise text to read as follows:

(A) Boxes at Luminaire Outlets

Boxes used at luminaire or lampholder outlets ~~in a ceiling~~ shall be designed for the purpose ~~and shall be required to support a luminaire weighing a minimum of 23kg (50 lb). Boxes used at a luminaire or lampholder outlets in a wall shall be designed for the putpose and shall be marked to indicate the maximum weight of the luminaire that is permitted to be supported by the box in the wall, if other than 23kg (50lb)~~. At every outlet used exclusively for lighting, the box shall be designed or installed so that a light fixture may be attached.

Substantiation: My proposal restores the article to the 2005 NEC. The problem with this requirement is that it paints the world with a wide, one size fits all paintbrush. The original substantiation for this change in 2005 was that the homeowner "might" take down the fixture that the electrician installs and install a heavier one. How is it good code to hold an electrician responsible today for what a homeowner may or may not do 5 or 10 years later? If you check you will find that even most of the the simple nail-on non-metallic boxes are rated 50 lbs. (Would anyone ever hang a 50 lb. fixture from one of these?) So you could say, because of this, what is the harm in having the rule? If that were the only case than you could say what is the need?

Why should the box for a plastic lampholder in the basement, which weighs less than the light bulb being screwed into it be rated 50 lbs?

Far worse than that are light fixtures that are snaked in. What if the electrician is snaking in a light in a plaster & lathe ceiling? Should he be required to put in a paddlefan support assembly for a light that might weigh 2 lbs or less? Is the paddlefan assembly kit rated 50 lbs? What about a ceiling that has 3/8 sheetrock over 1' square tiles (popular in the 50's) which has 3/4 " furring strips over a plaster and split planking ceiling? What 50 lb rated assembly are we going to require him to use here?

Every inspector should except anything that is installed in keeping with it's UL listing. There is no way that his "gut feel" in the field is going to be better than UL's listing that is earned after hundreds of manhours of testing. In Massachusetts we take it one step further. It is mandated in 90.4 that an inspector **WILL** accept anything installed in keeping with its UL listing. Pass & Seymore has and old work non metallic box with swing out tabs that is UL listed for a fixture I believe up to 10 lbs Another old work box with a springy bracket that I checked is rated 15 lbs. I am sure that there are many more from several manufacturers. The point that I am making is that 90.7 implies that an inspector should accept UL listed items, 90.4 in Mass. mandates that we will accept the above mentioned boxes, and Article 314.27 demands that we do not accept them. Two articles in direct conflict.

When you think of all the possible ceiling luminaire installations, 314.27 is too restrictive and too short sighted for all of the possible applications and shod be changed back to the 2005 wording.

Panel Meeting Action: Reject

Panel Statement: Past revisions confirmed the panel's position that boxes rated for installation in a ceiling to support luminaires should be rated for the support of luminaires rated 50 lb or less. Listings do exist that rate (and mark) the boxes for lower values, and the standard used to evaluate these boxes allows for this type of product. A proposal has been submitted to the UL Standards Technical Panel to revise requirements to ensure compliance with the 2008 code. Similar to the NFPA process for revising the NEC, standards revisions do require time and may lag behind revisions to the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-80 Log #724 NEC-P09 **Final Action: Reject**

(314.27(B))

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add text to read as follows:

314.27 Outlet Boxes.

(A) Boxes at Luminaire Outlets. *[unchanged by this Proposal]*

(B) Maximum Luminaire Weight. Outlet boxes or fittings designed for the support of luminaires and installed as required by 314.23 shall be permitted to support a luminaire weighing 23 kg (50 lb) or less. A luminaire that weighs more than 23 kg (50 lb) shall be supported independently of the outlet box<u>,</u> unless the outlet box is listed and marked for the maximum weight to be supported <u>and the luminaire does not exceed the maximum weight marking of the outlet box</u>.

[remainder unchanged by this Proposal]

Substantiation: Not enforceable by the AHJ, due to Boolean logic failure. The conditional portion of the second sentence is one criterion short of a complete pass/fail test. As 314.27(B) is presently worded, a luminaire could weigh 100 lbs [the luminaire "weighs more than 23 kg (50 lb)"] and the outlet box could be "marked for the maximum weight to be supported" of 80 lbs and STILL the luminaire could be inadequately left NOT SUPPORTED INDEPENDENTLY nor supported by an outlet box of the PROPER weight capacity.

Panel Meeting Action: Reject

Panel Statement: Although this section of the code does not expressly limit the luminaire weight, the weight must not exceed the rating of the box because 110.3(B) makes that limitation enforceable. Therefore, the additional text is not required. See also the panel action and statement on Proposal 9-77.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-81 Log #1157 NEC-P09 **Final Action: Reject**

(314.27(D))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise text to read as follows:

(D) Boxes at Ceiling-Suspended (Paddle) Fan Outlets. Outlet boxes or outlet box systems used as the sole support of a ceiling-suspended (paddle) fan shall be listed, shall be marked by their manufacturer as suitable for this purpose, and shall not support ceiling-suspended (paddle) fans that weigh more than 32 kg (70 lb). For outlet boxes or outlet box systems designed to support ceiling-suspended (paddle) fans that weigh more than 16 kg (35 lb), the required marking shall include the maximum weight to be supported.

<u>Where two or more separate switched, ungrounded conductors are provided to a ceiling mounted outlet box, in single or multi-family dwellings, the outlet box or outlet box system shall be listed for sole support of a ceiling-suspended (paddle) fan.</u>

Substantiation: Many new homes are built with multiple wired switches that accommodate future installation of fans with luminaire kits. Since standard luminaires are installed in standard boxes, the homeowner, when replacing the luminaire with a fan, very likely will not know to replace the standard box with a ceiling box rated for support of a fan and luminaire kit.

The revised language limits this requirement to single or multi-family dwellings. The practice of supplying a ceiling box with two switches is a common practice in new construction. For example, a standard ceiling box listed for luminaires is installed in a bedroom when a ceiling fan is not supplied by the builder. Two switches are wired to the box. One of the switches is connected to the luminaire and the other switch is not connected. When the homeowner decides over a period of time to replace the luminaire with a ceiling fan and light kit and connect both switches, they will not be aware of the required markings for a ceiling fan box and will mount the ceiling fan to the standard ceiling box. Ceiling fan assemblies are often located over the bed.

There is no requirement anywhere in the NEC for a ceiling box rated for ceiling fan support when a fan is not installed. Today, when the homebuilder does not supply a fan, they are neither obligated nor required to install a fan rated ceiling box. The proposed text fixes this problem and addresses a safety issue to protect homeowners and their children from injury, fire or shock. Ceiling fan boxes are also required to be tested and listed for luminaire support per UL 514A and UL 514C.

Panel Meeting Action: Reject

Panel Statement: The proposal does not take into consideration the physical location of a box where locating a ceiling-suspended (paddle) fan would be impractical. There are numerous reasons to install multiple switched conductors to the outlet box location that would not involve the installation of a ceiling-

suspended (paddle) fan. There are also other accepted methods of installing a ceiling-suspended (paddle) fan that does not utilize a fan brace box.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
RUPP, B.: NEMA acknowledges the need to refine this proposal to address the examples cited by the panel while continuing to assert that the practice of installing "spare" circuit conductors in locations such as a bedroom lights without installing an outlet box or system designed to support a fan is a potential safety issue and should be addressed.
Comment on Affirmative:
LEMAY, T.: There are many reasons for installing two or more separately switched ungrounded conductors to a ceiling mounted outlet box. A few examples are dual level switching of multiple lamp or multiple ballasted luminaries, control of an outlet "down stream" from the referenced lighting outlet or having a spare controlled ungrounded circuit conductor in a light outlet for extension to a load in another part of the room at a later time.
To speculate that having two or more separately switched ungrounded conductors present in ceiling mounted outlet box as being a reason to require this outlet box to be a ceiling fan rated box does not, in itself, provide substantiation for an additional code requirement.

9-82 Log #6 NEC-P09 **Final Action: Reject**
(314.27(D) Exception (New))

NOTE: This proposal appeared as Comment 9-33 on Proposal 2-265 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 2-265 was:
Revise as follows:
Other than Dwelling Units: For attics and ~~underfloor~~ under floor spaces containing equipment requiring servicing, ~~such as heating, air-conditioning, and refrigeration equipment,~~ at least one lighting outlet containing a switch or controlled by a wall switch shall be installed in such spaces. At least one point of control shall be at the usual point of entry to these spaces. The lighting outlet shall be provided at or near the equipment requiring servicing.
FPN: Examples of equipment requiring servicing may include but are not limited to heating, air-conditioning, refrigeration, power supplies and transformers used for signage.
Submitter: Alan Halbert, EE Products Inc.
Recommendation: Add a new exception to read:
314.27(D) Boxes at Ceiling-Suspended (Paddle) Fan Outlets. Outlet boxes or outlet box systems used as the sole support of a ceiling suspended (paddle) fan shall be listed, shall be marked by their manufacturers as suitable for this purpose, and shall not support ceiling-suspended (paddle) fans that weigh more than 32 kg (70 lb). For outlet boxes or outlet box systems designed to support ceiling-suspended (paddle) fans that weight more than 16 kg (35 lb), the required marking shall include the maximum weight to be supported.
Exception: For outlet box systems that are not subject to national testing standards and install through the interior of the outlet box, the system shall not be required to be listed.
Substantiation: The substantiation for this comment is provided in the abstract received by NFPA as supporting Material.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Boxes that support ceiling-suspended (paddle) fans are required to be listed to ensure that they can withstand the dynamic forces imparted by a fan. Since the intent of this product is to use the mounting bosses of non-rated outlet boxes to support the fan, it should be tested and marked with the catalog numbers of specific outlet boxes.
CMP-9 understands that the subject of this proposal is the proposed exception to 314.27(D).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-83 Log #3349 NEC-P09 **Final Action: Accept in Part**
(314.28(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A), delete "required to be".
In (1) and (2), add "or conduit body" after "box" in the first sentence.
Substantiation: Insulation, whether required or not, serves various purposes, including protection of the conductor from moisture and likelihood of short circuit and should be protected from damage. The requirements of (1) and (2) should also specifically apply to conduit bodies, as indicated in the heading.
Panel Meeting Action: Accept in Part
Accept the inclusion of the words "or conduit body" in (A)(1) and (A)(2). Reject the deletion of the words "required to be " from (A).
Panel Statement: Conductors that are not required to be insulated could be installed as bare conductors by right. If the decision is made for whatever design reasons to employ insulated conductors, no hazard results from incidental insulation damage during the installation process. Many grounding electrode conductors, the usual application of this provision, are installed using insulated conductors for no better reason than they happened to be available. In other cases the decision is deliberate, but related to environmental conditions where they emerge from the conduit system. In either case the withdrawal of the permission granted in the 2008 cycle would be excessive.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-84 Log #353 NEC-P09 **Final Action: Reject**
(314.28(A)(2) Exception)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise Exception as follows:
Exception: Where a raceway or cable entry is in the wall of a box or conduit body opposite a removable cover, the distance from that wall to the cover shall be permitted to comply with the distance required for one wire attached to a ~~per~~ terminal in Table 312.6(A).
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-85 Log #3667 NEC-P09 **Final Action: Reject**
(314.28(A)(2) Exception)

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Revise text as follows:
314.28(A)(2) ~~Exception~~ Exception No. 1
Exception No. 2: Where a single row of raceways or cables enters the wall of a box, and leaves the box through a wall opposite a removable cover, and the distance between raceways enclosing the same conductors is not less than 6 times the trade size of the largest raceway, the distance between the raceways inside the box and the opposite wall of the box would not be required to be increased for the additional entries in the same row.
Substantiation: Example: An installation where conduits enter the bottom of a pull box, and leave the back of the box opposite a removable cover. As long as the raceways enclosing the same conductors were spaced at least 6 times the diameter of the largest raceway as currently required by 314.28(A)(2), there would be no reason to increase the dimension of the box above the conduits exiting the back of the box. This additional space would not be utilized by the conductors. I have encountered a few installations similar to this and I have a hard time justifying requiring the installer to increase the box dimensions by adding the additional raceways as is currently required in this situation.
Panel Meeting Action: Reject
Panel Statement: The conductors must still be manipulated during the installation process and multiple sets of conductors entering the same wall decrease the room to apply cable bending tools or other installation procedures as successive sets are installed. It should be noted that this rule originally required a summation of all conduit entries on a single wall even if they occupied multiple rows. The decision to grant limited relief by taking a row at a time was controversial at the time but seems to be working well. CMP-9 is reluctant to further decrease the sizing on these pull boxes without more compelling substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-86 Log #3155 NEC-P09 **Final Action: Reject**
(314.28(A)(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise to read:
"Boxes or conduit bodies of dimensions less than those required in 314.28(A)(1) and (A)(2), including the Exception, shall be permitted...".
Substantiation: There are existing conduit bodies that are acceptable because they are listed for and are permanently marked with the maximum number and maximum size of conductors permitted by 314.28(A)(3), but are considered by some to not be acceptable because their dimension from the entry opposite to the removable cover does not comply with Table 312.6(A) called out in the Exception.
Panel Meeting Action: Reject
Refer to the action on Proposal 9-83, which inserted the words "or conduit body into the parent language of both (1) and (2).
Panel Statement: The exception applies as written and replaces the required dimension from opposite a removable cover with the Table 312.6(A) distance. This will now very clearly apply to conduit bodies, as is already expressly stated in the exception. CMP-9 agrees that such conduit bodies are acceptable, but finds the wording sufficiently obvious that no further changes in code wording are required. In fact, conduit bodies could almost never be used with large conductors without applying the exception.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-87 Log #577 NEC-P09 **Final Action: Accept in Principle**
(314.28(E))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by providing a title for 314.28(E)(5).

This action will be considered by the panel as a public comment.

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Add new text as follows:
(B) Power Distribution Block. Power distribution blocks shall be permitted for connections of conductors in sizes 4 AWG or larger where installed in metal boxes and the installation complies with (1) through (4).
(1) Installation. Power distribution blocks installed in metal boxes shall be listed.
(2) Size. In addition to the sizing requirement in 314.28(A), the power distribution block shall be installed in a metal box with dimensions not smaller than specified in the installation instructions of the power distribution block.
(3) Wire Bending Space. Wire bending space at the terminals of power distribution blocks shall comply with 312.6(B).
(4) Live Parts. Power distribution blocks shall not have uninsulated live parts exposed within a metal box, whether or not the box cover is installed.
Substantiation: This proposal seeks provisions in Article 314 that recognize the installation of power distribution blocks as a termination or connection means for conductors contained within a metal box. Similar provisions already exist in Article 376 for wireways, but since these types of connections could also be made in a box, the NEC should include similar rules in Article 314. The proposal seeks to limit the use of power distribution blocks to sizes 4 AWG or larger to place inherent limitations on the box size where they would be permitted. The panel may wish to include additional allowances for power distribution blocks in smaller boxes that are addressed in Table 314.16(A).
Panel Meeting Action: Accept in Principle
Add new text as follows:
(E) Power Distribution Block. Power distribution blocks shall be permitted in pull and junction boxes over 1650 cm3 (100 in.3) in size for connections of conductors where installed in metal boxes and the installation complies with (1) through (5).
Exception: Equipment grounding terminal bars shall be permitted in smaller enclosures.
(1) Installation. Power distribution blocks installed in metal boxes shall be listed.
(2) Size. In addition to the overall size requirement in the first sentence of 314.28(A)(2), the power distribution block shall be installed in a metal box with dimensions not smaller than specified in the installation instructions of the power distribution block.
(3) Wire Bending Space. Wire bending space at the terminals of power distribution blocks shall comply with 312.6.
(4) Live Parts. Power distribution blocks shall not have uninsulated live parts exposed within a metal box, whether or not the box cover is installed.
(5) Where the pull or junction boxes are used for conductors that do not terminate on the power distribution block(s), the through conductors shall be arranged so the power distribution block terminals are unobstructed following installation.
Panel Statement: CMP-9 agrees that this is a reasonable use for pull and junction boxes but wishes to reserve the practice for larger enclosures. Boxes of this size need not be limited to 4 AWG and larger conductors. In addition, these involve terminations, and the only sizing rule is the one for splices in 314.38(A)(2). Since pull and junction boxes are routinely capable of entry from multiple directions, the correct spacing from terminal to enclosure wall may qualify for the less conservative values in Table 312.6(A), and there is no reason to exclude those dimensions if they would apply. The exception provides for commonly used equipment grounding terminal bars. Finally, if the pull or junction box also includes through conductors, access to the distribution blocks should be maintained to terminals can be torqued or tested safely and without relocating or damaging the through conductors. The panel action editorially corrects the proposed (B) reference to (E).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HARTWELL, F.: CMP 9 inadvertently omitted a title for Paragraph (5) that will be required to comply with NEC Style Manual provisions. I would suggest "Through Wiring" as a suitable title for this provision.

9-88 Log #1696 NEC-P09 **Final Action: Accept**
(314.30(D))

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise the text in 314.30(D) as follows:
314.30 Handhole Enclosures.
(D) Covers. Handhole enclosure covers shall have an identifying mark or logo that prominently identifies the function of the enclosure, such "electric." Handhole enclosure covers shall require the use of tools to open, or they shall weigh over 45 kg (100 lb). Metal covers and other exposed conductive surfaces shall be bonded in accordance with 250.92~~(A)~~ if the conductors in the handhole are service conductors, or in accordance with 250.96(A) if the conductors in the handhole are feeder or branch-circuit conductors.
Substantiation: By deleting the reference to 250.92 part (A) which is general requirements for bonding of services, and referencing the entire 250.92 without being specific to (A), the actual methods of bonding at the service found in part (B) would be included in this requirement.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-89 Log #1049 NEC-P09 **Final Action: Reject**
(314.40(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
~~A~~ An identified means shall be provided in each metal box for the connection of ~~an~~ a wire-type equipment grounding conductor. The means shall be permitted to be a tapped hole ~~or equivalent~~ with at least two machine screw threads or a hole for a nut and bolt connection. Identified grounding clips shall be permitted.
Substantiation: The provision is apparently for wire type conductors since connection of metal raceways and cables provide a grounding means. "Equivalent" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The requirement as presently stated, occurring in the construction portion of the article, is a sufficient policy statement for a rule that will be implemented through the product standard. CMP-9 does not wish to further constrain the product standard revision process in this subject area. An identified grounding clip is not equivalent to a tapped hole.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-90 Log #4611 NEC-P09 **Final Action: Accept**
(314.40(D) (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following new subsection to 314.40, renumbering the present 314.40(D) as 314.40(E):
(D) Enclosure Edges. All sharp edges of metal pull and junction boxes over 1650 cm^3 (100 $in.^3$) in size that are subject to hand contact during customary installation activity shall, at the time of manufacture, be protected or shall be de-burred and rounded to minimize the risk of injury.
Substantiation: This proposal incorporates by this reference all technical substantiation provided in the 2008 cycle relative to Proposal 9-81 and Comment 9-42. The proposal is being made to rebut the position of the TCC that resulted in the rejection of this action in the 2008 cycle on the basis that it contained "unenforceable and vague terminology, such as "during customary installation activity" and "at the time of manufacture, be protected."
This action is to occur in Part III of the article, covering construction specifications. Parts of articles that include these parts are collections of policy statements by the NEC Committee that provide the basis for specific requirements developed as part of the product standard development process. We need go no further than the other lettered paragraphs in the proposed section in the companion proposal to this one aimed at 312.10 to illustrate this principle. Current Part (A) of that section requires protection against corrosion inside and out; how is this more enforceable? Current Part (B) of that section requires "ample strength and rigidity"; how is this less vague? The phrase "at the time of manufacture" effectively mandates that this become a subject for the product standard. The fact is that without product standards the North American safety system falls apart.
It would indeed be possible to write very specific rules, and they would not be pretty. We could access CPSC medical research and discover what radius (in microns, of course) of curvature on a raw edge of what degree of angle constitutes a cut hazard, and perhaps even make a stab at refining that number to account for the fact that most electricians have pretty tough skin on their hands. Where in the NEC does such a rule exist in a construction specification part of an article? Nowhere. The submitter has great confidence that if this policy direction becomes part of the NEC, the standards developers and the manufacturers will come up with something appropriate.
This issue has come up many times over the years, and CMP 9 has deferred to the product standards over and again, and nothing has taken place. This submitter is the senior member on CMP 9, and during the proposal period warned the NEMA and UL representatives that this was a recurring issue and that patience was running out. Nothing happened. The submitter of Comment 9-42, in his activities with the JATC, noted at the comment meeting that the problem among his members was so routine and severe that they were issuing gloves to avoid cuts on the metal edges. Enough is enough. This submitter, a working electrician 40 hours a week, wears the substantiation for this proposal in the form of scar tissue on his hands.
This proposal has no delayed effective date. The manufacturers have had their three years; if they promise to take this seriously then a date can be set as part of the comment period. The policy decision should stand.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 8 Negative: 4

Explanation of Negative:

BREITKREUTZ, B.: See my Explanation of Negative Vote on Proposal 9-36 (Log #4610).

COGHILL, P.: See my Explanation of Negative on Proposal 9-36 (Log #4610).

OSBORNE, R.: See negative comment on Proposal 9-36.

RUPP, B.: The substantiation for this proposal states that this issue has come up repeatedly over the years yet NEMA manufacturers of this equipment and UL representatives have no documented incidents or field complaints dealing with this issue. This lack of evidence and factual substantiation supports NEMA's position that this requirement is adequately addressed in the standards covering these products and is not needed within the installation code. In addition, the submitter's substantiation states that "The proposal is being made to rebut the position of the TCC…" yet none of the objectionable wording previously identified by the TCC has been changed in this proposal. NEMA manufacturers continue to encourage their customers to provide feedback when their products cause injuries. Also, UL actively solicits participation on the technical panels of the product standards to affect changes where necessary

Comment on Affirmative:

HARTWELL, F.: Refer to my Comment on Affirmative Vote for Proposal 9-36; the same arguments apply to large pull boxes covered here.

YOUNG, R.: The ACC supports having pull and junction boxes with no sharp edges; however, it will be difficult for inspectors and users to determine edges are too sharp without a reference to a product standard or listing or other specific testing means that defines a test method and pass/fail requirements.

9-91 Log #3348 NEC-P09 **Final Action: Reject**
(314.42)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Covers of outlet boxes and conduit bodies having ~~holes~~ openings through which flexible cord pendants ~~may~~ pass shall be provided with ~~approved~~ identified bushings or connectors, or shall have smooth, well-rounded surfaces on which the cord may bear. Where individual conductors pass through a metal cover or enclosure a separate hole equipped with ~~a~~ an identified bushing of ~~suitable~~ insulating material shall be provided for each conductor. ~~Such separate holes shall be connected by a slot as required by 300.20.~~

FPN: See 300.20(B).

Substantiation: Edit. "May" and "suitable, are subjective and terms to be avoided per the Style Manual. The provision should apply where pendants are actually installed. Openings "may" accommodate pendants, but be closed with plugs or seals.

Panel Meeting Action: Reject

Panel Statement: CMP-9 believes the AHJ is qualified to determine the suitability of a bushing, and therefore "approved" is the appropriate standard for product acceptance in this case. There has been no substantiation to support the elimination of the slotting requirement that correlates with 300.20.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-92 Log #3347 NEC-P09 **Final Action: Accept in Principle**
(314.70)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Where pull or junction boxes, or conduit bodies are used...(remainder unchanged).

Substantiation: Edit. The requirements should be specifically applicable to conduit bodies since 314.1 includes conduit bodies used as pull or junction, boxes but does not make a conduit body a box.

Panel Meeting Action: Accept in Principle

I. Revise 314.70 to read as follows:

314.70 General

(A) Pull and Junction Boxes. Where pull and junction boxes are used on systems over 600 volts, the installation shall comply with the provisions of Part IV and with the following general provisions of this article:

(1) Part I, 314.2; 314.3; and 314.4

(2) Part II, 314.15; 314.17; 314.20; 314.23(A), (B), or (G); 314.28(B); and 314.29

(3) Part III, 314.40(A) and (C); and; 314.41

(B) Conduit Bodies. Where conduit bodies are used on systems over 600 volts, the installation shall comply with the provisions of Part IV and with the following general provisions of this article:

(1) Part I, 314.4

(2) Part II, 314.15; 314.17; 314.23(A), (E), or (G); and 314.29

(3) Part III, 314.40(A); and 314.41

(C) Handhole Enclosures. Where handhole enclosures are used on systems over 600 volts, the installation shall comply with the provisions of Part IV and with the following general provisions of this article:

(1) Part I, 314.3; and 314.4

(2) Part II, 314.15; 314.17; 314.23(G); 314.28(B); 314.29; and 314.30

***

II. Revise 314.71 to read as follows:

314.71. Size of Pull and Junction Boxes, Conduit Bodies, and Handhole Enclosures. Pull and junction boxes and handhole enclosures shall provide adequate space and dimensions for the installation of conductors, and they shall comply with the specific requirements of this section. Conduit bodies shall be permitted provided they meet the dimensional requirements for boxes.

***

III. Change the title of Part IV to read "Pull and Junction Boxes, Conduit Bodies, and Handhole Enclosures for Use on Systems over 600 Volts, Nominal."

Panel Statement: The applicable requirements for conduit bodies in the general part of the article differ from those for conduit bodies and need to be listed separately. The action taken meets the submitter's intent. In addition, CMP-9 has added coverage for handhole enclosures. This was overlooked when handhole enclosures were added to Article 314.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-93 Log #3244 NEC-P09 **Final Action: Accept**
(314.72(D))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

Boxes and conduit bodies shall be installed so that the ~~wiring is~~ conductors are accessible without removing any fixed part of the building or structure.

Substantiation: Edit. Conduit bodies and structures other than buildings should be included.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-94 Log #713 NEC-P09 **Final Action: Reject**
(314.72(E))

Submitter: Joe Tedesco, Boston, MA

Recommendation: New FPN: NFPA 70E-2009, Standard for Electrical Safety in the Workplace, covers arc flash hazard analysis, 130.3.

Substantiation: NFPA 70E does not require signs reading: "DANGER HIGH VOLTAGE KEEP OUT".

Panel Meeting Action: Reject

Panel Statement: The warning is directed in part at unqualified persons who are not necessarily employees covered by NFPA 70E. The substantiation does not support the positioning of the note in this location.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 320 — ARMORED CABLE: TYPE AC

7-3 Log #4533 NEC-P07 **Final Action: Accept**
(320.2.Armored Cable, Type AC)

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revised text as follows:

320.2 Definition.

Armored Cable, Type AC. A fabricated assembly of insulated conductors in a flexible interlocked metallic armor ~~enclosure~~. See 320.100.

Substantiation: The present definition incorrectly used the word "enclosure." That term is defined in Article 100 as, "The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage."

Other proposed changes to the definition are intended to be editorial in nature and more accurately describe the product.

Panel Meeting Action: Accept

Panel Statement: Enclosure as defined in Article 100 does not apply to cable. This is a better description.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-4 Log #1526 NEC-P07 **Final Action: Reject**
(320.2.Armored Cable, Type AC.)

Submitter: Stanley Kaufman, CableSafe, Inc.

Recommendation: Revise text as follows:

320.2 Definition.

Armored Cable, Type AC. A fabricated assembly of insulated conductors, with or without optical fiber members, in a flexible metallic enclosure. See 320.100.

Substantiation: Article 330 explicitly mentions optical fibers in the definition of Metal Clad Cable.

"330.2 Definition.

Metal Clad Cable, Type MC. A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath."

Since Armored Cables can also contain optical fibers, this proposal would add optical fibers to the definition of Armored Cable also.

Panel Meeting Action: Reject

Panel Statement: Section 770.3(A) permits composite cables and requires that they be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable. Adding text to permit optical fiber members in the cable article is redundant.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-5 Log #2667 NEC-P07 **Final Action: Reject**
(320.10)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence:

Type AC cable shall only be permitted as follows:

Substantiation: Edit. Present wording is not a requirement: 90.5(B) states "shall be permitted" identifies actions allowed but not required, therefore, other use except as covered in 360.12 is not limited.

Panel Meeting Action: Reject

Panel Statement: Addition of the word "only" would conflict with the FPN at the end of 320.10. Uses permitted correctly identifies common uses but does not limit other applications as long as 320.12 is not violated. Uses permitted is not intended to be an all-inclusive list.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-6 Log #1796 NEC-P07 **Final Action: Accept in Principle in Part**
(320.10(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: For ~~feeders and branch~~ circuits in both exposed and concealed ~~work~~ installations.

Substantiation: Edit. The type of circuits is irrelevant; "feeders and branch circuits" doesn't include signal and control circuits.

Panel Meeting Action: Accept in Principle in Part

Accept in part the change of "work" to "installations". Revise to read "For feeders and branch circuits and control circuits in both exposed and concealed installations."

Panel Statement: The term "installations" is more appropriate. Since Type AC cable is rated 600V, it would not normally be used for signal circuits. Use of the term "circuits" would imply that it could be used for other applications such as service entrance.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-7 Log #533 NEC-P07 **Final Action: Reject**
(320.12)

Submitter: Joseph Penachio, Northeast Metro Tech H.S.

Recommendation: Revise text to read as follows:

(1) Services

(2) Where subject to ~~physical~~ damage.

(3) In damp or wet locations.

(4) In air voids of masonry block or tile walls where such walls are exposed or subject to excessive moisture or dampness.

(5) Where exposed to corrosive fumes or vapors.

(6) Embedded in plaster finish or brick or other masonry in damp or wet locations.

Substantiation: 230.43 services doesn't list AC as one of the wiring methods, and 320.10 doesn't list it as being permitted.

Adding services as (1) in the list of uses not permitted would clearly state that AC is not permitted in a clear positive text conforming with the new style format. Damage is damage so deleting the word physical doesn't change the text or intent of the code.

Panel Meeting Action: Reject

Panel Statement: The present wording is clear. Section 230.43 does not list type AC as an acceptable wiring method for service installations. This proposed language would be in conflict with section 3.3.5 of the NEC Style Manual. The striking of the term physical from 320.12(1) is also not appropriate and would conflict with the general provision of 3.2.5.5 of the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-8 Log #1763 NEC-P07 **Final Action: Reject**
(320.12(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: (1) Where likely to be subject to physical damage which impairs its functional capabilities.

Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. "Damage" is not defined; a small dent is damage. Much such damage does not affect conductors, grounding, or other functions.

Panel Meeting Action: Reject

Panel Statement: The proposed language does not add clarity to the existing language. The use of the term "likely" is unenforceable and vague and does not comply with 3.2.1 of the NEC Style Manual. The cable is not permitted to be installed where it is exposed to physical damage. Addition of the phrase "which impairs its functional capabilities" is subjective and vague and does not comply with 3.2.1 of the NEC Style Manual.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-9 Log #4534 NEC-P07 **Final Action: Reject**
(320.12(1))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise text as follows:

320.12 Uses Not Permitted.

Type AC cable shall not be used as follows:

(1) Where likely to be damaged where installed ~~subject to physical damage~~

(2) through (5) unchanged.

Substantiation: It can be safely said that all wiring methods are "subject to physical damage." This phrase is far too general and subjective. At times, opponents of cable wiring methods use the simple statement in the present Code rule as license to unreasonably restrict the use of Type AC cables. All wiring methods should be installed in a manner and location so the wiring method is not expected to be damaged in ordinary use. For example, wiring installed in walls, ceilings and floors in compliance with 300.4 can be reasonably expected to be isolated from physical damage in ordinary building operations. Can the cables be damaged in an unexpected event such as cutting a hole in the wall with a reciprocating saw to make a door opening? Certainly. However that is not likely to happen in normal building operation.

Listed Type AC cables are subject to extensive testing as prescribed in UL 4, the product safety standard. This testing ensures Type AC cables are suitable to be installed in most all ordinary locations.

The term "likely" is used in many NEC sections such as providing a condition the event or condition will occur such as: "… likely to become energized …", "… maximum fault current likely to be imposed …", "… not likely to be damaged …", "…equipment likely to be disconnected for repairs or replacement …", "… not likely to stretch during or after installation …" and "… conduct safely any fault current likely to be imposed".

Panel Meeting Action: Reject

Panel Statement: The proposed language does not add clarity to the existing language. The use of the term "likely" is unenforceable and vague and does not comply with 3.2.1 of the NEC Style Manual. The cable is not permitted to be installed where it is exposed to physical damage.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

STRANIERO, G.: The term "likely" is used 99 times throughout the NEC. Section 3.2.1 of the NEC Style manual states that the terms contained in Table 3.2.1, including the word "likely" shall be reviewed in context, and, if the resulting requirement is unenforceable or vague, the term shall not be used. In this instance the use of the term is not unenforceable or vague.

Comment on Affirmative:

HUNTER, C.: While the rejection of the word "likely" is appropriate, the submitter brings up valid concerns. The Panel should form a task force to consider revising or defining what "subject to physical damage" really means.

7-10 Log #1805 NEC-P07 **Final Action: Accept in Principle in Part**
(320.12(1) and (3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: (1) Where likely to be subject to physical damage

Revise: (3) Where likely to be subject to corrosive agents. ~~vapors~~

Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections. Corrosive liquids and solids should be included.

Panel Meeting Action: Accept in Principle in Part

Revise text to read as follows:

(4) Where exposed to corrosive conditions.

Panel Statement: See panel statement on Proposal 7-8 for the part not accepted. The panel has revised the wording of submitter's (3) and numbered it (4) as it appears in the code. The panel accepts in principle the term "agents" to include corrosive liquids and solids but changes the term to "conditions" to be all inclusive.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-11 Log #4535 NEC-P07 **Final Action: Reject**
(320.15)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise as follows:
320.15 Exposed Work.
Exposed runs of cable, except as provided in 300.11(A), shall closely follow the surface of the building finish or of running boards. Exposed runs shall also be permitted to be installed on the underside of joists where supported at each joist and located so as not likely to be damaged where installed ~~subject to physical damage~~.
Substantiation: It can be safely said that all wiring methods are "subject to physical damage." This phrase is far too general and subjective. At times, opponents of cable wiring methods use the simple statement in the present Code rule as license to unreasonably restrict the use of Type AC cables. All wiring methods should be installed in a manner and location so the wiring method is not expected to be damaged in ordinary use. For example, the exposed wiring covered by the present rule can be reasonably expected to be isolated from physical damage in ordinary building operations. Can the cables be damaged in an unexpected event such as using the cables to support other objects or persons? Certainly. However that is not likely to happen in normal building operation.

Listed Type AC cables are subject to extensive testing as prescribed in UL 4, the product safety standard. This testing ensures Type AC cables are suitable to be installed in most all ordinary locations.

The term "likely" is used in many NEC sections such as providing a condition the event or condition will occur such as: "… likely to become energized …", "… maximum fault current likely to be imposed …", "… not likely to be damaged …", "…equipment likely to be disconnected for repairs or replacement …", "… not likely to stretch during or after installation …" and "… conduct safely any fault current likely to be imposed".
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-9.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
STRANIERO, G.: See my reason for negative vote on 7-9.

7-12 Log #1542 NEC-P07 **Final Action: Reject**
(320.17)

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
320.17 Through or Parallel to Framing Members. Type AC cable shall be protected in accordance with 300.4(A), (B)(2), (C), and (D) where installed through or parallel to framing members.
Substantiation: To correlate with code change Proposal 300.4(B)(2).
Panel Meeting Action: Reject
Panel Statement: 300.4(B)(2) is specifically limited to nonmetallic sheathed cable and electrical nonmetallic tubing and is not applicable to Type AC cable. The submitter did not provide any technical substantiation and there is no documented history of failure with the permitted installation of Type AC cable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-13 Log #4536 NEC-P07 **Final Action: Accept in Principle in Part**
(320.23)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal concerning the use of the word "when" since the NEC Style Manual considers "when" as a condition of time.
This action will be considered by the panel as a public comment.
Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text as follows:
320.23 In Accessible Attics.
Type AC cables in accessible attics or roof spaces shall be installed as specified in 320.23(A) and (B).
(A) Cables ~~Where~~ Run Across the Top of Framing Members ~~Floor Joists~~.
In attics and roof spaces that are accessible, cables that are installed within 2.1 m (7 ft) above the framing members such as ceiling or floor joists shall be protected by substantial guard strips that are at least as high as the cable if the cable is: ~~Where~~
(1) run across the top of framing members ~~floor joists, or within 2.1 m (7 ft) of floor or floor joists~~
(2) across the face of rafters or studding, ~~in attics and roof spaces that are accessible, the cable shall be protected by substantial guard strips that are at least as high as the cable~~.
If ~~Where~~ this space is not accessible by permanent stairs or ladders, protection shall only be required within 1.8 m (6 ft) of the nearest edge of the scuttle hole or attic entrance.
(B) Cable Installed Parallel to Framing Members. If ~~Where~~ the cable is installed parallel to the sides of framing members such as rafters, studs, ~~or~~ ceiling or floor joists, neither guard strips nor running boards shall be required, and the installation shall also comply with 300.4(D).
Substantiation: This proposal intends editorial improvements rather than substantive changes. The term "framing members" is a much more accurate term for this section as often the joists that serve as the lower level of the attic are referred to as ceiling joists and not floor joists. Floor joists support the floor and not the attic or roof. The issues become clearer when the attached drawing is observed.

In addition, the sentence is proposed to be restructured for ease of reading and understanding.

Correcting this section is important since other articles, such as Articles 330 and 334 refer to this section rather than stating their own rule.

Here is a list of other sections that use the term "framing members:"
250.2 Ground-Fault Current Path FPN
300.4(D)
314.23(D)(1)
410.36(B)

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
320.23 In Accessible Attics.
Type AC cables in accessible attics or roof spaces shall be installed as specified in 320.23(A) and (B).
(A) Cables ~~Where~~ Run Across the Top of Floor Joists.
When ~~where~~ run across the top of floor joists, or within 2.1 m (7 ft) of floor or floor joists
across the face of rafters or studding, the cable shall be protected by substantial guard strips that are at least as high as the cable.
If ~~Where~~ this space is not accessible by permanent stairs or ladders, protection shall only be required within 1.8 m (6 ft) of the nearest edge of the scuttle hole or attic entrance.
(B) Cable Installed Parallel to Framing Members. When ~~Where~~ the cable is installed parallel to the sides of rafters, studs, ~~or~~ ceiling or floor joists, neither guard strips nor running boards shall be required, and the installation shall also comply with 300.4(D).
The panel rejects all remaining changes by the submitter.
Panel Statement: The addition of the word "cable" modified the title of (A) to be consistent with the title of (B). In second sentence of (A), the panel accepts the change of the word "where" to "If". The panel agrees with the removal of ~~in attics and roof spaces that are accessible,~~ in (A), since the phrase already appears in 320.23.
The panel agrees with the change from "or" to "ceiling or " in (B).
The panel accepted in principal the changing of "where" to "when" instead of "if". Both words comply with 3.3.4 of the NEC Style Manual.
The panel rejects the use of "framing member" as a general term since the current text is more descriptive for this application. Remaining changes do not provide additional clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
NIELSEN, D.: The proposed changes of "Where" replaced with "When" or "If" does not increase safety. The present code uses "Where" to indicate location. The change to "If" and "When" sets text to be time dependent. "Where" subject to physical damage is used throughout the code. This could be progressive to other parts of the code where "Where" is currently used. This change has potential to allow the opportunity for the user to be subjective in applying "If" and/or "When" the situation presents itself and not absolute in every location.

7-14 Log #2635 NEC-P07 **Final Action: Reject**
(320.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: SECURING and SUPPORTING.
(A) GENERAL. Type AC cable shall be secured to supports by staples, cable ties, straps, hangers or other fittings identified for the use and installed so as not to damage the cable.
(B) SPECIFIC Except as provided in (C) and 392.8(B) Type AC cable shall be secured to supports within 300 mm (12 in.) of terminations and at intervals not exceeding 1.4 m (4-$^1/_2$ ft). Runs secured in place through openings in framing members shall be considered supported.
FPN: See 300.4.
(C) UNSUPPORTED CABLES. Type AC cable shall be permitted to be unsupported where the cable complies with any of the following:
(1) Is fished between access points through concealed spaces in finished buildings or structures and supporting is impractical and the cable is fastened to supports at the point where it becomes accessible.
(2) Is not more than 600 mm (2 ft) in length where flexibility is necessary.

(3) No change.

(4) Intermediate support shall not be required where the cable is not more than 300 mm (12 in.) in length between enclosures secured in place and connected to threaded hubs or openings or through a knockout with no segments larger than the cable connector or with reducing washers larger than the largest knockout segment and the cable is bonded by identified means.

Substantiation: Securing and supporting are not necessarily the same. 392.8(B) should be noted as an "otherwise provided". "Terminations" replaces a laundry list of boxes, outlets, cabinets, etc. Runs through framing members should be secured in place (by size of opening, fasteners, protection plates). Support by openings in bar joists, for example do not provide in-place securement. Vertical runs through framing members provide support where cables are fastened, just as where vertical cables are fastened to the side of studs. A common accepted practice is to weave vertical cables in and out of openings in metal studs. Flexibility is sometime required at other than terminations, such as where crossing an expansion joint. Proposal provides for no intermediate support similar to 342.30(C) 344.30(C), and 352.30(C).

Panel Meeting Action: Reject

Panel Statement: The revision of the article does not improve existing language.

The submitter has not presented this proposal in accordance with the NFPA Regulations Governing Committee Projects, adopted by the Board of Directors. Furthermore, the referral to terminating and the deletion of the list of outlet box, junction box, cabinet, and fittings does not improve clarity and is considered more subjective then the current text. The removal of the reference to horizontal runs in the present subpart (B) would allow vertical runs of cable to be weaved though successive openings without mechanical support where the run is parallel to framing members.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-15 Log #2636 NEC-P07 **Final Action: Reject**

(320.30)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete and substitute: SECURING and SUPPORTING.

(A) GENERAL. Type AC cable shall be secured to supports by staples, cable ties, straps, hangers or other fittings identified for the use and installed so as not to damage the cable. Exception: Cables installed in raceway.

(B) SPECIFIC. Except as provided in (C) and 392.8(B) Type AC cable shall be secured to supports within 300 mm (12 in.) of terminations and at intervals not exceeding 1.4 m (4-$^1/_2$ ft). Runs secured in place through openings in framing members shall be considered supported.

FPN: See 300.4.

(C) UNSUPPORTED CABLES. Type AC cable shall be permitted to be unsupported where the cable complies with any of the following:

(1) Is fished between access points through concealed spaces in finished buildings or structures and supporting is impractical and the cable is fastened to supports at the point where it becomes accessible.

(2) Is not more than 600 mm (2 ft) in length where flexibility is necessary.

(3) No change.

(4) Intermediate support shall not be required where the cable is not more than 300 mm (12 in.) in length between enclosures secured in place and connected to threaded hubs or openings or through a knockout with no segments larger than the cable connector or with reducing washers larger than the largest knockout segment and the cable is bonded by identified means.

Substantiation: Securing and supporting are not necessarily the same. 392.8(B) should be noted as an "otherwise provided". "Terminations" replaces a laundry list of boxes, outlets, cabinets, etc. Runs through framing members should be secured in place (by size of opening, fasteners, protection plates). Support by openings in bar joists, for example do not provide in-place securement. Vertical runs through framing members provide support where cables are fastened, just as where vertical cables are fastened to the side of studs. A common accepted practice is to weave vertical cables in and out of openings in metal studs. Flexibility is sometime required at other than terminations, such as where crossing an expansion joint. Proposal provides for no intermediate support similar to 342.30(C) 344.30(C), and 352.30(C).

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 7-14.

Number Eligible to Vote: 14

ARTICLE 324 — FLAT CABLE CONDUCTOR: TYPE FCC

Ballot Results: Affirmative: 14

7-16 Log #1046 NEC-P07 **Final Action: Accept in Principle in Part**

(320.30(B) and (C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise texts:

(B) Unless otherwise ~~provided~~ permitted Type AC cable shall be secured to supports within 300 mm (12 in.) of every ~~outlet~~ box, ~~junction box,~~ cabinet, or fitting, and at intervals not exceeding 1.4 m (4$^1/_2$ ft) ~~where installed on or across framing members~~.

(C) Unless otherwise ~~provided~~ permitted Type AC cable shall be secured and supported at intervals not exceeding 1.4 m (4$^1/_2$ ft). ~~Horizontal~~ In other than vertical runs Type AC cable installed in accordance with applicable provisions of 300.4 (A) or (B) and securely fastened within 300 mm (12 in.) of terminations shall be considered supported where such support does not exceed 1.4 m (4$^1/_2$ ft) intervals.

Substantiation: "Provided" is not clear whether it is a Code provision or act of the installer. A reference to 300.4 provides clarity and other provisions as is done in 334.30(A) and specifies fastening within 12 in. of terminations.

Panel Meeting Action: Accept in Principle in Part

Revise text to read as follows:

(B) Securing. Unless otherwise permitted ~~provided,~~ Type AC cable shall be secured within 300 mm (12 in.) of every outlet box, junction box, cabinet, or fitting and at intervals not exceeding 1.4 m (41/2 ft) where installed on or across framing members.

(C) Supporting. Unless otherwise permitted ~~provided~~, Type AC cable shall be supported at intervals not exceeding 1.4 m (41/2 ft).

Panel Statement: The panel has replaced the word "provided" with "permitted" to increase clarity and consistency with the support and securing requirements of this section. The remaining language of this section is unchanged. See panel action to Proposal 7-14.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-17 Log #3234 NEC-P07 **Final Action: Reject**

(320.30(B) Exception (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add new text as follows:

Exception: Type AC cable shall not be required to be securely fastened in place where installed in cable trays except as required in 392.8(B).

Substantiation: Provision should be made for cable tray installation.

Panel Meeting Action: Reject

Panel Statement: The exception is not required because provisions are in 320.10(2) and installation requirements are in Article 392.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-18 Log #2173 NEC-P07 **Final Action: Accept in Principle**

(320.80)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: The term "adjustment factor" should be used throughout this section. It appears that "adjustment factor" and "derating factor" mean the same thing, so only one term should be used.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a), and the term "corrected" is the term used for temperature in 310.16.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel accepts the change from derating to adjustment. See committee action and statement on Proposal 7-19.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-19 Log #2989 NEC-P07 **Final Action: Accept in Principle**

(320.80)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

(A) Thermal Insulation. Armored cable installed in thermal insulation shall have conductors rated at 90°C (194°F). The ampacity of cable installed in these applications shall be that of 60°C (140°F) conductors. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and correction ~~derating~~ purposes, provided the final calculated ~~derated~~ ampacity does not exceed that for a 60°C (140°F) rated conductor.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a), and the term "corrected" is the term used for temperature in 310.16.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(A) Thermal Insulation. Armored cable installed in thermal insulation shall have conductors rated at 90°C (194°F). The ampacity of cable installed in these applications shall not exceed that of a 60°C (140°F) rated conductor. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and correction calculations; however the ampacity shall not exceed that for a 60°C (140°F) rated conductor.

Panel Statement: The text has been rearranged to improve clarity.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-20 Log #3514 NEC-P07 **Final Action: Accept**

(320.80)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 320.80 as shown:

"320.80 Ampacity. The ampacity shall be determined in accordance with ~~by~~ 310.15."

Substantiation: More appropriate text and consistency with 320.80(B).

Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-21 Log #4613 NEC-P07 **Final Action: Reject**
(320.80(A))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete the last sentence, which reads: "The 90°C (194°F) rating shall be permitted to be used for ampacity derating purposes, provided the final derated ampacity does not exceed that for a 60°C (140°F) rated conductor."
Substantiation: The ampacity of conductors within wiring methods embedded in thermal insulation should always be 90°C and the section does require this, but any derating for mutual conductor heating or ambient temperature effects should begin in the 60°C column or the results will exceed the likely ampacity of the conductors and create violations of 310.10. Refer to the submitter's proposal on 334.80 for an extensive discussion of the reasons for this, which are not repeated here to conserve space.
Panel Meeting Action: Reject
Panel Statement: 334.112 requires conductors insulated for 90C. Derating from 90C is appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-22 Log #1527 NEC-P07 **Final Action: Reject**
(320.82 (New))

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Add new text as follows:
320.82 Optical Fibers. When a Type AC Cable contains optical fibers, the installation of the optical fibers shall be in accordance with 770.133.
Substantiation: Section 770.133 contains the installation rules for optical fibers in composite optical fiber cables. Reference to Article 770 is necessary because Section 770.3(A) states:
"(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable."
Article 770 has definitions for optical fiber cables:
"Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering."
"Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors."
Panel Meeting Action: Reject
Panel Statement: The installation requirements for optical fibers with electrical conductors are covered in 770.133. Section 90.3 provides for the modification of Chapter 3 wiring methods as amended by Chapter 7. Adding the installation requirement of 770.133 to the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-23 Log #3515 NEC-P07 **Final Action: Accept in Principle**
(320.120)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Delete text to read as follows:
320.120 Marking. The cable shall be marked in accordance with 310.11, ~~except that Type AC shall have ready identification of the manufacturer by distinctive external markings on the cable sheath throughout its entire length~~
Substantiation: A cable sheath normally refers to a nonmetallic jacket or covering. Type AC cable does not have either. Interlocking metal tape is the outer construction material. There is no mention of a sheath in Part III of Article 320 nor in the UL Green Book.
Panel Meeting Action: Accept in Principle
Only change "sheath" to "armor." Do not delete any other text.
Panel Statement: This change is to correlate with the wording in 320.100.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 322 — FLAT CABLE ASSEMBLIES: TYPE FC

7-24 Log #981 NEC-P07 **Final Action: Accept in Principle in Part**
(322.12(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
(1) Where likely to be subject to corrosive agents ~~vapors or liquids~~ unless ~~suitable~~ identified for the location.
Substantiation: Edit. Liquids and solids should be included. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
(1) Where exposed to corrosive conditions unless suitable for the application.
Panel Statement: See panel statement on Proposal 7-10 for not accepting the words "likely to be". The "accept in principal" part changes the term corrosive agents to corrosive conditions.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-25 Log #3156 NEC-P07 **Final Action: Accept in Principle**
(322.12(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 322.12, delete ~~(3) In any hazardous (classified) location.~~
Renumber 322.12(4) as 322.12(3).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations. In fact, the present text conflicts with 501.10(B)(3) which states "Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations."
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(3) In any hazardous (classified) location except as specifically permitted by other articles in this *Code.*
Panel Statement: Revising (3) provides the user with the information that the use of this cable is not generally permitted in hazardous locations but provides the information that the user should check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 324 — FLAT CABLE CONDUCTOR: TYPE FCC

7-26 Log #2666 NEC-P07 **Final Action: Reject**
(324.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Use of FCC systems shall be permitted only for general purpose and appliance circuits and for individual circuits.
Substantiation: Present wording is not a requirement: 90.5(B) states "shall be permitted" identifies actions allowed but not required, therefore, present wording does not limit other uses. 322.10 and others use the word "only".
Panel Meeting Action: Reject
Panel Statement: 322.10, Type FC, is a unique construction and is limited to very specific uses permitted. Type FCC is a more general wiring method and is permitted in more applications except as limited by 324.12. Uses permitted correctly identifies common uses but does not limit other applications as long as 324.12 is not violated. Uses permitted is not intended to be an all-inclusive list.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-27 Log #3157 NEC-P07 **Final Action: Accept in Principle**
(324.12(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 324.12, delete ~~(3) In any hazardous (classified) location,~~
Renumber 324.12(4) as 324.12(3).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations. In fact, the present text conflicts with 501.10(B)(3) which states "Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations."
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 7-25.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 326 — INTEGRATED GAS SPACER CABLE: TYPE IGS

7-28 Log #2665 NEC-P07 **Final Action: Reject**
(326.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Type IGS cable shall only be permitted for use underground, including direct burial in the earth, as the following:
Substantiation: Edit. Present wording is not a requirement; 90.5(B) states "shall be permitted" identifies actions allowed but not required, therefore, present working does not limit other use.
Panel Meeting Action: Reject
Panel Statement: Uses Permitted correctly identifies common uses but does not limit other applications as long as 326.12 is not violated. Uses Permitted is not intended to be an all-inclusive list.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-29 Log #1056 NEC-P07 **Final Action: Accept**
(326.10(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
(3) Service lateral conductors.
Substantiation: It seems reasonable to include service lateral conductors as a use for IGS cable.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-30 Log #1973 NEC-P07 **Final Action: Accept**
(326.10(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: (3) Service-lateral conductors.
Substantiation: Underground service lateral conductors should be included.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-31 Log #354 NEC-P07 **Final Action: Accept**
(326.112)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise second sentence as follows:
The nominal gas pressure shall be 138 kPa gauge ~~(20 pounds per square inch gauge)~~ (20 pounds/square inch gauge).
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 328 — MEDIUM VOLTAGE CABLE: TYPE MC

7-32 Log #4763a NEC-P07 **Final Action: Reject**
(328.2.Medium Voltage Cable, Type MV)

Submitter: Steven Bruno, Sabic Industrial Plastics
Recommendation: Add new text to read as follows:
Put high voltage and medium voltage in definitions for clarity because I consider medium voltage of 2001 to be high voltage.
A companion proposal has been sent to CMP 9 for 490.2.
Substantiation: Article 328 and Article 490 are confusing to the electrical industry.
Panel Meeting Action: Reject
Panel Statement: The submitter has not cited a standard, which supports his philosophy that 2001 volts is considered as high voltage. The term high voltage is not presently in Article 328. No specific text was provided as required by NFPA regulations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-33 Log #267 NEC-P07 **Final Action: Accept in Principle**
(328.10)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relative to the text of the second sentences in both (3) and (6).
This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change the exception following (3) to a permissive code rule and number as (4):
Renumber (4) through (6) as (5) through (7).
Change exception following existing (6) to a permissive code rule and number as (8).
The text in the two exceptions will remain exactly the same when they are made permissive rules.
Substantiation: These two changes will comply with 3.1.4 of the NEC Style Manual. Both exceptions comply with the requirements for a permissive code rule and do not conflict in any way with any of the other list items since each defines specific additional requirements.
Panel Meeting Action: Accept in Principle
In (3) delete the word "exception" and put the exception text as a second sentence in (3).
In (6) delete the word "exception" and put the exception text as a second sentence in (6).
Panel Statement: The panel has revised the text of (3) and (6) and has rejected the renumbering.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-34 Log #2561 NEC-P07 **Final Action: Accept in Principle**
(328.10)

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise text as follows:
328.10 Uses Permitted. Type MV cable shall be permitted for use on power systems rated ~~up to 35,000~~ 0 through 35,000 volts nominal as follows:
Substantiation: This change would clarify the intent that 35,000 is included in the wording. In addition, the revised wording would be consistent with the comment on affirmative from Proposal 2-326 Log #2153 from the 2008 ROP.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
328.10 Uses Permitted. Type MV cable shall be permitted for use on power systems rated up to and including 35,000 volts nominal as follows:
Panel Statement: Lower range of 0 volts conflicts with the definition in 328.2. The panel agrees that 35,000 volts should be included.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-35 Log #2664 NEC-P07 **Final Action: Reject**
(328.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Type MV cable shall only be permitted for use on power systems rated up to not more than 35,000 volts nominal, as follows:
Substantiation: Edit. Present wording is not a requirement; 90.5(B) states "shall be permitted" identifies actions allowed but not required, therefore, other use except as covered in 328.12 is not prohibited.
Panel Meeting Action: Reject
Panel Statement: Addition of the word "only" would conflict with the FPN at the end of 328.10. Uses Permitted correctly identifies common uses but does not limit other applications as long as 328.12 is not violated. Uses Permitted is not intended to be an all-inclusive list.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-36 Log #4803 NEC-P07 **Final Action: Reject**
(328.14 (New))

Submitter: William Laidler, Hanover, MA
Recommendation: Add text to read as follows:
328.14 Cable Installation. Type MV cable shall be installed by qualified persons with documented training and experience in the installation of such equipment. The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.
Substantiation: This new section will ensure that only qualified people install type MV cable. The installation of any type of conductors or cable requires a certain amount of expertise and experience. When it comes to the installation of MV cables, installers are often under the misconception that these cables can be installed like any other conductor or cable and that is not true. The manufacturers provide various recommendations on cable-pulling tensions, sidewall bearing pressures, and bending radius for the cable that should be followed when medium voltage cables are installed to insure the cable is not damaged during the installation. Many will reference IEEE 576 which is the recommended practice of installing and splicing medium voltage power cables in commercial and industrial locations. These facts, along with the fact that many installations' specifications require the cable be tested before it is energized to detect any damage the cable may have sustained during the installation process, provide more evidence that the installation must be done

by qualified people. The language that I have proposed is already used in the NEC in Articles 215 and 685 requiring that only qualified people perform this specific task and that evidence of their training be documented and a permanent record be kept.
Panel Meeting Action: Reject
Panel Statement: "Qualified person" is already defined in Article 100. Workmanship is a requirement of 110.12.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LA DART, S.: The panel should accept this proposal.
Type MV cable "pulling" is not the same as pulling routine building wire. If a MV cable is damaged during the pull, the cable will most likely fail. This is a safety issue.
Qualified people know the importance of limiting tension and drag on cables, when pulling them into raceways. Knowing the inside diameter of the raceway, and comparing it to the diameter of the cables establishes a very important "ratio" with which cable manufacturers insist must be complied.
As cables are pulled through bends in raceways, the pressure that is exerted between the cable and the wall of the raceway is referred to as "sidewall bearing pressure". Exceeding this pressure will crush the cable's sidewalls.
A cable's minimum bending radius is directly related to its construction and directly affects cable insulation. Over bending the cables will damage the insulation, which also leads to failure.
There is also a "consumer" issue. Many installations are improperly made, and the cable performs quite well for a period of time; however, the cable prematurely fails as a result of damage that has gone undetected.
There are several other factors that must be considered for the proper installation of MV cable. Most contractors already insist on having qualified people make the installation.
Mr. Laidler's substantiation is "step-for-step" with many of the warnings that appear in trade magazine articles, some of which were written by H.R. Stewart, IEEE XPLORE. If the panel is unwilling to accept the new text, then the panel should, at a minimum: "Accept a FPN that would read: MV Cable should be installed by Qualified persons, in accordance with IEEE 576.
Comment on Affirmative:
SCHUMACHER, D.: I agree with the vote to reject, the panel does not have the authority to say who is, or is not qualified to work on any system, or wiring method.
SMITH, M.: I feel that this would not be able to be enforced by the inspectors, nor would the electrical contractors be able to identify that the end user will have this information on site.

ARTICLE 330 — METAL CLAD CABLE: TYPE MC

7-37 Log #4176 NEC-P07 **Final Action: Reject**
(330.2.Metal Clad, Cable, Type MC-R and 330.116)

Submitter: Richard Temblador, Southwire Company
Recommendation: Add following text to 330.2:
Metal Clad Cable, Type MC-R. A listed factory assembly of one or more insulated conductors with or without optical fiber members enclosed in a smooth or corrugated metallic sheath of sufficient size and mechanical integrity to allow for conductor replacement.
Add following text to 330.116:
Sheath of Type MC-R Cable: Type MC-R shall be constructed from a continuous smooth or corrugated metallic sheath. Supplemental protection of an outer covering of corrosion-resistant material shall be permitted and shall be required where such protection is needed. The number of conductors shall not exceed that permitted by the percentage fill in Table 1, Chapter 9. The armor shall meet the physical performance requirements for FMC or LFMC.
Substantiation: A feature that is commonly requested is the ability to replace conductors in Type MC Cable. This proposed design continues to provide the benefits of Type MC Cable with the added ability of replacing conductors after installation while maintaining the integrity of the armor and conductors.
Panel Meeting Action: Reject
Panel Statement: This type of raceway is more appropriately within the scope of CMP-8. This applies more to flexible raceways than cables. Standardized trade sizes, fittings, and installation requirements are a few of the issues the panel thought needed more investigation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-38 Log #3265 NEC-P07 **Final Action: Reject**
(330.4 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows;
330.XX LISTED Type MC cable and associated fittings shall be listed.
Substantiation: Edit. Many wiring methods are required to be listed and that should apply to Type MC cable.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation is provided to require listing
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-39 Log #262 NEC-P07 **Final Action: Accept**
(330.10(11) b.)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 330.10(A)(11) b. as follows:
b. A ~~lead sheath or~~ moisture-impervious jacket is provided under the metal covering.
Substantiation: Since lead is not environmentally friendly it is not commonly used anymore and should be deleted from the code. Deletion of the lead sheath has no significant impact on the use of Type MC cable since it is very easy to comply with a., b. (as modified), or c.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-40 Log #3158 NEC-P07 **Final Action: Accept in Principle**
(330.10(A)(9))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 330.10(A), delete ~~(9) In hazardous (classified) locations as permitted~~
Renumber 330.10(A)(10), (11), and (12) as 330.10(A)(9), (10), and (11), respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations. Additionally, in this particular instance, the present text is incomplete.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(9) In hazardous (classified) locations ~~as permitted~~ where specifically permitted by other articles in this *Code.*
Panel Statement: Revising (9) provides the user with the information that the use of Type MC cable is permitted in some hazardous locations and directs the user to check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-41 Log #1055 NEC-P07 **Final Action: Accept**
(330.10(A)(12))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "neutral" to "grounded".
Substantiation: The grounded conductor of a 4-wire delta connected system (not a neutral) should be included.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-42 Log #1054 NEC-P07 **Final Action: Reject**
(330.12(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Where likely to be subject to physical damage.
Substantiation: "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-43 Log #4537 NEC-P07 **Final Action: Reject**
(330.12(1))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise existing text of the 2008 NEC as follows:
330.12 Uses Not Permitted.
Type MC cable shall not be used under either of the following conditions:
(1) Where likely to be damaged at the location where installed ~~subject to physical damage~~
(2) Unchanged.
Substantiation: It can be safely said that all wiring methods are "subject to physical damage." This phrase is far too general and subjective. At times, opponents of cable wiring methods use the simple statement in the present Code rule as license to unreasonably restrict the use of Type MC cables. All wiring methods should be installed in a manner and location so the wiring method is not expected to be damaged in ordinary use. For example, wiring

installed in walls, ceilings and floors in compliance with 300.4 can be reasonably expected to be isolated from physical damage in ordinary building operations. Can the cables be damaged in an unexpected event such as cutting a hole in the wall with a reciprocating saw to make a door opening? Certainly. However that is not likely to happen in normal building operation.

Listed Type MC cables are subject to extensive testing as prescribed in UL 1569, the product safety standard. This testing ensures Type MC cables are suitable to be installed in most all ordinary locations and in those hazardous locations as prescribed in other locations in the Code.

The term "likely" is used in many NEC sections such as providing a condition the event or condition will occur such as: "… likely to become energized …", "… maximum fault current likely to be imposed …", "… not likely to be damaged …", "…equipment likely to be disconnected for repairs or replacement …", "… not likely to stretch during or after installation …" and "… conduct safely any fault current likely to be imposed".

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-9.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
STRANIERO, G.: See my reason for negative vote on 7-9.

7-44 Log #1543 NEC-P07 **Final Action: Reject**
(330.17)

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
330.17 Through or Parallel to Framing Members. Type MC cable shall be protected in accordance with 300.4(A), (B)(2), (C), and (D) where installed through or parallel to framing members.
Substantiation: To correlate with code change Proposal 300.4(B)(2).
Panel Meeting Action: Reject
Panel Statement: 300.4(B)(2) is specifically limited to nonmetallic sheathed cable and electrical nonmetallic tubing and is not applicable to Type MC cable. The submitter did not provide any technical substantiation, and there is no documented history of failure with the permitted installation of Type MC cable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-45 Log #3677 NEC-P07 **Final Action: Reject**
(330.17)

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Revise text as follows:
...with 300.4(A), (B), (C) and (D) where, etc.
Substantiation: 300.4(B) certainly needs to be included in the list of places where MC must be protected. Eight MC cables installed through one factory- or field-punched holes definitely need protection from the drywall screws being installed.
Panel Meeting Action: Reject
Panel Statement: 300.4(B) is specifically limited to nonmetallic sheathed cable and electrical nonmetallic tubing and is not applicable to Type MC cable. The submitter did not provide any technical substantiation, and there is no documented history of failure with the permitted installation of Type MC cable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-46 Log #3813 NEC-P07 **Final Action: Reject**
(330.25 (New))

Submitter: Ryan Savary, Houde Electric
Recommendation: Add a new Section 330.25, to read similar to Article 320.1:.
Exposed Work. Exposed runs of MC on the underside of joists shall be supported at intervals not exceeding 36 in.
Substantiation: The way this article is written now, you can run MC on the underside of joists, secured at intervals not exceeding 6 in. If you support mc on the underside of joists in 6 ft intervals you will have a sag. If you secured the MC in 3 ft intervals the cable could follow the structure better and would be less subject to physical damage.
AC cable and mc are similar, why such a difference in securing, every joint verses every 6 ft.
Panel Meeting Action: Reject
Panel Statement: The code is a minimum standard. It is permissible to support any wiring method at intervals closer than minimum requirements established.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-47 Log #1986 NEC-P07 **Final Action: Reject**
(330.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete present (A), (B), (C) and substitute:
(A) General. Except as provided in 300.30(D) or where installed in a cable tray or raceway, Type MC cable shall be supported and secured by staples, cable ties, straps, hangers, or other fittings identified for the use, installed so as not to damage the cable, at intervals not exceeding 1.8m (6ft). Cables containing four or fewer conductors not larger than AWG and not installed in a raceway or cable tray shall be secured at supports within 300 mm (12 in) of every cable termination.
(B) Through Openings and Notches. Cables installed in accordance with 300.4 shall be acceptable where supported and secured in accordance with this section.
(C) Unsupported Cables. Type MC cable shall be permitted without intermediate support or attachment where the cable
(1) Is fished between access points through concealed spaces in finished buildings and structures and the cable is supported and secured where it becomes accessible or,
(2) Is not more than 1.8m (6 ft) in length from the last point of support or cable connection to luminaires or other electrical equipment and the cable and terminations are within an accessible ceiling.
Substantiation: Edit. Supporting and securing are essentially the same thing except that notches in wood and openings through metal framing members such as studs and bar joists provide support but not necessarily securement required by (A). Openings in bar joists are not "holes". Cables run vertically in and out of openings in metal studs are well supported and commonly installed in that fashion. The last sentence of present (D)(2) is superfluous. Reference to 300.4 alerts Code users to other pertinent provisions.
Panel Meeting Action: Reject
Panel Statement: The proposed change to this section does not improve the clarity or consistency. For supporting and securing of MC cable...".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-48 Log #4777 NEC-P07 **Final Action: Reject**
(330.30)

Submitter: Rocky Dippel, Mesquite, NV
Recommendation: To add - 330.30(D)(3) Where flexibility is necessary from the last point of cable support, after installation, the lengths shall not exceed the following:
(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes $^1/_2$ in. through $1^1/_4$ in.)
(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes $1^1/_2$ in. through 2 in.)
(3) 15900 mm (5 ft) for metric designators 63 (trade sizes $2^1/_2$ in.) and larger.
Substantiation: To qualify proper support of MC cables where the cable is typically used in commercial and industrial applications. Cables exiting cable trays, and motor terminal housings provide a unique condition where flexibility is necessary. Mechanical vibration and maintenance would be such examples. This added verbage would clarify to AHJ's the intent of relaxing the existing code requirements as they are now written.
The change is based upon verbage found at 350.30(A) Example No.2. This is a common problem regarding MC-HL.
Panel Meeting Action: Reject
Panel Statement: This proposal would only apply to #10 or smaller with four or fewer conductors required to be supported within 12 in. of every box, cabinet, fitting or other cable termination. All other constructions are only required to be supported every 6 ft. Therefore, the proposed language is not applicable and furthermore does not clearly correlate how to apply trade size dimensions to cables.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-49 Log #3880 NEC-P07 **Final Action: Reject**
(330.30(B))

Submitter: Aaron Blanco, E Light Electric Services
Recommendation: Revise text as follows:
Unless otherwise provided, cables shall be secured at intervals not exceeding 1.8 m (6 ft). Cables containing four or fewer conductors sized 10 AWG or smaller shall be secured within ~~300 mm (12 in.)~~ 450 mm (18 in.) of every box cabinet fitting or other cable termination.
Substantiation: We have found that often when installing multiple MC cables into a box that the strapping becomes difficult if all the MC cables are run in the same direction from the same side of the box. This can sometimes cause added stress to the cables when meeting the current requirements. The revised text will allow additional flexibility to the installer, not reduce the safety of the installation and allow strapping in a manner that does not stress the cables.
Panel Meeting Action: Reject
Panel Statement: The 12 in. distance is consistent throughout the entire document. This requirement prevents undue stress on the point of transition

where a cable is terminated or enters a mechanical sleeve (e.g., raceway). The submitter has not presented documentation that a greater distance to the first support will provide the same level of support.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-50 Log #3882 NEC-P07 **Final Action: Reject**
(330.30(B))

Submitter: Gary Tanner, E Light Electric Services
Recommendation: Revise text as follows:
Exception 1: Where an obstruction prevents supporting with in 900 mm (12 in.) it is permissible to secure the cable with 1800 mm (24 in.) of the box luminaire, or other termination point.
Substantiation: This will allow supporting of the MC cable in a safe manner in those circumstances where a support strap cannot be added with 12 in.
Panel Meeting Action: Reject
Panel Statement: The 12 in. distance is consistent throughout the entire document. This requirement prevents undue stress on the point of transition where a cable is terminated or enters a mechanical sleeve (e.g., raceway). The submitter has not presented documentation that a greater distance to the first support will provide the same level of support.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-51 Log #3885 NEC-P07 **Final Action: Reject**
(330.30(B))

Submitter: Stephen Schwengel, E Light Electric Services
Recommendation: Revise text as follows:
Unless otherwise provided, cables shall be secured at intervals not exceeding 1.8 m (6 ft). Cables containing four or fewer conductors sized no larger than 10 AWG shall be secured within ~~300 mm (12 in.)~~ <u>450 mm (18 in.)</u> of every box, cabinet fitting or other cable termination.
Substantiation: When making installations in fight areas or above ceilings there is often not enough space to make the support within 12 in. Allowing this to be expanded 18 inches will allow more flexibility in these circumstances and not reduce the safety of the installation. The current requirements sometimes cause the MC cable to be bent in ways that could damage the MC cable during installation.
Panel Meeting Action: Reject
Panel Statement: The 12 in. distance is consistent throughout the entire document. This requirement prevents undue stress on the point of transition where a cable is terminated or enters a mechanical sleeve (e.g., raceway). The submitter has not presented documentation that a greater distance to the first support will provide the same level of support.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-52 Log #928 NEC-P07 **Final Action: Reject**
(330.30(D)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows:
(3) Is not more than 300 mm (12 in.) in length between boxes, cabinets, or other enclosures securely fastened in place, and securely fastened to the enclosure. Where cables are attached at knockouts with segments larger than the cable connector, reducing washers larger than the largest knockout segments shall be installed and the cable shall be bonded to the enclosure by identified means.
Substantiation: If the provisions of 342.30(C), 344.30(C), and 352.30(C) are deemed necessary, a similar provision should be in this article.
Panel Meeting Action: Reject
Panel Statement: The substantiation references do not apply to this wiring method. No technical documentation or history of failure was provided.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-53 Log #1615 NEC-P07 **Final Action: Accept**
(330.80(B)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Table 310.20” to “Table 310.15(B)(5)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Panel Statement: Subject to action by Panel 6 and any correlation of table numbering by the TCC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-54 Log #1632 NEC-P07 **Final Action: Accept**
(330.80(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In (2), change “Table 310.67 and Table 310.68” to “Table 310.60(C)(1) and Table 310.60(C)(2)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.67 through 310.86 as Tables 310.60(C)(1) through 310.60(C)(20) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Panel Statement: Subject to action by Panel 6 and any correlation of table numbering by the TCC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-55 Log #1528 NEC-P07 **Final Action: Reject**
(330.82 (New))

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Add new text as follows:
<u>**320.82 Optical Fibers.** When a Type AC Cable contains optical fibers, the installation of the optical fibers shall be in accordance with 770.133.</u>
Substantiation: Section 770.133 contains the installation rules for optical fibers in composite optical fiber cables. Reference to Article 770 is necessary because Section 770.3(A) states:
“(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.”
Article 770 has definitions for optical fiber cables:
“Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering.”
“Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors.”
Panel Meeting Action: Reject
Panel Statement: The installation requirements for optical fibers with electrical conductors are covered in 770.133. Section 90.3 provides for the modification of Chapter 3 wiring methods as amended by Chapter 7. Adding the installation requirement of 770.133 to the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-56 Log #1053 NEC-P07 **Final Action: Reject**
(330.100)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. The referenced sections already apply per 90.3.
Panel Meeting Action: Reject
Panel Statement: There is no section 330.100.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-57 Log #2392 NEC-P07 **Final Action: Accept**
(330.104)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the last phrase in the second sentence, revise “and” to “or” so it reads “or 12 AWG aluminum or copper-clad aluminum.”
Substantiation: “Or” is more appropriate since the rule offers a choice between 3 alternatives.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 332 — MINERAL-INSULATED, METAL-SHEATHED CABLE

7-58 Log #3264 NEC-P07 **Final Action: Reject**
(332.4 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
332.XX LISTED Type MI cable and associated fittings shall be listed.
Substantiation: Edit. Many wiring methods are required to be listed and that should apply to Type MI cable.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation is provided to require listing
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-59 Log #3159 NEC-P07 **Final Action: Accept in Principle**
(332.10(7))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 332.10, delete ~~(7) In any hazardous (classified) location~~
Renumber 332.10(8), (9), (10), and (11) as 332.10(7), (8), (9), and (10), respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations. In fact, the present text conflicts with 505.15(A) which states "In Class 1, Zone 0 locations, intrinsically safe wiring methods in accordance with Article 504 shall be permitted."
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(7) In ~~any~~ hazardous (classified) locations ~~as permitted~~ where specifically permitted by other articles in this *Code.*
Panel Statement: Revising (7) provides the user with the information that the use of Type MI cable is permitted in some hazardous locations and directs the user to check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-60 Log #1052 NEC-P07 **Final Action: Reject**
(332.12(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
Where likely to be subject to physical damage.
Substantiation: Though Type MI cable is resistant to damage it is not impervious, all wiring methods can be damaged. Underground runs are covered by 332.10. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-61 Log #1839 NEC-P07 **Final Action: Reject**
(332.12(1) and (2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (1) and substitute: Where likely to be subject to physical damage which impairs its intended functions.
Revise (2): Where likely to be exposed to conditions ~~that are destructive agents~~ that are destructive to the metallic sheath unless additional identified protection is provided.
Substantiation: Underground runs are covered in 332.10 (10) Bare copper conductors are permitted in corrosive areas such as pools, in concrete, in earth, and in open air where mildly corrosive agents are not destructive. Additional protection should be identified for the use. There are degrees of physical damage; a slight ding, dent, or nick which doesn't impair watertightness, grounding, or damage conductors is damage, but doesn't impair the functional qualities. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposals 7-8 and 7-10. The proposal does not add clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-62 Log #2686 NEC-P07 **Final Action: Reject**
(332.12(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
(3) Where likely to be exposed to physical damage unless protected by identified means.
Substantiation: Type MI cable is resistant to be not impervious to physical damage. "Likely" is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The language in 332.12(2) addresses the submitter's concerns.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-63 Log #1544 NEC-P07 **Final Action: Reject**
(332.17)

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
332.17 Through or Parallel to Framing Members. Type MI cable shall be protected in accordance with 300.4(A), (B)(2), (C), and (D) where installed through or parallel to framing members.
Substantiation: To correlate with code change Proposal 300.4(B)(2).
Panel Meeting Action: Reject
Panel Statement: 300.4(B)(2) is specifically limited to nonmetallic sheathed cable and electrical nonmetallic tubing and is not applicable to Type MI cable. The submitter did not provide any technical substantiation, and there is no documented history of failure with the permitted installation of Type MI cable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-64 Log #2628 NEC-P07 **Final Action: Reject**
(332.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Type MI cable shall be ~~supported and~~ secured to supports by staples, cable ties, straps, hangers or ~~similar~~ other identified means ~~designed~~ and installed so as not to damage the cable at intervals not exceeding 1.8 m (6 ft).
(A) ~~HORIZONTAL~~ RUNS THROUGH HOLES AND NOTCHES. ~~In other than horizontal runs~~, Cables installed in accordance with 300.4 shall be considered supported if secured in place and such support does not exceed 1.8 m (6 ft) intervals.
(B) UNSUPPORTED CABLE. Type MI cable shall be permitted to be ~~unsupported~~ without intermediate support where:
(1) The cable is fished between access points through concealed spaces in finished buildings or structures and supporting is impractical provided the cable is fastened to supports where the cable becomes accessible.
(2) The cable is not more than 1.8 m (6 ft) in length between enclosures secured in place, and connected to threaded hubs or openings or through a knockout with no segments larger than the cable connector, or with reducing washers larger than the largest knockout segment and the cable is bonded by identified means.
Delete (C).
Substantiation: Support and securing are not necessarily the same. Cables in vertical runs through holes and notches are supported when fastened to such support by the size of the hole, protection plates or fasteners, as required by the first paragraph and is no different than a vertical run secured to the side of a stud. Runs through large openings such as with bar joists provide support but not securement in place.
(B) should provide a provision similar to those for RMC, IMC, EMT RNMC.
(C) is superfluous; 392.8(B) already applies.
Panel Meeting Action: Reject
Panel Statement: The proposed revision of this section does not improve clarity of the existing language. The is no technical data in the substantiation to support such a broad change.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-65 Log #2639 NEC-P07 **Final Action: Reject**
(332.30 and Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Type MI cable shall be ~~supported and~~ secured to supports by staples, straps... (remainder unchanged).
Add: Exception: Where installed in cable trays 392.8(B) shall apply.
Delete (C).
Substantiation: Edit. Fastening means should be clearly indicated to be at required support intervals.
Present (C) should be an exception to the first paragraph as 392.8(B) does not modify the first paragraph.
See (90.3) but merely specifies what it is to be used for support.
Panel Meeting Action: Reject
Panel Statement: See the panel statement to Proposal 7-64.
Supporting and securing are distinctly different requirements and are independent of one another. 392.30(C) already addresses installation of Type MI cable in cable tray and is positive code text rather than an exception as recommended in the NEC Style Manual.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-66 Log #883 NEC-P07 **Final Action: Reject**
(332.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Type MI cable shall be permitted without intermediate support if not more than 1.8 m (6 ft) in length between boxes, cabinets or other enclosures. Where the cable is attached at knockouts with segments larger than the cable connectors, reducing washers larger than the largest knockout segments shall be installed and the cable shall be bonded to the enclosure by identified means.
Substantiation: None given.
Panel Meeting Action: Reject
Panel Statement: See committee action and statement on Proposal 7-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-67 Log #922 NEC-P07 **Final Action: Reject**
(332.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows:
Type MI cable shall be permitted without intermediate support if not more than 1.8 m (6 ft) in length between boxes, cabinets or other enclosures. Where the cable is attached at knockouts with segments larger than the cable connectors, reducing washers larger than the largest knockout segments shall be installed and the cable shall be bonded to the enclosure by identified means.
Substantiation: If the provisions of 342.30(C), 344.30(C) and 352.30(C) are deemed necessary, a similar provision should be in this article.
Panel Meeting Action: Reject
Panel Statement: The substantiation references do not apply to this wiring method. No technical documentation or history of failure was provided.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-68 Log #4811 NEC-P07 **Final Action: Reject**
(332.31)

Submitter: Leo F. Martin, Jr., Martin Electrical Code Consultants
Recommendation: Add a fine print note to follow 332.31 as follows:
FPN: NFPA 20-2007 standard for the installation of Stationary pumps for fire protection provides information on installation of fire pump controllers in 9.3.7.3.
Substantiation: To make the NEC more user friendly by making Code users aware that cutting slots or rectangular cutouts in a fire pump controller are not permitted.
Panel Meeting Action: Reject
Panel Statement: The section reference to NFPA 20 provided in the proposed language does not correlate with the substantiation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-69 Log #1229 NEC-P07 **Final Action: Reject**
(332.40(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
The conductors extending beyond the sheath shall be provided with an <u>identified fitting and</u> insulating material for the <u>ungrounded and grounded circuit conductors</u>.
Substantiation: The fitting and insulating material should be suitable for the use and color coded.
Panel Meeting Action: Reject
Panel Statement: The conductor extending beyond the sheath is bare and is intended for termination in a device. Additional text regarding the type of conductor does not add clarity and is not needed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-70 Log #4614 NEC-P07 **Final Action: Reject**
(332.80)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise by rewriting 332.80 as follows:
332.80. Ampacity. The ampacity of multiconductor Type MI cable shall be determined in accordance with 310.15. The ampacity of Type MI cable installed in cable tray shall be determined in accordance with 392.11. The ampacity of single-conductor Type MI cable shall be determined by (A) or (B).
(A) Maintained Spacing. Where the circuit groupings of Type MI cable required by 332.31 are installed on a messenger or as open runs with a maintained free air space of not less than 2.15 times one conductor diameter (2.15 x O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of the conductors shall be permitted to be determined by Table 310.17. The installation shall comply with (1), (2), and (3).
(1) Heat Dissipation. At each point of cable termination at an enclosure, the bundles shall be spread so each cable has a maintained spacing from adjacent cables of not less than one cable diameter for a distance of not less than 450 mm (18 in.) and not more than 750 mm (30 in.).
(2) Adjacent Ampacities. The ampacity determined under this procedure shall not be used to establish temperature ratings of conductors at terminations. The provisions of 310.15(A)(2) Exception shall not apply.
(3) End Seal. The conductor temperature at the end seal fitting shall not exceed the listed temperature rating of the end seal fitting.
(B) Spacing Not Maintained. Where the spacing in (A) is not maintained, the ampacity shall be determined using a method that does not rely on the ampacities of single conductors run in free air.
Substantiation: The NEC has to recognize that the cables are operating above 90°C under these conditions, admittedly harmless to the MI cable, but which need to correlate with 110.14(C), and 310.15(A)(2) and its exception. Some MI cable folks have told the submitter that they are relying on that exception to get them into an enclosure with terminations based on free-air temperatures over the run. That only works if the cable actually operates under free air conditions. For example, suppose the cable ran unbundled (not allowed; this is only for discussion). Then, for a 75°C allowable termination, the submitter agrees that you could use the 75°C column of Table 310-17. However, you can't run the cable unbundled. Furthermore, product standards almost universally rely on Table 310-16 to provide enough headroom in conductor sizing to allow for the conductor to function as a heat sink from the device. Therefore:
1) The cable must be unbundled for some distance, which the Code needs to specify upon due input from third parties, sufficient to allow the elevated temperature within the bundle to fall to the point where the end seals aren't affected. I have heard 1 ft as a number OK for 90°C end seals and somewhat greater for lower rated seals. Probably 2 ft is a good number, one that makes intuitive sense to users based on the nipple rule; this comment uses a range with that number in the middle.
2) The exception to 310.15(A)(2) relies on a length of higher ampacity (= cooler wires) to act as a heat sink for lower ampacity (= hotter wires) areas along the run. In this unique case if someone applies this exception to the conductors in the panelboard they would inadvertently be doing the reverse, that is, attempting to use hotter conductors as a heat sink for cooler conductors. Therefore this rule has to clearly stipulate how the allowable ampacity tables intersect with termination requirements.
Panel Meeting Action: Reject
Panel Statement: The current language in 332.80 already states that the temperature rating of the fittings, terminations, and equipment shall not be exceeded.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-71 Log #1616 NEC-P07 **Final Action: Accept**
(332.80(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the last line, change "Table 310.17" to "Table 310.15(B)(2)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Panel Statement: Subject to action by Panel 6 and any correlation of table numbering by the TCC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 334 — NONMETALLIC-SHEATHED CABLE: TYPE NM, NMC, AND NMS

7-72 Log #3870 NEC-P07 **Final Action: Reject**
(334)

Submitter: Mike Weitzel, Bechtel
Recommendation: Delete "NMC" in title of Article and elsewhere in Articles including its definition.
Types NM, ~~NMC~~, and NMS
Substantiation: What is Type NMC cable. Is it even manufactured any more? It is my understanding that Type UF is used in place of it. Perhaps it is time to delete this all together.
Panel Meeting Action: Reject
Panel Statement: This product is still being manufactured.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-73 Log #1529 NEC-P07 **Final Action: Reject**
(334.2.Nonmetallic-Sheathed Cable)

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Revise text as follows:
334.2 Definitions.
Nonmetallic-Sheathed Cable. A factory assembly of two or more insulated conductors, with or without optical fiber members, enclosed within an overall nonmetallic jacket.
Type NM. Insulated conductors, with or without optical fiber members, enclosed within an overall nonmetallic jacket.
Type NMC. Insulated conductors enclosed, with or without optical fiber members, within an overall, corrosion resistant, nonmetallic jacket.
Type NMS. Insulated power or control conductors, with or without optical fiber members, with signaling, data, and communications conductors within an overall nonmetallic jacket.
Substantiation: Article 330 explicitly mentions optical fibers in the definition of Metal Clad Cable.
"330.2 Definition.
Metal Clad Cable, Type MC. A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath."
Since Armored Cables can also contain optical fibers, this proposal would add optical fibers to the definition of Armored Cable also.
Panel Meeting Action: Reject
Panel Statement: Section 770.3(A) permits composite cables and requires that they be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable. Adding text to permit optical fiber members in the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-74 Log #2651 NEC-P07 **Final Action: Reject**
(334.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete: "except as prohibited in 334.10(A)" in (A)(2) and (B)(1).
Substantiation: Edit. Section 334.10(A) covers uses permitted and doesn't "prohibit", merely refers to 334.12 which covers uses not permitted.
Panel Meeting Action: Reject
Panel Statement: 334.10(3) defines the type of structure construction where Type NM Cable may be used. The uses permitted and not permitted apply to the installation methods within those structures.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-75 Log #3466 NEC-P07 **Final Action: Accept in Principle**
(334.10)

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Revise NEC 334.10 as follows:
334.10 Uses Permitted.
Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:
(1) One- and two-family dwellings and their accessory, utility, miscellaneous, incidental, secondary, or similar structures.
(2) Multifamily dwellings permitted to be of Types III, IV, and V construction except as prohibited in 334.12.
(3) Other structures permitted to be of Types III, IV, and V construction except as prohibited in 334.12. Cables shall be concealed within walls, floors, or ceilings that provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies.
Substantiation: The proposed wording will clarify that Type NM cable(s) are also permitted to be used in private garages, accessory buildings, storage sheds, or similar structures that are incidental, supplemental, or secondary in nature to one- and two-family dwellings. Lacking this clarification, inspectors have been considering such accessory structures as "Other structures" and attempting to enforce the rules in 334.10(3), whereby cables are required to be installed behind a rated thermal barrier material. Under normal circumstances, an uninhabitable accessory building should not be required to comply with rules that are more restrictive than what is required for a habitable building. If warranted, due to special circumstances and on a case-by-case basis, the inspector would retain the authority outlined in Article 110 to consider certain structures as "Other structures" under 334.10(3).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 7-77.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LA DART, S.: See comment 7-77.

7-76 Log #2783 NEC-P07 **Final Action: Accept in Principle**
(334.10(1))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise (1) of 334.210 as shown:
(1) One- and two-family dwellings and their including their accessory structures.
Substantiation: To permit the use of NM cable in garages and sheds without being concealed in a thermal barrier and having a 15 minute finish rating.
NM cable is already permitted in attached garages, attics and unfinished basements without a finish rating/thermal barrier.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 7-77.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LA DART, S.: See comment 7-77.

7-77 Log #3789 NEC-P07 **Final Action: Accept**
(334.10(1))

Submitter: James Grant, Rochester, NH
Recommendation: Revise text to read as follows:
334.10 Uses Permitted.
Type NM, Type NMC, and Type NMS cables shall be permitted to be used in the following:
(1) One- and two-family dwellings and their accessory structures.
Substantiation: With the present language an attached garage could utilize NM as an exposed wiring method. A detached garage, three ft away from the main dwelling, could not utilize NM as an exposed wiring method. The use of these accessory structures that are incidental to a dwelling unit normally do not change whether it is or is not attached to the structure. The requirement to add a 15-minute rated thermal barrier for dwelling unit's accessory structures is excessive.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LA DART, S.: The panel should reject this proposal, or accept in principal, in part. It would be acceptable to add "garages and storage sheds" to the text, but to allow Type NM cable to be installed in "ALL" accessory buildings creates a safety issue. Some of the accessory buildings would include children's play-houses, pool houses, game rooms, etc. The wiring method should be protected in these types of structures.

7-78 Log #4615 NEC-P07 **Final Action: Accept in Principle in Part**
(334.10(3) Exception No. 1 and No. 2 (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Insert two exceptions after (3) to read as follows:
Exception No. 1 to (2) and (3): For buildings or structures required to be of Type I or Type II construction, Type NM, Type NMC, and Type NMS cables shall be permitted to be used, provided that where so applied in buildings or structures exceeding three stories above grade, circuits run in Type NM, NMC, or NMS cable shall not leave the floor or dwelling unit from which the circuits originate.
Exception No. 2 to (3): For detached buildings that are accessory structures to dwelling occupancies, Type NM, Type NMC, and Type NMS cables shall be permitted to be used without concealment.
Substantiation: The first proposed exception is well familiar to CMP 7 as the high-rise exception that has been a landmark feature of the Massachusetts Electrical Code for over thirty years. We are aware of and understand the Standards Council decision relative to the use of Type NM cable, however, we are choosing to take this opportunity to place on the record a simple datum: During the time Massachusetts has chosen to not follow the NEC limitations regarding occupancy prohibitions with respect to this wiring method, no loss experience has yet been documented with respect to the use of this wiring method in occupancies where the NEC disallows it that is traceable to the choice of wiring method.
Further, we note some concern in the industry regarding seeming changes in the character of this wiring method over the intervening thirty years with respect to the robustness of its construction. We want to take this opportunity to remind CMP 7 that this should not drive decisions regarding acceptable occupancy classifications. Article 334, like many articles, contains a "construction specifications" part over which the code making panel retains plenary authority to drive changes in the ability of a wiring method to withstand physical damage. We invite CMP 7 to exercise that authority instead of placing arbitrary limits on occupancy limitations. Such changes would be squarely within the parameters that supported the decision of the Standards Council with respect to the use of this wiring method.

The second proposed exception is new in this code cycle, and we request that CMP 7 look at this on its own merits. The literal text of the existing NEC requires that NM cables run in a detached garage or other residential outbuilding be concealed behind a thermal barrier. This is plainly excessive, and entirely unsupported by any of the substantiation on which the Standards Council based its decision in the 2002 NEC cycle. We are aware of a number of states that have removed this inadvertent requirement, which goes far beyond the most restrictive occupancy limitations ever suggested for this wiring method. For example, it is more limiting than the three-story limitation imposed in the 1970s, or even the one- and two-family dwelling limitation suggested by some at that time.
Panel Meeting Action: Accept in Principle in Part
The Panel rejects exception No. 1. The panel accepts submitter's Exception No. 2 in principal.
Panel Statement: The panel rejects Exception 1. Reference to local codes is inappropriate since they are not nationally recognized. Installation practices vary throughout the country. See panel action on Proposal 7-77 for the part accepted in principal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-79 Log #1697 NEC-P07 **Final Action: Accept in Principle**
(334.10(5) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal concerning the use of the word "when" since the NEC Style Manual considers "when" to be a condition of time.
This action will be considered by the panel as a public comment.
Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Add text [formerly found in the exception to 334.12(A)] in a new 334.10(5).
334.10 Uses Permitted.
(5) Type NM, NMC, and NMS cable shall be permitted in Type I and II construction when installed within raceways permitted to be installed in Type I and II construction.
Substantiation: This change is editorial in nature and the use of positive language is preferable to exceptions and it is easier to find acceptable wiring methods under "Uses Permitted" than under the heading "Uses Not Permitted".
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Add text [formerly found in the exception to 334.12(A)] in a new 334.10(5).
334.10 Uses Permitted.
(5) Type I and II construction when installed within raceways permitted to be installed in Type I and II construction.
Panel Statement: Acceptance is consistent with the Technical Correlating Committee request to change exceptions into positive code text provided there is no technical change to the code. Proposal 7-82 correlates 334.12(A) Exception with this proposal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-80 Log #2409 NEC-P07 **Final Action: Reject**
(334.10(5))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Add: (5) As temporary wiring system as defined in 590.4(C).
Substantiation: When looking for how to use non-metallic sheathed cable you turn to Article 334. There are referrals to permit the use of non-metallic sheathed cable for hazardous locations and places of assembly, i.e. 334.12(A)(4)(5)(10). There is no mention of use for temporary wiring. By placing a new (5) under 334.10, you would understand that non-metallic sheathed cable can be used as temporary wiring.
Panel Meeting Action: Reject
Panel Statement: Article 590 permits NM and NMC but not NMS for temporary wiring.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-81 Log #3332 NEC-P07 **Final Action: Reject**
(334.10(A)(1), (B)(1), and (C)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "except as prohibited by 334.10(C).
Substantiation: Edit. Superfluous: Already covered in 334.12 "uses not permitted". 334.10(C) does not prohibit; only references a section which does.
Panel Meeting Action: Reject
Panel Statement: The panel understands the proposal refers to 334.10(3) rather than 334.10(C). Section 334.10(3) defines the type of structure construction where Type NM cable may be used. The uses permitted and not permitted apply to the installation methods within those structures.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-82 Log #1698 NEC-P07 **Final Action: Accept**
(334.12)

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Delete the Exception to 334.12(A)(1) and move that text to a new 334.10(5) as positive text because it is a use that is permitted. See companion proposal for 334.10(5).
334.12 Uses Not Permitted.
(A) Types NM, NMC, and NMS. Types NM, NMC, and NMS cables shall not be permitted as follows:
(1) In any dwelling or structure not specifically permitted in 334.10(1), (2), and (3).
~~Exception: Type NM, NMC, and NMS cable shall be permitted in Type I and II construction when installed within raceways permitted to be installed in Type I and II construction.~~
Substantiation: This change is editorial in nature and the use of positive language is preferable to exceptions and it is easier to find acceptable wiring methods under "Uses Permitted" than under the heading "Uses Not Permitted".
Panel Meeting Action: Accept
Panel Statement: See panel action on Proposal 7-79.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-83 Log #4497 NEC-P07 **Final Action: Reject**
(334.12(4) Exception (New))

Submitter: Dennis A. Portillo, Randolph Community College
Recommendation: Add new text as follows:
334.12 Uses Not Permitted.
(B) Types NM and NMS. Types NM and NMS cables shall not be used under the following conditions or in the following locations:
(4) In wet or damp locations
<u>Exception to 4: NM cable shall be permitted to be installed in an approved enclosure that is installed in a wet location</u>
Substantiation: This new exception will make it clear that the NM cable used to supply current to an air conditioner disconnect located on the side of a dwelling is compliant. This type of installation is done everyday without any problems as well as for outside panels.
Panel Meeting Action: Reject
Panel Statement: The existing permitted uses in 334.10 lists uses permitted unless so restricted by 334.12.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-84 Log #3852 NEC-P07 **Final Action: Accept**
(334.12(A)(1) Exception)

Submitter: Bill McGovern, City of Plano
Recommendation: Delete text as follows:
~~*Exception: Type NM, NMC, and NMS cable shall be permitted in Type I and II construction when installed within raceways permitted to be installed in Type I and II construction.*~~
Substantiation: Substantiation for allowance of NM, NMC, and NMS cable being permitted to be installed in Types I and II construction during the previous edition (ROP 7-51) was for the allowance of a hybrid cable on the market consisting of power, communications and signaling conductors under a common jacket. This type of cable was to be used under Article 780 Closed-Loop and Programmed Power Distribution which was removed from the 2008 NEC. NM cable is not designed nor was it intended to be installed in raceways, in long runs consisting up to 4-90 degree angle bends between junction boxes. Attempting to pull NM cable into metal raceways will lead to damage of the jacket and possibly the conductors themselves. There will also be misapplication of this exception leading to NM cable being installed in those types of construction without raceways of any kind and without inspection may lead to a shock and or fire hazard.
Panel Meeting Action: Accept
Panel Statement: The panel does not agree with the substantiation. Evidence has not been provided that pulling NM cable into metal raceways will lead to damage of the jacket or conductors. Also see panel action and statement on Proposals 7-79 and 7-82.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-85 Log #3160 NEC-P07 **Final Action: Accept in Principle**
(334.12(A)(10))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 333.12(A), delete ~~(10 In hazardous (classified) locations, except where permitted by the following:~~
~~a. 501.10(B)(3)~~
~~b. 502.10(B)(3)~~
~~c. 504.20~~

Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations. Additionally, in this instance, the references are incomplete, as 503.10(A)(3) and 505.15(C)(1)(h) are missing.

Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.

Panel Meeting Action: Accept in Principle

Revise all of (10) to read as follows:

(10) In hazardous (classified) locations except where specifically permitted by other articles in this *Code.*

Panel Statement: Revising (10) provides the user with the information that the use of nonmetallic-sheathed cable is generally not permitted in hazardous locations and directs the user to check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate. The proposed refers to 334.12(A)(10).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-86 Log #1762 NEC-P07 **Final Action: Reject**

(334.12(A)(11) (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add: (11) Where likely to be subject to physical damage.

Substantiation: Edit. This is a standard provision for many wiring methods. 334.15(B) only applies to exposed work.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 7-8.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-87 Log #1947 NEC-P07 **Final Action: Reject**

(334.12(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete "or damp".

Substantiation: This not permitted use would prevent installation in many basements and crawl spaces. Damp locations are not likely to be detrimental to the plastic jacket. 334.16 indicates cables are moisture resistant which implies they are suitable for damp locations. 334.10(A) permits installation in voids of masonry and tile blocks which may be damp.

Panel Meeting Action: Reject

Panel Statement: Types NM and NMS are only permitted in "normally dry" locations; Type NMC is the only construction permitted in "dry, moist, damp, or corrosive locations".

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-88 Log #2626 NEC-P07 **Final Action: Reject**

(334.12(B)(4))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

In wet ~~or damp~~ locations.

Substantiation: The jacket of NM cable is not seriously affected by dampness. Many basements and crawl spaces may be only occasionally damp and prohibit the wide present use of NM cable in these locations. Type NM cable is permitted in normally dry locations per 334.10(B) which infers it may be used in occasionally wet or damp locations.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 7-87.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-89 Log #2663 NEC-P07 **Final Action: Reject**

(334.12(B)(4))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

In wet ~~or damp~~ locations <u>unless enclosed in weatherproof enclosures</u>.

Substantiation: Present wording appears to prohibit installation in weatherproof enclosures such as panelboards, for switches and receptacles installed in wet locations. 334.16 indicates NM and NMS cables are moisture resistant.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 7-83 and 7-87.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-90 Log #4774 NEC-P07 **Final Action: Reject**

(334.12(B)(4))

Submitter: Jeff Fitzloff, State of Idaho Division of Building Safety

Recommendation: Add text to read as follows:

(4) In wet or damp locations <u>except as permitted as follows:</u>

<u>(a) May terminate in an enclosure that is listed for use in wet or damp locations.</u>

Substantiation: As the code stands now we can not terminate in panel boards, safety switches, and luminaires in outside locations as the interior of these are wet or damp locations.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 7-83.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-91 Log #4494 NEC-P07 **Final Action: Reject**

(334.12(B)(4) Exception (New))

Submitter: Dennis W. Morgan, II, Randolph Community College

Recommendation: Add new text as follows:

334.12 Uses Not Permitted.

(B) Types NM and NMS cables shall not be used under the following conditions or in the following locations:

(4) In wet or damp locations

<u>Exception to 4: NM shall be permitted to be installed in a rain tight enclosure in a wet location</u>

Substantiation: By adding the exception it would allow NM cable to be installed to supply a 3R disconnect for equipment installed outdoors such as air conditioner disconnects on dwelling units. The installation of NM cables to the air conditioner disconnects and meter combos have been a standard of practice throughout America for years. This also would be in line with the verbiage found in 300.9 which does not mention enclosures.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 7-83.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-92 Log #2332 NEC-P07 **Final Action: Accept**

(334.15(B))

Submitter: David Nemchik, Medina County Building Department [Ohio]

Recommendation: Revise text as follows:

(B) Protection from Physical Damage

[note: second paragraph]

Type NMC cable installed in shallow chases or grooves in masonry, concrete, or adobe, shall be protected in accordance with the requirements in 300.4~~(E)~~<u>(F)</u> and covered with plaster, adobe, or similar finish.

Substantiation: When 330.4 was amended for the 2008 code cycle, this reference was not properly updated.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-93 Log #3479 NEC-P07 **Final Action: Accept**

(334.15(B))

Submitter: Danny Thomas, Henderson, NC

Recommendation: Revise text to read as follows:

Type NMC cable installed in shallow chases or grooves in masonry, concrete or adobe, shall be protected in accordance with the requirements in 300.4~~(E)~~ (F) and covered with plaster, adobe or similar finish.

Substantiation: 300.4 is a reference for "Cables and Raceways Installed Under Roof Decking." The correct code reference is the one noted in my proposal.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-94 Log #3927 NEC-P07 **Final Action: Accept**

(334.15(B))

Submitter: Goran Haag, Champion Fiberglass, Inc.

Recommendation: Add new text to read as follows:

Everywhere Schedule 80 PVC is mentioned, "Type RTRC marked with the suffix -XW" should also be included.

Substantiation: For the NEC 2008, Type RTRC marked with the suffix –XW and Schedule 80 PVC were added as sufficient for Class I Division 2 installations. The Type RTRC marked with the suffix –XW were "forgotten" at some places in the NEC, needs to be corrected.

Panel Meeting Action: Accept

Panel Statement: The panel accepted the two locations to add this phrase, but wants a comma following the phrase.

According to the 2008 UL white book under file card DZKT, Reinforced thermosetting resin conduit is Listed in trade sizes 1/2 to 6 in. -------XW-type reinforced thermosetting resin conduit is Listed for aboveground use and is suitable for use wherever IPS, ID, RTRC 40, and RTRC 80 conduit may be used. The marking ''AG, XW, RTRC'' identifies conduit suitable for use where exposed to physical damage in accordance with the NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-95 Log #7 NEC-P07 **Final Action: Reject**
(334.15(C))

NOTE: This proposal appeared as Comment 7-36 on Proposal 7-63 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 7-63 was:
Revise text to read as follows:
(C) In Unfinished Basements. Where the cable is run at angles with joists in unfinished basements, it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. NM cable installed on the walls of an unfinished basement shall be protected from physical damage. Where NM cable is used on a wall of an unfinished basement it shall be permitted to be installed in a listed conduit or tubing or protected by other approved means. Conduit or tubing shall ~~utilize~~ be provided with a ~~nonmetallic~~ suitable bushing or adapter at the point the cable enters the raceway. The NM cable sheath shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (1/4 in.). The cable shall be secured within 300 mm (12 in.) of the point where the conduit enters the conduit or tubing. Metal conduit and tubings and metal outlet boxes shall be grounded.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise panel third sentence:
NM cable installed on the wall of a ~~an unfinished~~ basement or garage shall be permitted...(remainder unchanged).
Substantiation: While this is apparently not prohibited by present code and has been a common practice, it is worthwhile as clarification. However, it should not be limited to unfinished basements. It is applicable to garage walls, finished walls etc., where NM cable is permitted.
Panel Meeting Action: Reject
Panel Statement: No substantiation for additional text and 334.15(B) provides protection from physical damage.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-96 Log #1289 NEC-P07 **Final Action: Reject**
(334.15(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Raceway conductor fill requirements (shall) (shall not) apply.
Substantiation: Proposal is intended to clarify whether fill requirements are intended to apply.
Panel Meeting Action: Reject
Panel Statement: Submitter did not provide specific recommendation. Note 9 of Table 1 Chapter 9 instructs the installer to consider multiconductor cables as a single conductor. The xxx.22 section of all the raceway articles instructs the installer to adhere to the percentage of fill requirements found in Table 1 of Chapter 9.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-97 Log #2349 NEC-P07 **Final Action: Accept in Principle**
(334.15(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relative to the NEC Style Manual on writing exceptions as positive text.
This action will be considered by the panel as a public comment.
Submitter: Julian R. Burns, Quality Power Solutions, Inc.
Recommendation: Add new text as follows:
(C) In Unfinished Basements and Crawl Spaces. Where cable is run at angles with joists in unfinished basements and crawl spaces, it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. NM cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance with 300.4. Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point the cable enters the raceway. The NM cable sheath shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (¼ in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor.
New Exception:
Exception No. 1: Where the height of a crawl space does not exceed 1.4m (4½ ft) it shall be permissible to secure NM cables, that run at angles with joist, to the bottom edge of joist. NM cables run within 2.1m (7 ft) of crawl space access shall comply with 320.23.
Substantiation: The CMP's requirement to include a crawl space area into the same requirements as an unfinished basement has placed electricians into harms way. There have been instances within our state where electricians have been hurt trying to bore out joist in crawl spaces as low as 24 in. above ground. This requirement does not provide any degree of protection of cables. Also, where joist have been bored out for the installation of NM cables, the cables have been damaged by the unskilled labor installing insulation in the crawl space. They have pulled (yanked) the NM cables down to get the insulation between the joist.
Panel Meeting Action: Accept in Principle
Accept the new text in (C) and revise the exception as follows:
Exception: Where the height of a crawl space does not exceed 1.4 m (4 1/2 ft), it shall be permissible to secure nonmetallic-sheathed cables, installed at angles to the joists, to the bottom edge of joists. Nonmetallic-sheathed cable installed within 2.1 m (7 ft) of crawl space access shall be protected by substantial guard strips that are at least as high as the cable.
Panel Statement: NM was changed to "nonmetallic-sheathed cable" to permit all three Types NM, NMC, and NMS.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12 Negative: 2
Explanation of Negative:
HINRICHS, J.: The submitter has not provided any technical information to support this change. He only indicates that someone may become injured. Many crafts may have occasion to go into a crawl space, in order to perform installations or maintenance. If what the submitter is suggesting regarding the installation of NM Cable is accepted, the cable will be more susceptible to damage than if it were run as required by the 2008 edition of the NEC. In addition, the installer also will continue to have to crawl under the building, to install the NM Cable.
LA DART, S.: The panel should reject this proposal. The current code text requires the cables to be run through "bored holes". The reason for this method of installation is to protect the cables from physical damage. The current code text should remain.
The acceptance of this proposal will create a "safety issue". The allowance to run exposed cables across the face of framing members in a "crawl space" will subject the cables to physical damage. It is important to understand that the new rule would apply to each and every installation, and it is equally important to be able to envision the endless possibilities of what could be placed within the crawl space.
Crawl Spaces are often times used for storage areas and are filled to capacity with "stuff" that could easily snag and damage the fragile cable's insulation. This would create a "shock hazard". Remember, we should consider all of "the conditions of use" that could occur in ALL crawl spaces.
Additionally, the code will continue to allow the cables to be run at angles with framing members, (as the crow flies). Now you have cables "crossing over" one another, exposed----And resembling a spider's web. Is this "neat and workmanlike"?
The practice of recessing cables within the protective cavity of framing members should continue. This protects the cables from stored equipment, and other essential items, such as duct-work, other piping, etc., and most importantly---It protects service technicians from possibly coming into contact with an energized piece of equipment, due to the fact that it is being energized by a bare, ungrounded, damaged conductor.

7-98 Log #2456 NEC-P07 **Final Action: Reject**
(334.15(C))

Submitter: Gerald Horn, Spencer Research & Development dba/J-Horn Electric Inc.
Recommendation: Revise text to read as follows:
Smaller cable shall be run either through bored holes in joist or on running boards or through a listed device designed to support NM cable installed perpendicular to the joist. This device is attached to the bottom of each joist and must be installed within 6 in. of either side of the center support beam of the basement or crawl space.
Substantiation: This listed device would put less stress on the NM cable sheath, would not weaken the wood ceiling joist and will save time and expense for the installer.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: "Stackers" are covered by the words "…or similar fittings designed and installed so as not to damage the cable" in 334.30. It is not necessary to list in the code every possible means of securing and supporting nonmetallic-sheathed cable.
Stackers are permitted to be used within the cavity between joists, installed so that the cables are parallel to the joist, but not below the joist.
Smaller cable sizes are more susceptible to physical damage than the larger sizes. Accordingly, the code specifies the requirements for additional physical protection required for the smaller cables, and requires that any cables

approved by the code to be run at angles with joists.

In addition, submitter did not note the revisions in the submittal.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-99 Log #2707 NEC-P07 **Final Action: Accept in Part**
(334.15(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal identifying the part of the proposal that was rejected.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete portion beginning with the third sentence and substitute:

That portion of nonmetallic-sheathed cable installed on the wall of an unfinished basement or crawl space shall be installed in an identified conduit, electrical metallic tubing, electrical nonmetallic tubing, flexible nonmetallic tubing, surface metal raceways or surface nonmetallic raceways,or shall be protected by other identified means. Where the raceway does not terminate in a box or other enclosure, an insulating bushing shall be provided where the nonmetallic cable enters the raceway. Where the raceway terminates in a box or other enclosure the cable sheath shall extend in the box or enclosure not less than 6 mm (1/4 in.). Where the raceway is connected to a box or other enclosure the provisions of 250.86 Exception No. 2 shall not apply.

FPN: See Notes 5 and 9 of Chapter 9 Table 1 for calculation of raceway conductor fill.

Substantiation: The provisions should also apply to NMC and NMS cables, be a requirement and include crawl spaces. Raceways should be identified for the use. Insulating fittings are not necessary where the cable enters a raceway from a box or enclosure to which the raceway is connected. Securing of cable is covered by 334.30. A metal raceway may be perceived covered by Exception No. 2 for 250.86 which doesn't seem appropriate for raceways that are not "isolated" (without a connection to a box or other enclosure). The proposed FPN would be helpful for this installation.

Panel Meeting Action: Accept in Part

Replace all references to NM cable with the word nonmetallic-sheathed cable.

Panel Statement: Reference to NM cable includes Type NM, Type NMC, and Type NMS, but for clarity it changes NM to "nonmetallic-sheathed cable" so it includes all three types. The panel agrees with the grounding issues because it is essential to this location and type of installation. The last sentence of the paragraph covers grounding issues sufficiently.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-100 Log #4161 NEC-P07 **Final Action: Reject**
(334.15(C))

Submitter: Ron B. Chilton, North Carolina Department of Insurance

Recommendation: Delete text as follows:

(C) In Unfinished Basements ~~and Crawl Spaces.~~ Where cable is run at angles with joists in unfinished basements and crawl spaces, it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. NM cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance with 300.4. Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point the cable enters the raceway. The NM cable sheath shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (1/4 in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor.

Substantiation: Although an added measure of protection for the cable during time of construction, after the building is complete and other construction trades are not installing other systems, there is no reason the cable should be exposed to damage just as reasonably as the roof shouldn't leak and cause a wet location. There have been, however, many recorded accidents injuring Electricians, as well as Plumbing and Mechanical installers, finding the necessity to lay on the earth, holding a drill or sawzall, or other electrical tool, dragging an extension cord in the crawl space as opposed to instances of damage to cable after installation in a crawl space. (Record of incident in North Carolina included as example - the example was not received at NFPA). This requirement unnecessarily exposes workers to the greater chance or possibility of electrical shock. By character unfinished basements are intended for ready access and, therefore, subject to high incidence of exposure that can subject the wiring system to damage. Conversely, the crawl spaces have limited access and are generally used for only servicing equipment and possibly some limited storage. The existing protections required by 334.15 have been effective and reliable for years prior to the addition of crawl spaces to 334.15(C).

Panel Meeting Action: Reject

Panel Statement: Section 334.15(C) does apply to crawl spaces. See panel action and statement on Proposal 7-97.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

LA DART, S.: See negative comment on 7-97.

7-101 Log #4855 NEC-P07 **Final Action: Reject**
(334.15(C))

Submitter: John Steinke, Amish Electric

Recommendation: Delete entire paragraph, and rewrite to read:

(C) In Unfinished Basements and Crawl Spaces:

(1)(a) It shall be permitted to run cables either through joists, or to secure them to the lower face of the joists. Where cables pass through holes, either a chamfered edge, or a bushing, will be used to protect the cables from abrasion. Where the cables are attached to the lower face of the joist, and the joists are 24", or less, on center, it shall be sufficient to attach the cables at each joist. Where the joists are farther apart, running boards shall be used to provide additional support.

(1)(b) Where entry to the space is by permanent stairway, and the space is at least 6 ft tall, continuously, as measured from the entry point, cables run overhead shall be provided with either additional support or protection. Such protection may be by enclosing the cables within a ceiling, running them between piping, enclosing them within a conduit or raceway, or mounting them to running boards.

(1)(c) It shall be permitted to protect cables by running them through conduit. Where cables are protected by running through conduit, entry to the conduit shall have a bushing or fitting to protect the cable from abrasion. Cables shall be secured within 12" of entry to the conduit. The conduit shall be supported within 12" of each end, and with no more than 4-1/2 ft. between supports. Where there are no splices or connections to the cables it shall not be required to bond the raceway or conduit to the equipment grounding conductor. Conduit and raceway fill shall be calculated as if each cable were a single round conductor, with a diameter equal to the greatest dimension of the cable.

Substantiation: The section, as currently worded, is illogical, contradictory, and overly broad.

The practice of using running boards to protect overhead cables has classically been illustrated with the example of someone hanging laundry from the cables. Requiring running boards was asserted to protect the cables from this.

The fault in this logic is that cables run through joists are not so protected, and just as easy to attach a clothes hanger from. At least in this case, the cables are supported at every joist - typically less than 2 ft. With running boards, there is no requirement for the attachments of the cable to the running boards to be lass the 4 ft.

Requiring the use of running boards also encouraging bundling - while the use of cable support "trees" might provide a method.

The section also does not distinguish between a space that can only be wriggled through on your belly, and a space you can walk through. One is not likely to be hanging laundry in an 18" space, with an access hatch that you must crawl through. All jesting aside, building codes typically require 'habitable' spaces to be 6 ft tall, or taller.

Finally, there is the common issue of running cables through pipe for protection. While this certainly is done in other places than basements, it is hoped that this proposed change will provide some more general guidelines, as well bring this section in accord with the previous section (334.15B) which does NOT require such protection to be bonded.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 7-97, which is acceptable to the panel and covers this issue. The product standard addresses installation through bored holes. Remaining proposal recommendations are addressed elsewhere in the code.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

7-102 Log #2347 NEC-P07 **Final Action: Reject**
(334.15(D))

Submitter: Julian R. Burns, Quality Power Solutions, Inc.

Recommendation: Revise text to read as follows:

(C) In Unfinished Basements ~~and Crawl Spaces.~~ Where cable is run at angles with joists in unfinished basements ~~and crawl spaces,~~ it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. NM cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance with 300.4. Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point the cable enters the raceway. The NM cable sheath shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (¼ in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor.

New 334.15(D):

(D) Crawl Spaces. Where the height of the crawl space does not exceed 1.4m (4½ ft) it shall be permissible to secure NM cables, that run at angles with joist, to the bottom edge of joist. NM cables run within 2.1 m (7 ft) of crawl space access shall comply with 320.23.

Substantiation: The CMP's requirement to include a crawl space area into the same requirements as an unfinished basement has placed electricians into harms way. There have been instances within our state where electricians have been hurt trying to bore out joist in crawl spaces as low as 24 in. above ground. This requirement does not provide any degree of protection of cables. Also, where joist have been bored out for the installation of NM cables, the cables have been damaged by the unskilled labor installing insulation in the crawl space. They have pulled (yanked) the NM cables down to get the insulation between the joist.
Panel Meeting Action: Reject
Panel Statement: The remainder of (C) applies to crawl spaces and was not added to (D) in the proposal. See panel action and statement on Proposal 7-97.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-103 Log #2625 NEC-P07 **Final Action: Reject**
(334.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete all but (C) and substitute: SECURING and SUPPORTING. Nonmetallic-sheathe cables shall be secured to supports by staples, cable ties, straps, hangers, or other identified fittings installed so as not to damage the cable. Flat cable shall not be stapled on edge.

Exception No. 1: Fasteners shall not be required for cables in raceways or other enclosures.

Exception No. 2 Fasteners shall not be required for continuous runs in cable trays except as required in 392.8.

FPN: See 314.17(C) for cables terminated in nonmetallic boxes.

(A) SPECIFIC. Except as otherwise provided, nonmetallic-sheathed cables shall be secured to supports at intervals not exceeding 1.4 m (4 1/2 ft) and within 300 mm (12 in.) of terminations. Runs of cables through openings or notches in framing members in accordance with 300.4 shall be considered supported where secured in place.

(B) UNSUPPORTED CABLES. Nonmetallic-sheathed cables shall be permitted without intermediate support where the cable:

(1) Is fished between access points through concealed spaces in finished buildings or structures and supporting is impracticable, and the cable is securely supported at the point(s) where it becomes accessible

(2) Is not more than 1.4 m (4 1/2 ft) from the last point of support to the point of connection to a luminaire or other electrical equipment within an accessible space above the ceiling or attached to the ceiling.

(3) Is not more than 300 mm (12 in.) in length between enclosures fastened in place, and connected to threaded hubs or openings, or through a knockout with no segments larger than the cable connector, or with reducing washers larger than the largest knockout segments.

Substantiation: Securing and supporting are not necessarily the same; cable laid on the floor is supported.: Termination replaces a laundry list of boxes, cabinets, and fittings. The provision should correlate with 314.17(C) and 392.8(B). Vertical runs through framing members provide support where cables are secured (per the first sentence) just as vertical runs are secured to the side of a stud. Reference to 314.17(C) should be made. Proposal is similar to 342.30(C), 344.30(C), and 352.30(C).
Panel Meeting Action: Reject
Panel Statement: The proposed change to this section does not improve the clarity or consistency for supporting and securing of NM cable. See panel statement on Proposal 7-14.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-104 Log #3233 NEC-P07 **Final Action: Reject**
(334.30 Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add an Exception as follows:

Exception: Nonmetallic-sheathed cable shall ot be required to be securely fastened in place where installed in cable trays except as required in 392.8(B).

Substantiation: Provision should be made for cable tray istallation.
Panel Meeting Action: Reject
Panel Statement: The exception is not required because provisions are in 334.10(4) and installation requirements are in Article 392.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-105 Log #921 NEC-P07 **Final Action: Reject**
(334.30(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows:

(3) If not more than 300 mm (12 in.) in length between boxes, cabinets, or other enclosures securely fastened in place and securely fastened to the enclosure. Where the cable is attached at knockouts with segments larger than the cable connector reducing washers larger than the largest knockout segment shall be installed.

Substantiation: If the provisions of 342.30(C), 344.30(C) and 352.30(C) are deemed necessary, a similar provision should be in this article.
Panel Meeting Action: Reject
Panel Statement: The substantiation references do not apply to this wiring method. No technical documentation or history of failure was provided.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-106 Log #1701 NEC-P07 **Final Action: Reject**
(334.30(C))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 8 for action in Article 342.
Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise 344.30(C) as follows:

(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, Type IMC shall be permitted to be unsupported where the raceway is not more than <u>5 ft or 20 times the trade size, whichever is less,</u> ~~450 mm (18 in.)~~ and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.

Substantiation: The proposed revision will make the unsupported length, between enclosures, dependent on the raceway OD, which is a factor in how well a given raceway will resist bending.
Panel Meeting Action: Reject
Panel Statement: The panel is not sure what the submitter is proposing. Article 334 addresses NM cable; however, the recommendation specifies Type IMC. 334.30(B) addresses unsupported cables; however, the recommendation addresses 334.30(C), which is Wiring Device Without a Separate Outlet Box.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-107 Log #324 NEC-P07 **Final Action: Reject**
(334.80)

Submitter: Gaylord Poe, Inspection Bureau, Inc.
Recommendation: Revise as follows:

334.80 Ampacity. The ampacity of Types NM, NMC, ~~and~~ NMS, <u>and SE</u> cable shall be determined in accordance with 310.15. The ampacity shall be in accordance with the 60°C (140°F) conductor temperature rating. The ~~90°C (194°F)~~ <u>listed</u> rating <u>of the conductors</u> shall be permitted to be used for ampacity derating purposes, provided the final derated ampacity does not exceed that for a 60°C (140°F) rated conductor. The ampacity of Types NM, NMC, ~~and~~ NMS<u>, and SE</u> cable installed in cable tray shall be determined in accordance with 392.11.

Substantiation: Type SE cable needs to be included in the first paragraph of 334.80 to coincide with the change made to 338.10(B)(4)(a) in NEC 2008. There is much confusion regarding the ampacity of Type SE cable used for interior wiring, 338.10(B)(4)(a) states that SE cable "shall comply with the installation requirements of Part II of Article 334." but the only reference to ampacity in Part II of Article 334 is in 334.80. The first paragraph of 334.80 should include Type SE cable if the intent of 338.10(B)(4)(a) is that Type SE cable used as interior wiring is also subject to the 60°C (140°F) conductor temperature rating.
Panel Meeting Action: Reject
Panel Statement: Article 334 is for NM cable; it is inappropriate to include SE in this section. SE ampacity is covered in Article 338.
338.10(B)(4)(a) stipulates that Type SE cable installed in interior installations shall comply with Part II of Article 334. Part II includes 334.80, Ampacity, so it already applies.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-108 Log #2174 NEC-P07 **Final Action: Accept in Principle in Part**
(334.80)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:

334.80 Ampacity.

The ampacity of Types NM, NMC, and NMS cable shall be determined in accordance with 310.15. The ampacity shall be in accordance with the 60°C (140°F) conductor temperature rating. The 90°C (194°F) rating shall be permitted to be used for ampacity <u>adjustment and correction</u> ~~derating~~ purposes, provided the final <u>calculated</u> ~~derated~~ ampacity does not exceed that for a 60°C (140°F) rated conductor. The ampacity of Types NM, NMC, and NMS cable installed in cable tray shall be determined in accordance with 392.11.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a). The term "correction" is used in 310.16.
Panel Meeting Action: Accept in Principle in Part
Revise first paragraph as follows:

334.80 Ampacity.

The ampacity of Types NM, NMC, and NMS cable shall be determined in accordance with 310.15. The allowable ampacity shall not exceed that of a 60°C (140°F) rated conductor. The 90°C (194°F) rating shall be permitted to be

used for ampacity adjustment and correction calculations, provided the final ampacity does not exceed that for a 60°C (140°F) rated conductor. The ampacity of Types NM, NMC, and NMS cable installed in cable tray shall be determined in accordance with 392.11.
Panel Statement: The panel accepted "adjustment and correction" in place of "derating" but did not accept "calculated". The text has been rearranged to improve clarity. See committee action on Proposal 7-19.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-109 Log #2752 NEC-P07 **Final Action: Accept**
(334.80)

Submitter: Travis Lindsey, Travis Lindsey Consulting Services
Recommendation: Revise text to read as follows:
334.80 Ampacity.
Where more than two NM cables containing two or more current-carrying conductors are installed without maintaining spacing between cables through the same opening in wood framing that is to be sealed with ~~fire or draft stopped using~~ thermal insulation, caulk or sealing foam, the allowable ampacity of each conductor shall be adjusted in accordance with Table 310.15(B)(2)(a) and the provisions of 310.15(A)(2), Exception shall not apply.
Substantiation: The terms fire-stopped and draft stopped are industry terms which are used in specific building code applications. The use of these terms is not standard, therefore a different term is used to reduce confusion over application and provide an easier more universal interpretation of the language. Changing the language does not change the scope of application for this code section.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-110 Log #2990 NEC-P07 **Final Action: Accept in Principle in Part**
(334.80)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
334.80 Ampacity.
The ampacity of Types NM, NMC, and NMS cable shall be determined in accordance with 310.15. The ampacity shall be in accordance with the 60°C (140°F) conductor temperature rating. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and correction ~~derating~~ purposes, provided the final calculated ~~derated~~ ampacity does not exceed that for a 60°C (140°F) rated conductor. The ampacity of Types NM, NMC, and NMS cable installed in cable tray shall be determined in accordance with 392.11.
Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a). The term "correction" is used in 310.16.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: See panel action and statement on Proposal 7-108.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-111 Log #4616 NEC-P07 **Final Action: Reject**
(334.80)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Delete the second paragraph and revise the first paragraph to read as follows:
334.80 Ampacity. Type NM, NMC, and NMS cable shall have conductors rated at 90°C (194°F). Where installed in thermal insulation, the ampacity of conductors shall be that of 60°C (140°F) conductors. The ampacity of Types NM, NMC, and NMS cable installed in cable tray shall be determined in accordance with 392.11.
Substantiation: Thermal insulation severely degrades the ampacity of conductors. Mid-length conductor derating, whether as a consequence of the ambient temperature notes to Table 310.16, etc., or mutual conductor heating issues covered in 310.15(B)(2)(a), assumes free dissipation of heat from the raceway or cable assembly involved. If that assumption is invalid, then the calculations are invalid. This is true for all wiring methods.
We are aware that CMP 7 reviewed, as a key factor in the revision to 338.10(B)(4)(a), the NEMA research for the 1987 cycle (Proposal 4-97), which showed the cable jacket of 2/3 AWG SEU cable "completely charred" as well as adjacent "charred wood members" when embedded in thermal insulation (specifically, when covered with 7 inches of cellulose insulation) and subjected to currents corresponding to their Table 310.16 ampacities. Similar cables exceeded their temperature ratings when drawing only two-thirds of their table ampacities. The term "final derated ampacity" in this context is meaningless. Ampacity is the continuous current carrying ability of a wire under conditions of use. It is determined by thermodynamics. If the use impedes free circulation of air, then the ampacity is reduced to whatever it is.
If there are no thermal impediments to air circulation, then it is appropriate to allow the 90°C number for derating purposes. If installed in thermal insulation, start with the 60°C number, just as was the case for armored cable prior to the 2005 NEC.
The data in the 1987 NEMA proposal illustrates this principle nicely, since the experimental parameters allow for a very close inference as to the actual effect of thermal insulation on ampacity, at least for 2 AWG aluminum cable assemblies with nonmetallic sheaths. From that experimental data, it is obvious that the true ampacity of 2 AWG XHHW Aluminum made up as Type SE cable is about 60 amperes when it is embedded in cellulose insulation. In fact, the ampacity is even lower because the test set-up used only two current-carrying conductors and comparable table listings are based on three conductors. The table ampacity of the 90°C (XHHW) individual conductors of the SE cable make-up, starting in the 60°C column is 75 amperes. Even this number is much higher than the actual ampacity as determined by test under the specified conditions of use.
The current NEC does not account for this hazard because it allows code users to start their derating calculations in the 90°C column, and bundle many conductors together or run through high-temperature ambients, all apparently valid according to traditional procedures. Suppose, for example, cables accounting for nine 12 AWG current-carrying conductors are bundled [The applicability of 310.15(B)(2)(a) has always been assumed in these arguments, and now is specifically mandated by the third paragraph] through attic floor joists with an assigned design temperature of 45°C. The resulting ampacity (assuming THHN conductors) would appear to be 30A x 0.7 x 0.87 = 18A. The 60°C ampacity of 12 AWG conductors is 25A. Since the calculation result (18A) does not exceed 25A, it appears to be allowed by the NEC, but is it technically correct?
This conclusion is, in fact, incorrect. This calculation does not take into account the effect of thermal insulation. The more technically correct answer is given by the armored cable rules in the 2002 and prior editions of the NEC: Begin with the 60°C column: 25A x 0.7 x 0.71 = 12A. There is no consistent percent multiplier that can be applied to correct for thermal insulation. Because heat dissipation has to account for I^2R losses, which are usually much higher for larger cables expected to carry much more current, one can't confidently predict the exact ampacity of a given application. However, one can predict with confidence that the thermal insulation effect will be significant. The 60°C rule provides a prescriptive approximation of how to counteract the effects of thermal insulation. It probably overstates the result in the smallest sizes of conductors, and understates it in the larger sizes, but it is the only readily available option at this time.
Not only does the NEC wording understate the hazard with respect to the use of Type NM cable where embedded in thermal insulation, it perversely overstates the hazard where thermal insulation is not involved. A 90°C conductor running through open floor joists does not need to be reduced to a 60°C conductor at any stage of an ampacity calculation. Although this is a distinction largely (but certainly not entirely) without a difference for common branch-circuit applications due to the operation of 240.4(D), it is a major issue for larger circuits.
This section now governs the interior branch-circuit and feeder applications of Type SE cable, which is now taken at the 60°C column value as the upper final ampacity limit in all instances. This is appropriate for embedment in insulation, but far too low for most common applications for those cables. For example, traditional 4/0 Al XHHW SER cable (180A nominal ampacity for terminations; 205A for derating start point; 150A for final ampacity) must now be taken as a 150A cable for a cable that has been an industry workhorse for 200A feeders (200A being the next higher standard size above the 75°C column). NEC users have been alarmed to find out their 200A cable just lost 25% of its ampacity. The 150A number is completely defensible for 4/0 Al cabling in insulation. The 200A number is perfectly defensible for the same cable run across or through open floor joists. This proposal fully addresses both the understatement of ampacity on open runs and the overstatement of ampacity on runs embedded in thermal insulation.
The second paragraph is deleted because there is no loss experience known to the Committee on this point, perhaps because of the more conservative start point for derating in accordance with this proposal wording that has applied consistently in Massachusetts for many years now.
Panel Meeting Action: Reject
Panel Statement: The panel rejects the submitter's proposed language for the first paragraph in 334.80 since the existing language was based on the recognition that NM cable is often installed or embedded in thermal insulation. The panel rejects the deletion of the second paragraph since local practice is not justification for national code rules, and the submitter did not provide sufficient proof to counter the research presented in previous code cycles. The submitter refers to a NEMA research document multiple times. This research was not available to the panel, nor is there any record of it being reviewed in the 2008 code cycle.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-112 Log #1530 NEC-P07 **Final Action: Reject**
(334.82 (New))

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Add new text as follows:
334.82 Optical Fibers. When a Nonmetallic-Sheathed Cable contains optical fibers, the installation of the optical fibers shall be in accordance with 770.133.
Substantiation: Section 770.133 contains the installation rules for optical fibers in composite optical fiber cables. Reference to Article 770 is necessary because Section 770.3(A) states:
"(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable."
Article 770 has definitions for optical fiber cables:
"Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering."
"Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors."
Panel Meeting Action: Reject
Panel Statement: The installation requirements for optical fibers with electrical conductors are covered in 770.133. Section 90.3 provides for the modification of Chapter 3 wiring methods as amended by Chapter 7. Adding the installation requirement of 770.133 to the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-113 Log #174 NEC-P07 **Final Action: Reject**
(334.101 (New))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add new text to read:
334.101 Hybrid NM and Communications Cables. The construction of hybrid NM and communications cables shall comply with Part III of this article and also comply with 800.179(I).
Substantiation: Acceptance of this proposal will bring about correlation with Article 800. Section 800.179 is shown below.
(I) Hybrid Power and Communications Cables. Listed hybrid power and communications cables shall be permitted where the power cable is a listed Type NM or NM-B conforming to the provisions of Article 334, and the communications cable is a listed Type CM, the jackets on the listed NM or NM-B and listed CM cables are rated for 600 volts minimum, and the hybrid cable is listed as being resistant to the spread of fire.
FPN: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Flame Tray Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Panel Meeting Action: Reject
Panel Statement: Section 90.3 provides that Chapter 3 requirements do not apply to Chapter 8 unless specifically referenced. The installation requirements for listed hybrid power and communications cables are covered in 800.179. A correlating reference in Article 334 is not needed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-114 Log #58 NEC-P07 **Final Action: Reject**
(334.104(C))

Note: This Proposal appeared as Comment 7-45 on Proposal 7-78 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 7-78 was:
Revise as follows:
334.116 Sheath. The outer sheath of nonmetallic-sheathed cable shall comply with 334.116(A), (B), and (C).
(A) Type NM. The overall covering shall be flame retardant and moisture resistant.
(B) Type NMC. The overall covering shall be flame retardant, moisture resistant, fungus resistant, and corrosion resistant.
(C) Type NMS. The overall covering shall be flame retardant and moisture resistant. The sheath shall be applied so as to separate the power conductors from the communications and signaling conductors. The signaling conductors shall be permitted to be shielded. An optional outer jacket shall be permitted.
~~**FPN: For composite optical cable, see 770.9 and 770.133.**~~
334.117 Optical Fibers. Optical fibers shall be permitted in the construction of Nonmetallic-Sheathed Cables.

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Continue to accept this proposal in principle in part by modifying the action as shown.
(C) Optical Fibers. Optical fibers shall be permitted in Type NMS ~~cable as permitted in 770.9(C) and 770.113~~.
Substantiation: Panel 16 action on proposal 16-36 eliminated section 770.9(C).
Panel 16 action on proposals 16-51 and 16-60 modified section 770.113. Section 770.13, currently and as modified by proposals 16-51 and 16-60, has no requirements dealing with composite optical fiber cable. Section 770.113 requires the use of listed optical fiber cables with an exception for a limited length of unlisted outside plant cable to enter the building.
Panel Meeting Action: Reject
Panel Statement: Section 770.3(A) permits composite cables and requires that they be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable. Adding text to permit optical fiber members in the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 336 — POWER AND CONTROL TRAY CABLE: TYPE TC

7-115 Log #1531 NEC-P07 **Final Action: Reject**
(336.2.Power and Control Tray Cable, Type TC.)

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Revise text as follows:
336.2 Definition.
Power and Control Tray Cable, Type TC. A factory assembly of two or more insulated conductors, with or without optical fiber members and with or without associated bare or covered grounding conductors, under a nonmetallic jacket.
Substantiation: Article 330 explicitly mentions optical fibers in the definition of Metal Clad Cable.
"330.2 Definition.
Metal Clad Cable, Type MC. A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath."
Since Armored Cables can also contain optical fibers, this proposal would add optical fibers to the definition of Armored Cable also.
Panel Meeting Action: Reject
Panel Statement: Section 770.3(A) permits composite cables and requires that they be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable. Adding text to permit optical fiber members in the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-116 Log #3236 NEC-P07 **Final Action: Reject**
(336.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence as follows:
Type TC cable shall only be permitted to be used as follows:
Substantiation: "permitted" does not invoke a requirement per 90.5(B).
Panel Meeting Action: Reject
Panel Statement: Uses permitted correctly identifies common uses but does not limit other applications as long as 336.12 is not violated. Uses permitted is not intended to be an all-inclusive list.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-117 Log #1946 NEC-P07 **Final Action: Reject**
(336.10(7))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (7) Where not likely to be subject to physical damage...(remainder unchanged).
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-118 Log #4088 NEC-P07 **Final Action: Reject**
(336.10(7))

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Revise text to read as follows:
In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is continuously supported and protected against physical damage using mechanical protection, such as struts, angles, or channels, Type TC tray cable that complies with the crush and impact requirements of Type MC cable and is identified for such use with the marking Type TC-ER shall be permitted ~~between a cable tray and the utilization equipment or device~~ to be exposed. The cable shall be secured at intervals not exceeding 1.8 m (6 ft). Equipment grounding for the utilization equipment shall be provided by an equipment grounding conductor within the cable. In cables containing conductors sized 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an equipment grounding conductor in accordance with 250.119(B).
Substantiation: There is no technical reason to restrict the use of TC-ER cable to only between the cable tray and utilization equipment. As long as the cable is continuously supported and protected against physical damage, it should be permitted to be used between pieces of utilization equipment.
Panel Meeting Action: Reject
Panel Statement: Type TC-ER cable is not permitted to be installed as exposed runs in unlimited lengths. The cable is primarily designed to be installed in cable tray and as permitted in 336.10.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
RUNYON, G.: The panel should have accepted this proposal. It specifies that the cable must be protected which is the main concern of the panel members. There is no technical reason that TC-ER cannot be safely installed outside of a cable tray. The panel should allow this type of installation that provides a cost effective method without compromising safety.

7-119 Log #3681 NEC-P07 **Final Action: Reject**
(336.10(7) Exception)

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Revise text as follows:
Exception: The cable shall be mechanically supported where exiting the cable tray using a strain relief or similar means to ensure that the minimum bending radius is not exceeded.
Substantiation: More direction is needed to clarify the requirements of the new exception that was new in the 2008 NEC.
Panel Meeting Action: Reject
Panel Statement: The last sentence in 336.10(7) Exception contains the requirement but does not specifically define what to use. The user has the flexibility to select the appropriate means to comply with the requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-120 Log #4389 NEC-P07 **Final Action: Accept**
(336.12)

Submitter: John R. Kovacik, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
336.12 Uses Not Permitted.
Type TC tray cable shall not be installed or used as follows:
(1) Installed where it will be exposed to physical damage
(2) Installed outside a raceway or cable tray system, except as permitted in 336.10(4) and 336.10(7)
(3) Used where exposed to direct rays of the sun, unless identified as sunlight resistant
(4) Direct buried, unless identified for such use
Substantiation: 336.10(4) permits the use of Power and Control Tray Cable Type TC to be supported by a messenger wire outdoors. This appears to conflict with 336.12(2) where it is not allowed to be installed outside of a raceway or cable tray system except as permitted in 336.10(7).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-121 Log #1945 NEC-P07 **Final Action: Reject**
(336.12(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (1) Installed where it will likely be exposed to physical damage.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-122 Log #1545 NEC-P07 **Final Action: Accept**
(336.12(2))

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
336.12 Uses Not Permitted.
Type TC tray cable shall not be installed or used as follows:
(1) Installed where it will be exposed to physical damage
(2) Installed outside a raceway or cable tray system, except as permitted in 336.10(4) and 336.10(7)
(3) Used where exposed to direct rays of the sun, unless identified as sunlight resistant
(4) Direct buried, unless identified for such use
Substantiation: 336.10(4) permits the use of Power and Control Tray Cable Type TC to be supported by a messenger wire outdoors. This appears to conflict with 336.12(2) where it is not allowed to be installed outside of a raceway or cable tray system except as permitted in 336.10(7).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-123 Log #2167 NEC-P07 **Final Action: Accept**
(336.12(2))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
336.12 Uses Not Permitted.
Type TC tray cable shall not be installed or used as follows:
(1) Installed where it will be exposed to physical damage
(2) Installed outside a raceway or cable tray system, except as permitted in 336.10(4) and 336.10(7)
(3) Used where exposed to direct rays of the sun, unless identified as sunlight resistant
(4) Direct buried, unless identified for such use
Substantiation: 336.10(4) permits the use of Power and Control Tray Cable Type TC to be supported by a messenger wire outdoors. This appears to conflict with 336.12(2) where it is not allowed to be installed outside of a raceway or cable tray system except as permitted in 336.10(7).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-124 Log #1532 NEC-P07 **Final Action: Reject**
(336.82 (New))

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Add new text as follows:
336.82 Optical Fibers. When a Type TC Cable contains optical fibers, the installation of the optical fibers shall be in accordance with 770.133.
Substantiation: Section 770.133 contains the installation rules for optical fibers in composite optical fiber cables. Reference to Article 770 is necessary because Section 770.3(A) states:
"(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable."
Article 770 has definitions for optical fiber cables:
"Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering."
"Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors."
Panel Meeting Action: Reject
Panel Statement: The installation requirements for optical fibers with electrical conductors are covered in 770.133. Section 90.3 provides for the modification of Chapter 3 wiring methods as amended by Chapter 7. Adding the installation requirement of 770.133 to the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-125 Log #4320 NEC-P07 **Final Action: Reject**
(336.100)

Submitter: Robert L. Seitz, Artech Engineering
Recommendation: Revise text as follows:
A metallic sheath or armor as defined in 330.116 shall not be permitted either under or over the non metallic jacket. Metallic shield(s) shall be permitted over groups of conductors, under the outer jacket, or both. A braided or basket weave armor shall be permitted beneath the outer jacket.
Substantiation: There is need for an additional cable construction for use in industrial establishments that provides additional durability and benefit of a flexible metallic armor beneath the outer jacket. The existing restriction against

armor in Tray Cable only references the types of armor described for MC cable in Article 330. The intent is to have a range of cable construction available that Shipboard Cable (IEEE 1580 and UL 1309) for shipboard and offshore applications. The allowance for a braided armor for tray cable should in no way compromise tray cable installations.
Panel Meeting Action: Reject
Panel Statement: The prohibition of a metallic sheath or armor on Type TC cable was intentional to provide a distinct construction difference between Type MC cable and Type TC cable based on the permitted installation uses of each cable type. Applications cited are outside scope of the NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-126 Log #4321 NEC-P07 **Final Action: Reject**
(336.118)

Submitter: Robert L. Seitz, Artech Engineering
Recommendation: Add the following new text:
336.118 Braided Armor. The armor shall be constructed of 0.32 mm diameter +- 0.01 mm, forming a basket weave that shall firmly grip the cable. Percent coverage should be between 88% and 94%.
Substantiation: A companion proposal that permits a braided construction to 336.100 has been submitted by this author. This proposal would provide guidance for the construction of the braided armor. The intent is to provide a construction that is the same as for Shipboard cable as described in IEEE 1580 or UL 1309 without specifically referencing or copying from those documents.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-125.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 338 — SERVICE-ENTRANCE CABLE: TYPES SE AND USE

7-127 Log #1286 NEC-P07 **Final Action: Reject**
(338.3 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
338. XX Raceway Conductor Fill. Where enclosed in a raceway, conductor fill requirements shall apply.
Substantiation: Where a short section of raceway is used for protection, conductor fill requirements are often overlooked.
Panel Meeting Action: Reject
Panel Statement: Note 9 of Table 1 in Chapter 9 instructs the installer to consider multiconductor cables as a single conductor. The xxx.22 section of all the raceway articles instructs the installer to adhere to the percentage of fill requirements found in Table 1 of Chapter 9.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-128 Log #2597 NEC-P07 **Final Action: Reject**
(338.10(4)() and (b) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new exception for (a) and (b): Service -entrance cable installed in cable trays shall not be required to be fastened in place except as specified in 392.8(B).
Substantiation: Edit. Provision should be made for cable tray installation.
Panel Meeting Action: Reject
Panel Statement: The exception is not required because 338.10(B)(4) refers the user back to 334.10(4) for installation requirements of SE cable. Cable tray installation requirements are in Article 392. The exception is not required.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-129 Log #920 NEC-P07 **Final Action: Reject**
(338.10(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows:
"...and the insulation complies with applicable provisions of Article 334.
Substantiation: Edit. It is assumed that Article 334 should apply.
Panel Meeting Action: Reject
Panel Statement: The insulation requirements for NM cable are contained in UL 719 and the insulation requirements for SE Cable are contained in UL 854. The requirements are not the same in the two standards.
There is no requirement that the insulation on service-entrance cable comply with 334.112. Also, 4.1.1 of the NEC Style Manual states that references shall not be made to an entire article.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-130 Log #1285 NEC-P07 **Final Action: Reject**
(338.10(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Insert "or bonding" between "grounding" and "purposes".
Substantiation: The uninsulated conductor may be used for bonding, for example where connecting two metal enclosure suitable for use as equipment grounding conductors.
Panel Meeting Action: Reject
Panel Statement: The original language was introduced to clarify that the bare conductor of a Type SE Cable shall only be used as a equipment grounding conductor for branch circuits and feeders. Article 100 does provide a distinction between the function of equipment grounding and bonding.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-131 Log #1943 NEC-P07 **Final Action: Accept in Principle**
(338.10(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In the heading, change "GROUNDED" TO "GROUNDING"...
Substantiation: Edit. The text relates to equipment grounding (conductor) which is not the same as "grounded" (system) conductor.
Panel Meeting Action: Accept in Principle
Revise heading of 338.10(B)(2) to read as follows:
Use of Uninsulated Conductor.
Panel Statement: Depending on the use of SE cable, the bare conductor may be used as a grounded or grounding conductor. The permissive language of 338.10(B)(2) establishes a condition where the bare conductor may be used for branch circuit applications.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-132 Log #1699 NEC-P07 **Final Action: Accept**
(338.10(B)(2) Exception)

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Clarify the Exception to 338.10(B)(2) by adding the text as follows:
338.10 Uses Permitted.
(B) Branch Circuits or Feeders.
(2) Grounded Conductor Not Insulated. Type SE service-entrance cable shall be permitted for use where the insulated conductors are used for circuit wiring and the uninsulated conductor is used only for equipment grounding purposes.
Exception: In existing installations, u~~U~~ninsulated conductors shall be permitted as a grounded conductor in accordance with 250.32 and 250.140 where the uninsulated grounded conductor of the cable originates in service equipment, and 225.30 through 225.40.
Substantiation: Since feeders are now required to be 4-wire, it would not be practical, for example, to install a new feeder under 250.32 with an uninsulated grounded conductor. The added text will correlate with the new requirement for feeders and accommodate the previously code compliant 3-wire feeders in existing installations.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-133 Log #451 NEC-P07 **Final Action: Accept in Principle**
(338.10(B)(4))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.
This action will be considered by the panel as a public comment.
Submitter: Richard W. Likes, L & F Electric
Recommendation: Add new text to read as follows:
Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Part II of Article 334, excluding 334.80.
Substantiation: SE cable has always had this exception. If the manufactures have changed the insulation on the wire, it should reflect on the temperature/ampacity chart. This is just raising the cost of wire by having to use a larger size. Has the NEC been wrong for all these years?
Panel Meeting Action: Accept in Principle
Accept inserted text. plus Insert language: "Where installed in thermal insulation, the ampacity shall be in accordance with the 60°C (140°F) conductor temperature rating. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and correction purposes, provided the final derated ampacity does not exceed that for a 60°C (140°F) rated conductor."
Panel Statement: The panel recognizes that SE cable is listed to 75C. The panel also recognizes that installation in thermal insulation can decrease the ampacity of a cable assembly.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 10 Negative: 4

Explanation of Negative:

HINRICHS, J.: The information provided CMP-7 during the 2008 NEC code cycle, was indicative that this product was manufactured similar to NM Cable, and was subject to the same installation concerns as NM Cable during electrical installations within thermal insulation, or when "bundled". The submitter has not supplied any technical documentation to indicate why this requirement should be removed.

LA DART, S.: The panel should reject this proposal. This is a safety issue. Type SE Cable should continue to comply with the requirements of 334.80. Panel 7 reviewed substantiation that showed the results of normal loading of conductors, when the conductors were run through thermal insulation.

Insulation degradation will occur as a result of the lack of heat dissipation through a thermal barrier. Both types, "NM and SE Cable", are similar in construction. Both are required to have a 90 degree C. rating. The performance rating for both cables, when placed in thermal insulation will be the same, therefore, 334.80 should apply.

MERCIER, C.: The language proposed by the Panel falls short when SE cables are installed as branch circuits in that it does not require all of the ampacity adjustment requirements found in 334.80.

STRANIERO, G.: The panel action to permit the 90C rating to be used for ampacity adjustment and correction factors should be rejected. Type NM cable has this provision because the insulated conductors are required to be rated 90C. The insulated conductors in SE cable are not required to be rated 90C and are typically rated 75C as indicated in the panel statement. Permitting the 90C rating to be used for ampacity adjustment and correction factors for Type SE is not appropriate.

Comment on Affirmative:

HUNTER, C.: While the panel's action is a reasonable compromise to address concerns about wiring methods (including SE) in thermal insulation, there was no substantiation presented in either the 2008 or 2011 Code cycle to warrant the ampacity restrictions placed on this wiring method in the 2008 NEC.

7-134 Log #2401 NEC-P07 **Final Action: Accept in Principle**
(338.10(B)(4)(a))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.

This action will be considered by the panel as a public comment.

Submitter: Julian R. Burns, Quality Power Solutions, Inc.

Recommendation: Revise text to read as follows:

(4) Installation Methods for Branch Circuits and Feeders.

(a) Interior Installations. In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Part II of Article 334<u>, excluding 334.80</u>.

Substantiation: CMP 7 removed the text without any technical merit. Even the UL listing of SE type cable is a minimum of 75 degree Centigrade and can be higher if so marked by the manufacturer (See the copy from the UL White Book that I have Provided). The manufactures of Type SE cable also acknowledge that the rating of their cable is 75°C and the conductors are rated 90°C in a dry location. Typical terminations for circuit breakers and wiring devices are rated at 75°C thus there is no valid technical merits to limit the ampacity of SE Type cable to the 60°C as set forth in 334.80. The substantiation that Mr. Hartwell gave during the 2008 NEC process was based on a NEMA test in 1987, this was 20+ years ago. Technology has progressed and insulation compounds have been improved, also the substantiation that Mr. Daly gave had no merit at all it was just a statement.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 7-133.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 10 Negative: 4

Explanation of Negative:

HINRICHS, J.: The information provided CMP-7 during the 2008 NEC code cycle, was indicative that this product was manufactured similar to NM Cable, and was subject to the same installation concerns as NM Cable during electrical installations within thermal insulation or when "bundled". The submitter has not provided information to the contrary, that the concerns mentioned in 7-133 are not valid.

LA DART, S.: See comment on 7-133.

MERCIER, C.: See My Explanation of Negative on 7-133.

STRANIERO, G.: See my reason for negative vote on proposal 7-133.

Comment on Affirmative:

HUNTER, C.: See 7-133.

7-135 Log #3153 NEC-P07 **Final Action: Accept in Principle**
(338.10(B)(4)(a))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.

This action will be considered by the panel as a public comment.

Submitter: Terry Cromer, NC Association of Electrical Contractors

Recommendation: Revise text as follows:

(a) Interior Installations. In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Part II of Article 334<u>, excluding 334.80.</u>

Substantiation: CMP 7 removed the text without any technical merit. Even the UL listing of SE type cable is a minimum of 75 degree Centigrade and can be higher if so marked by the manufacturer. (See copy of UL White Book - no copy was received by NFPA). The manufacturers of type SE cable also acknowledge that the rating of their outside jacket for the cable is 75 degree C and the conductors are rated 90 degree C in a dry location. Typical terminations for circuit breakers and wiring devices are rated at 75 degree C, thus, there is no valid technical merits to limit the ampacity of SE Type cable to the 60 degree C as set forth in 334.80. The substantiation that Mr. Hartwell gave during the 2008 NEC process was based on a NEMA test in 1980's; this was 20+ years ago. In 1996, SE Cables went from 60 degrees ampacity to 75 degree ampacity due to the new technology that has been progressed and insulation compounds have been improved, also the sustantiation that Mr. Daly gave had no merit at all, it was just a statement.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 7-133.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 10 Negative: 4

Explanation of Negative:

HINRICHS, J.: See my Explanation of Negative on Proposal 7-134 (Log #2401).

LA DART, S.: See comment on 7-133.

MERCIER, C.: See My Explanation of Negative on 7-133.

STRANIERO, G.: See my reason for negative vote on proposal 7-133.

Comment on Affirmative:

HUNTER, C.: See 7-133.

7-136 Log #3815 NEC-P07 **Final Action: Accept in Principle**
(338.10(B)(4)(a))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.

This action will be considered by the panel as a public comment.

Submitter: Christel K. Hunter, Alcan Cable

Recommendation: Add new text to read as follows:

(4) Installation Methods for Branch Circuits and Feeders

(a) Interior Installations. In addition to the provisions of this article, Type SE service-entrance cable used for interior wiring shall comply with the installation requirements of Parts I and II of Article 334, <u>excluding 334.80</u>.

Substantiation: In the 2008 NEC, the underlined text was deleted. There was no technical, experimental or field evidence substantiation given for this change. The effect is to limit the temperature rating of the SE cable assembly to 60°C, even though SE cable is listed to be used up to 75°C. NM cable and SE cable are listed to different standards, UL 719 for NM and UL 854 for SE.

In the 1999 NEC, a similar restriction was made, and the panel's action for the 2002 NEC (May 2001 ROC 7-98)

"was to correct an inadvertent correlation oversight. No technical substantiation has been provided to equate the ampacity requirements of Types NM and SE cables."

Once again,no technical substantiation has been provided, and yet the panel changed the ampacity restrictions in the 2008 NEC.

The research performed decades ago that resulted in the limitation of NM cable to 60C may or may not still be valid, but it does not and never has applied to SE cable. Insulations and installations have changed over the years, so perhaps it is time to update the research on these wiring methods. Until new evidence and adequate substantiation is available for evaluation, it is inappropriate to change the application of a cable assembly that has been used successfully and safely for decades.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 7-133.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 10 Negative: 4

Explanation of Negative:

HINRICHS, J.: See my Explanation of Negative on Proposal 7-134 (Log #2401).

LA DART, S.: See comment on 7-133.

MERCIER, C.: See My Explanation of Negative on 7-133.

STRANIERO, G.: See my reason for negative vote on proposal 7-133.

Comment on Affirmative:

HUNTER, C.: Please see my comment on 7-133.

7-137 Log #1944 NEC-P07 **Final Action: Reject**
(338.12(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (1) Where likely to be subject to physical damage.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-138 Log #1971 NEC-P07 **Final Action: Reject**
(338.100)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last part: Type SE or USE cable containing two or more conductors shall be permitted to have one conductor uninsulated where used as a grounded service conductor or equipment grounding or bonding conductor, unless otherwise provided in this Code.
Substantiation: There should be restructions on the use of the uninsulated conductor.
Panel Meeting Action: Reject
Panel Statement: The use of uninsulated conductors is and has been addressed throughout the NEC. This section covers the construction of the cable and its makeup. The use of the cables is covered in Part II Installations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 340 — UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE: TYPE UF

7-139 Log #1533 NEC-P07 **Final Action: Reject**
(340.2. Underground Feeder and Branch-Circuit Cable, Type UF)

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Revise text as follows:
340.2 Definition.
Underground Feeder and Branch-Circuit Cable, Type UF. A factory assembly of one or more insulated conductors, with or without optical fiber members, with an integral or an overall covering of nonmetallic material suitable for direct burial in the earth.
Substantiation: Article 330 explicitly mentions optical fibers in the definition of Metal Clad Cable.
"330.2 Definition.
Metal Clad Cable, Type MC. A factory assembly of one or more insulated circuit conductors with or without optical fiber members enclosed in an armor of interlocking metal tape, or a smooth or corrugated metallic sheath."
Since Armored Cables can also contain optical fibers, this proposal would add optical fibers to the definition of Armored Cable also.
Panel Meeting Action: Reject
Panel Statement: Section 770.3(A) permits composite cables and requires that they be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable. Adding text to permit optical fiber members in the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-140 Log #1942 NEC-P07 **Final Action: Reject**
(340.12(7))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (7) Where likely to be subject to physical damage.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-141 Log #3161 NEC-P07 **Final Action: Accept in Principle**
(340.12(7))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 340.12, delete ~~(7) In any hazardous (classified) location, except as otherwise permitted in this Code.~~
Renumber 340.12(8), (9), (10), and (11) as 340.12(7), (8), (9), and (10) respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(7) In hazardous (classified) locations except as specifically permitted by other articles in this *Code*.
Panel Statement: Revising (7) provides the user with the information that the use of this cable is not generally permitted in hazardous locations but provides the information that the user should check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-142 Log #1525 NEC-P07 **Final Action: Reject**
(340.82 (New))

Submitter: Stanley Kaufman, CableSafe, Inc.
Recommendation: Add new text as follows:
340.82 Optical Fibers. When a Type UF Cable contains optical fibers, the installation of the optical fibers shall be in accordance with 770.133.
Substantiation: Section 770.133 contains the installation rules for optical fibers in composite optical fiber cables. Reference to Article 770 is necessary because Section 770.3(A) states:
"(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable."
Article 770 has definitions for optical fiber cables:
"Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering."
"Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors."
Panel Meeting Action: Reject
Panel Statement: The installation requirements for optical fibers with electrical conductors are covered in 770.133. Section 90.3 provides for the modification of Chapter 3 wiring methods as amended by Chapter 7. Adding the installation requirement of 770.133 to the cable article is redundant.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 342 — INTERMEDIATE METAL CONDUIT: TYPE IMC

8-13 Log #1761 NEC-P08 **Final Action: Reject**
(342.11 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 342.11 USE NOT PERMITTED. Where likely to be subject to physical damage which impairs its functional capabilities.
Substantiation: This wiring method is damage resistant, but not impervious to damage. "Damage" is not defined; a small dent is damage but does not impair grounding, watertightness, or inserting or withdrawing conductors. This wiring method can be damaged by backhoes, jackhammers, impacts by vehicles and other sources.
Panel Meeting Action: Reject
Panel Statement: Suggested language is subjective and unenforceable.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-14 Log #3317 NEC-P08 **Final Action: Reject**
(342.12 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 342.XX Uses not permitted. Intermediate metal conduit shall not be used where likely to be subject to physical damage.
Substantiation: No wiring method is immune to physical damage.
Panel Meeting Action: Reject
Panel Statement: This adds a limitation that is without technical merit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-15 Log #233 NEC-P08 **Final Action: Reject**
(342.14)

Submitter: Kevin Daye Hanson, Columbus, OH
Recommendation: Revise as follows:
To ensure bonding, where practicable, dissimilar metals in contact anywhere in the system shall be avoided ~~to~~ eliminating the possibility of galvanic action.
Substantiation: We have a few inspectors who use this to say that aluminum MC cable cannot rest against metal sprinkler pipe. Some are also saying that our aluminum flexible metal conduit cannot be up against the duct work which extends from the unfinished ceiling to the furnace which stands alone on the floor.
Panel Meeting Action: Reject

Panel Statement: The implication is that galvanic action only has a deleterious effect on bonding. While bonding is an aspect damage to the raceway wall itself is also of consideration.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-16 Log #355 NEC-P08 **Final Action: Accept**
(342.28)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise second sentence as follows:
Where conduit is threaded in the field, a standard cutting die with a taper of 1 in 16 ~~(¾ in. taper per foot)~~ (¾ in. taper/foot) shall be used.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
DABE, J.: The term "per" appears in the NEC 180 times. The term has been in existence since 1580, and has a very understandable meaning "for each, for every". There is no reason it can not appear in a standard.

8-17 Log #4745 NEC-P08 **Final Action: Accept in Principle**
(342.30(A))

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
342.30 Securing and Supporting.
IMC shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 342.30(A) and (B), or permitted to be unsupported in accordance with 342.30(C).
(A) Securely Fastened.
(1) Each IMC shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.
(2) Fastening shall be permitted to be increased to a distance of 1.5 m (5 ft) where structural members do not readily permit fastening within 900 mm (3 ft).
(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast.
Substantiation: This is an update from the style manual to provide a list of all of the requirements for securely fastened and part (A) of this section. Part (B) of this same section has already done in a list type format. There is no other changes made to this section and does not change the sections intent. Makes it easier for site & write by having more specific itemization of securing IMC.
Panel Meeting Action: Accept in Principle
Revise 342.30(A) to read as the following:
342.30 Securing and Supporting.
IMC shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 342.30(A) and (B), or permitted to be unsupported in accordance with 342.30(C).
(A) Securely Fastened. IMC shall be secured in accordance with one of the following:
(1) IMC shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box, cabinet, conduit body, or other conduit termination.
(2) Where structural members do not readily permit fastening within 900 mm (3 ft), fastening shall be permitted to be increased to a distance of 1.5 m (5 ft).
(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast.
Panel Statement: CMP-8 is in agreement with submitter; editorial changes were made for clarity and in accordance with style manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-18 Log #1991 NEC-P08 **Final Action: Reject**
(342.30(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Exposed vertical risers from ~~industrial~~ fixed machinery or fixed equipment in industrial or commercial occupancies shall be permitted to be supported at intervals not exceeding 6m (20 ft) if the conduit is unbroken or intermediate connections are threaded. ~~made up with threaded couplings~~ and the conduit securely fastened and supported at the top and bottom of the riser, and no other means of intermediate support is ~~readily available~~ exists.
Substantiation: Conduit is available in 20 ft. lengths and couplings may not be required. All fittings should be threaded, such as a T conduit body which is commonly installed near the bottom of the riser above a floor flange where the conduit terminates, where wiring is tapped to equipment. Since there is no requirement for supervision or qualified personnel, this provision should not be limited to industrial premises. This installation is commonly employed in supermarkets, homeowner supply stores, plant nurseries, and other premises.
Panel Meeting Action: Reject
Panel Statement: CMP-8 recognizes that not all industrial machinery is fixed in place and has rejected similar proposals in the past. Conduit shall be in a continuous length when installed. If this cannot be achieved then threaded couplings are permitted to be used. This section does not address the termination of the conduit into a conduit body. Section 342.30(B)(3) is not limited to industrial premises.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-19 Log #1852 NEC-P08 **Final Action: Reject**
(342.30(B)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Runs of IMC shall be permitted to be supported by openings or notches in framing members where support and fastening comply with this section.
FPN: See 300.4.
Substantiation: Whether, vertical or horizontal, runs can be supported by holes and notches and other openings. Support is not necessarily the same as fastening. This section requires fastening at specified intervals which applies and not negated where support is by holes, notches or other openings. This fastening is necessary especially where IMC is run through large openings in bar joists or metal studs vertical runs of Type AC and MC cables through openings in metal studs are commonly installed and accepted. Reference to 300.4 is pertinent to this section. Vertical runs on the side of studs are supported because they are required to be fastened.
Panel Meeting Action: Reject
Panel Statement: This section applies only to horizontal runs of conduit and allows the openings through framing members to "support" the conduit. Vertical runs of conduits shall be "supported" and "securely fastened".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-20 Log #1920 NEC-P08 **Final Action: Reject**
(342.30(B)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Superfluous. This particular type of support is not prohibited by this section. Other specific support such as by messenger wire, direct burial, or embedment in concrete is not noted as a special type of support. Installation through holes and notches is covered by 300.4. The provision doesn't correlate with (B)(2).
Panel Meeting Action: Reject
Panel Statement: This section applies only to horizontal runs of conduit and allows the openings through framing members to "support" the conduit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-21 Log #697 NEC-P08 **Final Action: Reject**
(342.30(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
342.30 Securing and Supporting.
IMC shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 342.30(A) and (B), or permitted to be unsupported in accordance with 342.30(C).
(A) Securely Fastened. *[unchanged by this Proposal]*
(B) Supports. *[unchanged by this Proposal]*
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, Type IMC shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.
Substantiation: Requirements in existing 250.97 Exception and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the knockout opening is oversized or not. "Oversized knockouts", however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-24a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-22 Log #1700 NEC-P08 **Final Action: Reject**
(342.30(C))

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise 342.30(C) as follows:
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, Type IMC shall be permitted to be unsupported where the raceway is not more than 5 ft or 20 times the trade size, whichever is less, ~~450 mm (18 in.)~~ and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The proposed revision will make the unsupported length, between enclosures, dependent on the raceway OD, which is a factor in how well a given raceway will resist bending.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-24a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-23 Log #3067 NEC-P08 **Final Action: Reject**
(342.30(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered,~~ Type IMC shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: This code rule is overly restrictive.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-24a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-24 Log #3627 NEC-P08 **Final Action: Reject**
(342.30(C))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered~~, Type IMC shall be permitted to be unsupported where the raceway is not more than ~~450 mm (18 in.)~~ 900 mm (3 ft) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The change for the 2008 code is too restrictive. Under the provisions of 342.30(A), we could have concentric or eccentric knockouts in a raceway installation and still not provide support for up to five ft from the enclosure. The metal deck roof areas allowing you to go up to five ft are more subject to vibration than switchboard or panelboard installations.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-24a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-24a Log #2200 NEC-P08 **Final Action: Accept**
(342.30(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this provision. Also, delete the clause "or permitted to be unsupported in accordance with 342.30(C)" from the last sentence of 342.30.
Substantiation: The concept of a special support rule for short lengths of raceway run between enclosures of various sorts was added to the 2008 NEC for the first time in the history of the NEC with negligible technical substantiation and no evidence of loss experience, and remains at variance from routine trade practice. The existence of a coupling now immediately provokes a support requirement, even on a 6-inch and a 4-inch long heavy-wall 4 trade size steel nipples put together to make an 11-inch (approx.) combined raceway. A 90 degree sweep roughly 2 trade size or larger (any centerline length over 18 in.) now requires intermediate support. The literal text now requires support to structure on a 3-in. nipple if even one of its ends "encounters" a concentric knockout.
Although there are those who believe the new rule simply offers limited relief from a rule that required all raceways to be independently supported, routine field experience throughout the history of rigid raceway wiring methods does not substantiate such assertions. We are unaware of any significant attempts to require supports on short nipples. All rigid raceways under NEC rules must be listed, including their couplings; is it conceivable that a coupling between two segments of a short (3 ft or less) nipple so seriously degrades the stability of the raceway that such a support is needed? Concentric knockouts in enclosures are reviewed as part of the UL 50 process, and as anyone working these enclosures recently should be aware, those standards have been strengthened and these knockouts are now more robust than in previous decades; is this the time to require even more support?
Raceways generally require support within 3 ft of terminations, and when the entire length is just that long or shorter, no additional support should be needed. In effect, the locknuts and bushings or connectors and locknuts at each end are supports. This is not a new concept for the NEC: CMP 7 just added the wording "(wiring method) fittings shall be permitted as a means of cable support" in a number of cable articles. If carried to its logical conclusion and routinely enforced (however unlikely), this new support rule will likely drive the market in the direction of cabled wiring methods without any technical justification.
It should be remembered that supports to structure are not infallible. Many raceways hang from threaded rod of indefinite length every 10 ft or so and within 3 ft (5 ft. in some cases) of enclosures, depending on the specific rules for the size and character of the supported raceway. Such support clearly meets the rules in this section, but would it add anything to a nipple between enclosures? Further, even when rigid supports such as one-hole clips are used, the raceway beyond the last clip can have an indefinite number of couplings and enter the center knockout of an indefinite number of concentric knockouts; how is this arrangement so inherently more secure than a nipple between enclosures? This new NEC provision was without precedent, and addressed a nonexistent problem.
Panel Meeting Action: Accept
Panel Statement: CMP-8 does not necessarily agree with the submitter's substantiation. Securement requirements are found in 342.30(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: IEEE does not agree with the concluding statement in submitter's substantiation that "This new NEC provision (in the 2008 NEC)… addressed a non-existent problem." During the 2008 NEC cycle Panel 8 fully considered the need for adding the section which the submitter proposes to delete. The Panel determined that the present language was needed to clarify that short nipples do not require additional support and that this was not universally understood by AHJ's, especially in remote & rural areas.
Comment on Affirmative:
DABE, J.: The base rule under.30(A) for IMC, RMC, PVC, RTRC, and EMT, remains in force. The conduit systems shall be securely fastened within 3 feet between termination points.

8-25 Log #1318 NEC-P08 **Final Action: Accept in Principle in Part**
(342.46)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Where a conduit enters a box, fitting, or other enclosure, a bushing shall be provided to protect the wires from abrasion unless the design of the box, fitting, or enclosure ~~is such to afford equivalent~~ provides such protection.
Substantiation: Edit. "Equivalent" is subjective, undefined and a term to be avoided.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
Where a conduit enters a box, fitting, or other enclosure, a bushing shall be provided to protect the wires from abrasion unless the box, fitting, or enclosure is designed to provide this protection.
Panel Statement: CMP-8 accepts the submitter's suggestion to remove the word "equivalent" and has edited to meet the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 344 — RIGID METAL CONDUIT: TYPE RMC

8-26 Log #4617 NEC-P08 **Final Action: Reject**
(344.6 Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the following exception:
Exception: RMC made from red brass shall be permitted to be approved.
Substantiation: This proposal has been made in a more extensive form previously; this proposal only covers red brass. While the submitter was revising the American Electricians' Handbook and again while revising the National Electrical Code Handbook for the same publisher (McGraw-Hill), he made a survey of all manufacturing listees in the UL category "Rigid Nonferrous Metallic Conduit (DYWV)". None of those listees report production of listed red brass heavy wall conduit. CMP 8 has responded to prior submittals on this point with assertions that listed products are available, but this submitter has been unable to substantiate that point. At best it is almost impossible to find and has been so for decades.
This is why 680.23(B)(2)(a) specifically allows brass conduit to be approved and not listed, thereby constituting a deliberate Chap. 6 amendment of this Chapter 3 rule. Some plumbing supply houses carry heavy wall red brass pipe, often in 12-ft lengths, that takes a conventional pipe thread extremely well, and

is a very robust product with an extremely smooth interior that, if anything, is somewhat more difficult to bend than IMC or RMC. Lack of heavy foot pressure with excessive force on the handle won't kink the product, but will bend the bender handle. Approval is at the discretion of the local inspector, but this product should certainly be recognized until a listed alternative becomes more available.
Panel Meeting Action: Reject
Panel Statement: Red Brass conduit is required to be listed. Product standards and the follow-up services NRTLs utilize for a listed product insures the performance of the product in the field and meets the panel's intent. However, where necessary, the AHJ by special permission may waive specific requirements in this code per 90.4.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-27 Log #1950 NEC-P08 **Final Action: Reject**
(344.10(A)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Aluminum RMC shall be permitted where ~~judged suitable for the environment~~ identified for the use.
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. Who is to be the judge? Environment may not be deemed to include uses.
Panel Meeting Action: Reject
Panel Statement: Characteristics of aluminum are such that its condition of use is predicated on being used where not subject to excessive corrosion or being protected with supplementary corrosive protection. Current language is compatible with 300.6.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-28 Log #3316 NEC-P08 **Final Action: Reject**
(344.12 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 344.XX Uses not permitted. Rigid metal conduit shall not be used where likely to be subject to physical damage.
Substantiation: No wiring method is immune to physical damage.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-14.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-29 Log #232 NEC-P08 **Final Action: Reject**
(344.14)

Submitter: Kevin Daye Hanson, Columbus, OH
Recommendation: Revise as follows:
To ensure bonding, where practicable, dissimilar metals in contact anywhere in the system shall be avoided ~~to~~ eliminating the possibility of galvanic action.
Substantiation: We have a few inspectors who use this to say that aluminum MC cable cannot rest against metal sprinkler pipe. Some are also saying that our aluminum flexible metal conduit cannot be up against the duct work which extends from the unfinished ceiling to the furnace which stands alone on the floor.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-15.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-30 Log #356 NEC-P08 **Final Action: Accept**
(344.28)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise second sentence as follows:
Where conduit is threaded in the field, a standard cutting die with a 1 in 16 taper (¾ in. taper/foot) ~~(¾-in. taper per foot)~~ shall be used.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
DABE, J.: See my statement for 8-16.

8-31 Log #2657 NEC-P08 **Final Action: Reject**
(344.30(A) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: Section 392.6(J) requires raceways to be secured to the cable tray per the appropriate raceway article. Section 392.8(B) applies to cable only.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-32 Log #1990 NEC-P08 **Final Action: Reject**
(344.30(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Exposed vertical risers from ~~industrial~~ fixed machinery or fixed equipment in industrial or commercial occupancies shall be permitted to be supported at intervals not exceeding 6m (20 ft) if the conduit is unbroken or intermediate connections are threaded. ~~made up with threaded couplings~~ and the conduit securely fastened and supported at the top and bottom of the riser, and no other means of intermediate support ~~is readily available~~ exists.
Substantiation: Conduit is available in 20 ft. lengths and couplings may not be required. All fittings should be threaded, such as a T conduit body which is commonly installed near the bottom of the riser above a floor flange where the conduit terminates, where wiring is tapped to equipment. Since there is no requirement for supervision or qualified personnel, this provision should not be limited to industrial premises. This installation is commonly employed in supermarkets, homeowner supply stores, plant nurseries, and other premises.
Panel Meeting Action: Reject
Panel Statement: CMP-8 recognizes that not all industrial machinery is fixed in place and has rejected similar proposals in the past. Conduit shall be in a continuous length when installed. If this cannot be achieved then threaded couplings are permitted to be used. This section does not address the termination of the conduit into a conduit body. Section 344.30(B)(3) is not limited to industrial premises.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-33 Log #1909 NEC-P08 **Final Action: Reject**
(344.30(B)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence and substitute: Runs of RMC shall be permitted to be supported by openings or notches in framing members where support and fastening comply with this section.
FPN: See 300.4.
Substantiation: Whether vertical or horizontal, runs can be supported by holes and notches and other openings. Support is not necessarily the same as fastening. This section requires fastening at specified intervals which applies and not negated where support is by holes, notches or other openings. This fastening is necessary especially where RMC is run through large openings in bar joists or metal studs. Vertical runs of Type AC and MC cables through openings in metal studs are commonly installed and accepted. Reference to 300.4 is pertinent to this section. Vertical runs on the side of studs are supported because they are required to be fastened.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-19.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-34 Log #698 NEC-P08 **Final Action: Reject**
(344.30(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
344.30 Securing and Supporting.
RMC shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 344.30(A) and (B), or permitted to be unsupported in accordance with 344.30(C).
(A) Securely Fastened. *[unchanged by this Proposal]*
(B) Supports. *[unchanged by this Proposal]*
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, Type RMC shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.
Substantiation: Requirements in existing 250.97 Exception and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the knockout opening is oversized or not. "Oversized knockouts", however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.

Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-35.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-35 Log #2201 NEC-P08 **Final Action: Accept**
(344.30(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this provision. Also, delete the clause "or permitted to be unsupported in accordance with 344.30(C)" from the last sentence of 344.30.
Substantiation: The concept of a special support rule for short lengths of raceway run between enclosures of various sorts was added to the 2008 NEC for the first time in the history of the NEC with negligible technical substantiation and no evidence of loss experience, and remains at variance from routine trade practice. The existence of a coupling now immediately provokes a support requirement, even on a 6-inch and a 4-inch long heavy-wall 4 trade size steel nipples put together to make an 11-inch (approx.) combined raceway. A 90 degree sweep roughly 2 trade size or larger (any centerline length over 18 in.) now requires intermediate support. The literal text now requires support to structure on a 3-in. nipple if even one of its ends "encounters" a concentric knockout.

Although there are those who believe the new rule simply offers limited relief from a rule that required all raceways to be independently supported, routine field experience throughout the history of rigid raceway wiring methods does not substantiate such assertions. We are unaware of any significant attempts to require supports on short nipples. All rigid raceways under NEC rules must be listed, including their couplings; is it conceivable that a coupling between two segments of a short (3 ft or less) nipple so seriously degrades the stability of the raceway that such a support is needed? Concentric knockouts in enclosures are reviewed as part of the UL 50 process, and as anyone working these enclosures recently should be aware, those standards have been strengthened and these knockouts are now more robust than in previous decades; is this the time to require even more support?

Raceways generally require support within 3 ft of terminations, and when the entire length is just that long or shorter, no additional support should be needed. In effect, the locknuts and bushings or connectors and locknuts at each end are supports. This is not a new concept for the NEC: CMP 7 just added the wording "(wiring method) fittings shall be permitted as a means of cable support" in a number of cable articles. If carried to its logical conclusion and routinely enforced (however unlikely), this new support rule will likely drive the market in the direction of cabled wiring methods without any technical justification.

It should be remembered that supports to structure are not infallible. Many raceways hang from threaded rod of indefinite length every 10 ft or so and within 3 ft (5 ft. in some cases) of enclosures, depending on the specific rules for the size and character of the supported raceway. Such support clearly meets the rules in this section, but would it add anything to a nipple between enclosures? Further, even when rigid supports such as one-hole clips are used, the raceway beyond the last clip can have an indefinite number of couplings and enter the center knockout of an indefinite number of concentric knockouts; how is this arrangement so inherently more secure than a nipple between enclosures? This new NEC provision was without precedent, and addressed a nonexistent problem.
Panel Meeting Action: Accept
Panel Statement: CMP-8 does not necessarily agree with the submitter's substantiation. Securement requirements are found in 344.30(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: See my explanation of negative vote on Proposal 8-24a.
Comment on Affirmative:
DABE, J.: See my statement for 8-24(a).

8-36 Log #3068 NEC-P08 **Final Action: Reject**
(344.30(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered,~~ Type RMC shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: This requirement is overly restrictive.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-35.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-37 Log #3628 NEC-P08 **Final Action: Reject**
(344.30(C))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered~~, Type RMC shall be permitted to be unsupported where the raceway is not more than ~~450 mm (18 in.)~~ <u>900 mm (3 ft)</u> and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The change for the 2008 code is too restrictive. Under the provisions of 344.30(A), we could have concentric or eccentric knockouts in a raceway installation and still not provide support for up to five ft from the enclosure. The metal deck roof areas allowing you to go up to five ft are more subject to vibration than switchboard or panelboard installations.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-35.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-38 Log #1316 NEC-P08 **Final Action: Accept in Principle**
(344.46)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Where a conduit enters a box, fitting, or other enclosure, a bushing shall be provided to protect the wires from abrasion unless the design of the box, fitting, or enclosure ~~is such to afford equivalent~~ <u>provides such</u> protection.
Substantiation: Edit. "Equivalent" is subjective, undefined and a term to be avoided.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Where a conduit enters a box, fitting, or other enclosure, a bushing shall be provided to protect the wires from abrasion unless the box, fitting, or enclosure <u>is designed to provide this</u> protection.
Panel Statement: See committee panel and statement on Proposal 8-25.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-39 Log #4801 NEC-P08 **Final Action: Reject**
(344.60)

Submitter: Anthony C. Gradi, Pease Development Authority
Recommendation: Delete the following text:
~~Rigid metal conduit is permitted to be an equipment ground.~~
Substantiation: In the event that the conduit sustains physical damage, the equipment and ground are rendered useless.
Panel Meeting Action: Reject
Panel Statement: Rigid conduit system is tested and listed for grounding. RMC complies with Article 250 for grounding. The submitter provided no technical substantiation to prove otherwise. RMC is permitted for use where subject to physical damage. Any damaged RMC should be replaced.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: The IEEE believes this proposal should be "accepted". Industry experience indicates that, for several reasons including the one presented by the proposal submitter, metallic conduit systems do not always provide adequate equipment grounding. As a result, ANSI/IEEE Standard 142-2007 (the "Green Book"), section 2.2.3, recommends installation of a separate equipment grounding conductor (EGC) in conduit.
With regard to the Panel statement that RMC is tested and listed for grounding, there does not appear to any reference to a test method for establishing the adequacy of RMC as an equipment grounding conductor in the UL White Book either in the section on RMC or in the White Book NEC Correlation Index. Further, if there is such a UL test described elsewhere, the current level used and resulting voltage drop would both be of interest as factors in determining the suitability of RMC as an EGC for all installations.
Finally, if the proposed change is ultimately accepted it would have to be correlated with other sections of the NEC that presently recognize RMC as a grounding means. Similarly, Article 342 for IMC would require revision. (See also my Comments on Proposal 8-129).

ARTICLE 348 — FLEXIBLE METAL CONDUIT: TYPE FMC

8-40 Log #182 NEC-P08 **Final Action: Reject**
(348.9)

Submitter: Franklin H. King, Eugene, OR
Recommendation: When depth gage tubing cutters are used to cut EMT conduit there is no reduction to the internal diameter of the pipe. The code should read"

" When depth gauge tubing cutters are used to sever EMT pipe, there need be no reduction of wire pull into the pipe."

Substantiation: The code implies that the wire fill of a conduit cut with a tubing cutter must comply to the rule of wire fill for flexible conduit using an inside connector. Refering to page 70/595 in the 2001 issue Proposal Report. (Listed as a request by Franklin H. King)
Panel Meeting Action: Reject
Panel Statement: The code does not require a wire fill reduction when conduit or tube cutters are used. The panel recognizes that the proposal is intended for EMT and not FMC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

LOYD, R.: I believe this proposal was meant for Section 358.9. It is not appropriate to place cutting requirements in the Code as that is a workmanship issue. Reaming is required in 358.28(A) which would resolve the submitter's concern.

8-41 Log #3162 NEC-P08 **Final Action: Reject**
(348.12(4))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 348.12, delete ~~(4) In any hazardous (classified) location except as permitted by other articles in this Code~~

Renumber 348.12(5), (6), and (7) as 348.12(4), (5), and (6), respectively.

Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.

Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.

Panel Meeting Action: Reject
Panel Statement: The reference to the NEC Style Manual 2.2.1 (scope of an article) has no applicable relationship to the argument made by the submitter. The reference to the NEC Style Manual 4.1.2 (other references), "Use references to other NEC rules to avoid repeating a requirement", supports the reference to other articles of the code. CMP-8 has not attempted to determine which wiring methods shall be allowed in hazardous locations, but instead has informed the user that other articles will determine the use of this wiring method in hazardous locations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-42 Log #1760 NEC-P08 **Final Action: Reject**
(348.12(7))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where <u>likely to be</u> subject to physical damage <u>which impairs its functional capabilities.</u>
Substantiation: One reason for using this wiring method is protection of conductors from damage. It can sustain some damaging force such as a small dent which doesn't damage conductors, affect grounding or insertion or withdrawal of conductors.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-43 Log #2756 NEC-P08 **Final Action: Reject**
(348.20(A)(2))

Submitter: Rich Wolfe, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:

348.20 Size.

(A) Minimum. FMC less than metric designator 16 (trade size 1/2) shall not be used unless permitted in 348.20(A)(1) through (A)(5) for metric designator 12 (trade size 3/8).

(1) For enclosing the leads of motors as permitted in 430.245(B)

(2) <u>Only when exposed to physical damage,</u> in lengths not in excess of 1.8 m (6 ft), for any of the following uses:

a. For utilization equipment

b. As part of a listed assembly

c. For tap connections to luminaires as permitted in 410.117(C)

(3) For manufactured wiring systems as permitted in 604.6(A)

(4) In hoistways as permitted in 620.21(A)(1)

(5) As part of a listed assembly to connect wired luminaire sections as permitted in 410.137(C).

Substantiation: If 3/8 in. flex is not exposed to physical damage, it should be allowed to be used in lengths longer than 6 ft. There are applications in the field where a longer length of flex is needed and the trade size of 1/2 in. flex is too large for the tight areas where the flex is needed to be routed. Also, if the 3/8 in. flex is used for tap conductors for a luminaire above a ceiling, the length should be allowed to go beyond 6 ft if needed. AC and MC cable does not have any length restrictions either.
Panel Meeting Action: Reject
Panel Statement: FMC is not acceptable for use in areas of physical damage. See Section 348.12(7).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-44 Log #2537 NEC-P08 **Final Action: Accept**
(348.30)

Submitter: Marcus R. Sampson, Lysistrata Electric
Recommendation: Revise text to read as follows:

348.30 Securing and Supporting.

FMC shall be securely fastened in place and supported in accordance with 348.30(A) and (B).

(A) Securely Fastened. FMC shall be securely fastened in place by an approved means within 300 mm (12 in.) of each box, cabinet, conduit body, or other conduit termination and shall be supported and secured at intervals not to exceed 1.4 m (4 ft).

Exception No. 1: Where FMC is fished between access points through concealed spaces in finished buildings or structures and supporting is ~~impractical~~ impracticable.

Substantiation: The term "impractical" is not an enforceable term. Who determines whether secure support is practical? The installer or the end-user or the inspector? Where support is "impracticable" the installer should look to, and the inspector should allow, this exception.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-45 Log #2656 NEC-P08 **Final Action: Reject**
(348.30 Exception No. 5 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Exception No. 5: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-46 Log #2892 NEC-P08 **Final Action: Reject**
(348.30(A) Exception (New))

Submitter: Jerry Grant, Plainfield, IL
Recommendation: Add new text to read as follows:

Exception: <u>Where raceways measure lengths equal to or less than the lengths described in exception No.2, fastening shall not be required.</u>

Substantiation: This is a clarification of the text. The text is often applied in this manner in the field.
Panel Meeting Action: Reject
Panel Statement: Exception No. 2 is acceptable only when flexibility is necessary after installation and is not a general rule. Technical substantiation is needed to consider such a revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-47 Log #2895 NEC-P08 **Final Action: Accept in Principle**
(348.30(A) Exception No. 2)

Submitter: Jerry Grant, Plainfield, IL
Recommendation: Add new text to read as follows:

Exception: Where flexibility is necessary after installation, lengths shall not exceed<u>, measuring from the last fastener of the raceway,</u> the following:

Substantiation: This is clarification of the text. The text is often applied in this manner in the field.
Panel Meeting Action: Accept in Principle

Revise Section 348.30(A) Exception 2 to read as follows:

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes 1/2 through 11/4)

(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 11/2 through 2)
(3) 1500 mm (5 ft) for metric designators 63 (trade size 21/2) and larger.
Panel Statement: Panel changes made for clarity reasons.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-48 Log #2658 NEC-P08 **Final Action: Reject**
(348.30(A) Exception No. 5 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Exception No. 5: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-49 Log #3235 NEC-P08 **Final Action: Reject**
(348.30(B) Exception No. 5 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:
Exception No. 5 FMC shall not be required to be securely fastened in place where installed in cable trays except as required in 392.8(B).
Substantiation: Provision should be made for cable tray installation.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31. CMP-8 recognizes that the submitter probably meant 348.30(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-50 Log #1948 NEC-P08 **Final Action: Accept in Part**
(348.42)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: ~~COUPLINGS and~~ CONNECTORS. Angle connectors shall not be ~~used for~~ concealed ~~raceway installations~~.
Substantiation: Edit. Present wording implies that a concealed raceway terminated flush with a wall cannot be extended with an angle connector. The text does not relate to couplings.
Panel Meeting Action: Accept in Part
Keep the title as Coupling and Connectors
Delete “used for” and “raceway installations”
Revise text as follows:
COUPLINGS and CONNECTORS. Angle connectors shall not be ~~used for~~ concealed ~~raceway installations~~.
Panel Statement: Submitter’s substantiation is correct but titles of sections have been harmonized with other raceway sections.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
LOYD, R.: There are no couplings made for flexible metal conduit the submitter is correct. Although the titles in each like section in chapter 3 are harmonized it does not make sense to list something that is not appropriate.

8-51 Log #2345 NEC-P08 **Final Action: Reject**
(348.60)

Submitter: David Mercier, Southwire Company
Recommendation: Revise the first sentence of 348.60:
“Where used to connect equipment where flexibility is required <u>to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement</u> after installation, an equipment grounding conductor shall be installed.”
Substantiation: The purpose of this change is to clarify the use of the term “flexibility” with respect to using an equipment grounding conductor in flexible metal conduit, to ensure the integrity of the ground path. Installed flexible conduit which is connected to equipment which may be moved or subject to vibration can compromise continuity of the ground path. A companion proposal has been submitted to panel 5 for 250.118(5)(d).
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: Acceptance of the proposed language will better clarify the meaning of the “flexibility” that FMC is suitable to provide. And, while it is understood that the NEC is not a design guide, inclusion of the proposed language will also aid in facilitating responsible engineering designs seeking compliance with the intent of the NEC. Installation and definition of the equipment grounding conductor is covered under CMP-5 responsibility and acceptance of the proposed revision by CMP-8 should be correlated with CMP-5.

ARTICLE 350 — LIQUIDTIGHT FLEXIBLE METAL CONDUIT: TYPE LFMC

8-52 Log #3163 NEC-P08 **Final Action: Reject**
(350.10(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 350.10(2), delete ~~by 501.10(b), 502.10, 503.10, and 504.20 and in other hazardous (classified) locations where specifically approved, and~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-53 Log #976 NEC-P08 **Final Action: Reject**
(350.10(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
For direct burial <u>in earth or embedded in concrete</u> ~~where~~ <u>if</u> listed and marked for the purpose.
Substantiation: Edit. It is not clear whether direct burial is intended to include embedment in concrete.
Panel Meeting Action: Reject
Panel Statement: As the Code is currently written, LFMC is not approved for concrete encasement. The proposal does not supply the technical substantiation to revise this section. Section 356.10(7) for LFNC was revised for the 2008 NEC and clearly states that LFNC is acceptable for concrete encasement and what connectors are permitted to be used.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-54 Log #4173 NEC-P08 **Final Action: Reject**
(350.10(4))

Submitter: David Mercier, Southwire Company
Recommendation: Add new text as follows:
<u>(4) Type LFMC as a listed manufactured prewired assembly, metric designator 16 through 103 (trade size 1/2 through 4) conduit.</u>
Substantiation: This change would expand the use of prewired assemblies to allow conductors sized large enough for feeder applications.
Panel Meeting Action: Reject
Panel Statement: Technical substantiation was not provided that unlimited lengths and sizes can be transported and stored safely without damage to the enclosed conductors prior to the installation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BERMAN, R.: This proposal should be accepted. Safe transportation and storage is not an issue unique to that of listed prewired assemblies and is important for all electrical equipment to be installed in accordance with the NEC. If electrical equipment is damaged prior to installation, it should not be used in accordance with NEC Section 110.12(B).
Listed prewired assemblies are comprised of listed components that could be field assembled and inspected by an AHJ, but are assembled in the factory prior to field installation.

8-55 Log #1759 NEC-P08 **Final Action: Reject**
(350.12(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where <u>likely to be</u> subject to physical damage <u>which impairs its functional capabilities.</u>
Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. “Damage” is not defined; a small dent is damage, but unless it affects watertight integrity it has not impaired functional capabilities.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-56 Log #2634 NEC-P08 **Final Action: Reject**
(350.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise texts: LFMC shall be securely fastened in place to supports by ~~an approved~~ identified means within 300 mm (12 in.) of terminations. ~~Each box, cabinet, conduit body or other conduit termination and shall be supported and secured~~ at intervals not to exceed 1.4 m (4-1/2 ft).

Exception No. 1: Where LFMC is fished between access points through concealed spaces in finished buildings or structures and supporting is impractical provided the conduit is securely fastened to supports where it becomes accessible.

Exception No. 2 and 3 no change.

Exception No. 4: Lengths within an accessible ceiling not exceeding 1.8 m (6 ft) from the last point of support where the raceway is securely fastened for connections to luminaries or other equipment within an accessible ceiling or mounted on the surface of the ceiling.

Add: Exception No. 5: Intermediate support shall not be required where the raceway is not more than 300 mm (12 in.) in length between enclosures secured in place and connected to threaded hubs or openings or through a knockout with no segments larger than the raceway connector, or with reducing washers larger than the largest knockout segment and the raceway is bonded with a bonding jumper.

Exception No. 6: Where installed in cable trays the provisions of 392.8(B) shall apply.

Substantiation: Fastening should be to supports, which is not specifically required. “Termination” eliminates some wordage.

Exception No. 4 should also apply to surface mounted equipment.

Exception No. 5 is similar to provisions for unsupported raceways in other articles.

Section 392.8(B) should apply where the conduit is installed in cable tray.

Panel Meeting Action: Reject
Panel Statement: “Securely Fastened” is not restricted to supports only. Securing to concrete walls, cable trays, and other approved means are acceptable whether it is fished, exposed, or concealed.
Not all securely fasten means are “identified”.
The Panel finds the wordage useful for the user.
Exception 4 applies to raceways within an accessible ceiling only. It is recognized that a degree of concealment is present and the luminaire would be installed in the ceiling grid.
Proposed Exception 6 is unacceptable since Section 392.6(J) requires raceways to be secured to the cable tray per the appropriate raceway article. Section 392.8(B) applies to cable only.
Additional change does not improve the usability of the NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-57 Log #919 NEC-P08 **Final Action: Reject**
(350.30 Exception No. 5 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add a new Exception No. 5: Intermediate support shall not be required if the conduit is not more than 300 mm (12 in.) in length between boxes, cabinets, or other enclosures securely fastened in place and securely fastened to the enclosure. Where conduit is attached at knockouts larger than the conduit connector, reducing washers larger than the largest knockout segment shall be installed and the conduit shall be bonded to the enclosure by approved means.
Substantiation: If the provisions of 342.30(C), 344.30(C) and 352.30(C) are deemed necessary, a similar provision should be in this article.
Panel Meeting Action: Reject
Panel Statement: The provision for shorter lengths of conduits between terminations applied to “rigid conduits” only. There was not a substantiation to allow flexible conduits or tubings to be allowed for the same provision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-58 Log #2655 NEC-P08 **Final Action: Reject**
(350.30 Exception No. 5 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Exception No. 5: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-59 Log #2890 NEC-P08 **Final Action: Reject**
(350.30(A) Exception (New))

Submitter: Jerry Grant, Plainfield, IL
Recommendation: Add new text to read as follows:

Exception: At hookups for machines, machine tools and utilization equipment, if secure fastening is not available, strain relief within 12 inches of the raceway connector shall be sufficient.

Substantiation: Secure fastening is not always available at all hookups for machines, machine tools and utilization equipment. This would provide an alternate method of compliance and help maintain the connection between the raceway and connector.
Panel Meeting Action: Reject
Panel Statement: The proposal does not improve clarity or content.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-60 Log #2893 NEC-P08 **Final Action: Reject**
(350.30(A) Exception (New))

Submitter: Jerry Grant, Plainfield, IL
Recommendation: Add new text to read as follows:

Exception: Where raceways measure lengths equal to or less than the lengths described in exception No.2, fastening shall not be required.

Substantiation: This is clarification of the text. The text is often applied in this manner in the field.
Panel Meeting Action: Reject
Panel Statement: Exception No. 2 is acceptable only when flexibility is necessary after installation and is not a general rule. Technical substantiation is needed to consider such a revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-61 Log #2896 NEC-P08 **Final Action: Accept in Principle**
(350.30(A) Exception No. 2)

Submitter: Jerry Grant, Plainfield, IL
Recommendation: Add new text to read as follows:

Exception: Where flexibility is necessary after installation, lengths shall not exceed, measuring from the last fastener of the raceway, the following:

Substantiation: This is clarification of the text. The text is often applied in this manner in the field.
Panel Meeting Action: Accept in Principle

Revise Section 350.30(A) Exception 2 to read as follows:

Exception No. 2: Where flexibility is necessary after installation, lengths from the last point where the raceway is securely fastened shall not exceed the following:

(1) 900 mm (3 ft) for metric designators 16 through 35 (trade sizes 1/2 through 11/4)

(2) 1200 mm (4 ft) for metric designators 41 through 53 (trade sizes 11/2 through 2)

(3) 1500 mm (5 ft) for metric designators 63 (trade size 21/2) and larger

Panel Statement: Panel changes made for clarity reasons.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-62 Log #1908 NEC-P08 **Final Action: Reject**
(350.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence and substitute: Runs of LFMC shall be permitted to be supported by openings or notches in framing members where support and fastening comply with this section.

FPN: See 300.4.

Substantiation: Whether vertical or horizontal, runs can be supported by holes and notches and other openings. Support is not necessarily the same as fastening. This section requires fastening at specified intervals which applies and not negated where support is by holes, notches or other openings. This fastening is necessary especially where LFMC is run through large openings in bar joists or metal studs. Vertical runs of Type AC and MC cables through openings in metal studs are commonly installed and accepted. Reference to 300.4 is pertinent to this section. Vertical runs on the side studs are supported because they are required to be fastened.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-19.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-63 Log #2602 NEC-P08 **Final Action: Reject**
(350.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Runs of LFMC shall be permitted in accordance with 300.4 where in compliance with 350.30(A).
Substantiation: Other than horizontal runs can be supported by framing members by the opening or protection plate and where secured, just as where run on the side of a stud. Fastening should be required where the opening provides support, but is large as in bar joists which provide support, but not securement in place.
Panel Meeting Action: Reject
Panel Statement: Section 300.4 deals with protection of conductors from physical damage, not securing or supporting.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-64 Log #1949 NEC-P08 **Final Action: Accept in Part**
(350.42)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: ~~COUPLINGS AND~~ CONNECTORS. Angle connectors shall not be ~~used for~~ concealed ~~raceway installations~~.
Substantiation: Edit. Present wording implies that a concealed raceway terminated flush with a wall cannot be extended with an angle connector. The text does not relate to couplings.
Panel Meeting Action: Accept in Part
Keep the title as Coupling and Connectors
Delete "used for" and "raceway installations"
Revise text as follows:
Couplings and Connectors. Angle connectors shall not be ~~used for~~ concealed ~~raceway installations~~.
Panel Statement: Submitter's substantiation is correct but titles of sections have been harmonized with other raceway sections.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
LOYD, R.: There are no couplings made for Liquidtight flexible metal conduit the submitter is correct. Although the titles in each like section in chapter 3 are harmonized it does not make sense to list something that is not appropriate.

8-65 Log #2346 NEC-P08 **Final Action: Reject**
(350.60)

Submitter: David Mercier, Southwire Company
Recommendation: Revise the first sentence of 350.60:
"Where used to connect equipment where flexibility is required <u>to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement</u> after installation, an equipment grounding conductor shall be installed."
Substantiation: The purpose of this change is to clarify the use of the term "flexibility" with respect to using an equipment grounding conductor in liquidtight flexible metal conduit, to ensure the integrity of the ground path. Installed liquidtight flexible conduit which is connected to equipment which may be moved or subject to vibration can compromise continuity of the ground path. A companion proposal has been submitted to panel 5 for 250.118(6)(e).
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: Acceptance of the proposed language will better clarify the meaning of the "flexibility" that LFMC is suitable to provide. And, while it is understood that the NEC is not a design guide, inclusion of the proposed language will also aid in facilitating responsible engineering designs seeking compliance with the intent of the NEC. Installation and definition of the equipment grounding conductor is covered under CMP-5 responsibility and acceptance of the proposed revision by CMP-8 should be correlated with CMP-5.

ARTICLE 352 — RIGID NONMETALLIC CONDUIT: TYPE RNC

8-66 Log #2175 NEC-P08 **Final Action: Accept**
(352.2.Rigid Polyvinyl Chloride Conduit (PVC))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
352.2 Definition.
Rigid Polyvinyl Chloride Conduit (PVC). A rigid nonmetallic conduit ~~(RNC)~~ of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables...
Substantiation: The reference to "RNC" is not needed, as it is not used anywhere in the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-67 Log #2991 NEC-P08 **Final Action: Accept**
(352.2.Rigid Polyvinyl Chloride Conduit (PVC))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
352.2 Definition.
Rigid Polyvinyl Chloride Conduit (PVC). A rigid nonmetallic conduit ~~(RNC)~~ of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables.
Substantiation: The reference to "RNC" is not needed, as it is not used anywhere in the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-67a Log #CP800 NEC-P08 **Final Action: Accept**
(352.10)

Submitter: Code-Making Panel 8,
Recommendation: Revise 352.10 to add a new section "I"
(I) Insulation Temperature Limitations. Conductors or cables rated at a temperature higher than the listed temperature rating of PVC conduit shall be permitted to be installed in PVC conduit, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the PVC conduit.
Delete section 352.12 (E) and the exception in it's entirety
~~(E) Insulation Temperature Limitations. For conductors or cables operating at a temperature higher than the PVC conduit listed operating temperature rating.~~
~~Exception: Conductors or cables rated at a temperature higher than the PVC conduit listed temperature rating shall be permitted to be installed in PVC conduit, provided they are not operated at a temperature higher than the PVC conduit listed temperature rating.~~
Substantiation: Moving the conductor operating temperature requirements makes it clear for the code user that conductors marked with a rated temperature higher than that of the raceway can be used when the conductors are operated within the raceway temperature rating. The exception was redundant to the current requirement in the uses not permitted. This proposal removes the exception per the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-68 Log #2768 NEC-P08 **Final Action: Accept**
(352.10(G))

Submitter: Tom Whorley, CANTEX, Inc.
Recommendation: Revise text as follows:
Underground Installations. For underground installations, ~~homogenous and nonhomogenous~~ PVC shall be permitted for direct burial and underground encased in concrete. See 300.5 and 300.50.
Substantiation: The terms "homogenous" and "nonhomogenous" are confusing, making the code more difficult to understand. Terms "homogenous" and "nonhomogenous" are not defined in Article 100. Terms "homogenous" and "nonhomogenous" are not used in any other sections of Article 352.
The removal of the two terms does not change the meaning or application of this section of the code. As written, this statement leads one to believe that nonhomogenous PVC can only be used in underground applications and this is not the case.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-69 Log #3164 NEC-P08 **Final Action: Reject**
(352.12(A))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 352.12, delete ~~(A) Hazardous (Classified) Locations. In any hazardous (classified) location, except as permitted by other articles of this Code.~~

Renumber 352.12(B), (C), and (D) as 352.12(A), (B), and (C,) respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.

Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-70 Log #1758 NEC-P08 **Final Action: Reject**
(352.12(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where <u>likely to be</u> subject to physical damage <u>which impairs its functional capabilities.</u> ~~unless identified for such use.~~
Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. “Damage” is not defined; a small dent is damage, but unless it affects watertight integrity it has not impaired functional capabilities. Is this wring method identified as suitable to be damaged?
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-71 Log #1710 NEC-P08 **Final Action: Accept in Principle**
(352.12(D) and (E))

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
352.12(D) ~~**Ambient Temperatures.** Where subject to ambient temperatures in excess of 50°C (122°) unless listed otherwise.~~
<u>**Operating Temperature.** Where any combination of ambient and conductor temperature produces an operating temperature in excess of that for which the material is listed.</u>
~~**(E) Insulation Temperature Limitations** For conductors or cables operating at a temperature higher than the PVC conduit listed operating temperature rating. Exception: Conductors or cables rated at a temperature higher than the PVC conduit listed temperature rating shall be permitted to be installed in PVC conduit, provided they are not operated at a temperature higher than the PVC conduit listed temperature rating.~~
Substantiation: The NEC style manual rule concerning use of exceptions states: “Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule.” As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from operating at a higher temperature than the PVC conduit listed operating temperature rating. The proposed new wording consolidates the ambient and insulation temperature limitations into one sentence and eliminates the need for the exception. This is the same wording found currently in 350.12 and would provide consistency with the other articles addressing the operating temperatures of raceways. Similar proposals are submitted for: 353.12, 355.12, and 362.12.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-67a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-72 Log #1687 NEC-P08 **Final Action: Accept in Principle**
(352.12(E) Exception)

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
352.12
(E) Insulation Temperature Limitations For conductors or cables operating at a temperature higher than the PVC conduit listed operating temperature rating.
~~Exception~~ <u>FPN:</u> Conductors or cables rated at a temperature higher than the PVC conduit listed temperature rating shall be permitted to be installed in PVC conduit, provided they are not operated at a temperature higher than the PVC conduit listed temperature rating.
Substantiation: The NEC style manual rule concerning use of exceptions states: “Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule.” As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from **operating** at a higher temperature than the PVC conduit listed operating temperature rating. The exception should be deleted or changed to a fine print note.
Similar proposals are submitted for: 353.12(5), 355.12(E), and 362.12(4).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-67a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-73 Log #2654 NEC-P08 **Final Action: Reject**
(352.30(A) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Exception: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-74 Log #1849 NEC-P08 **Final Action: Reject**
(352.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence.
Substantiation: Superfluous. This particular type of support is not prohibited by this section. Other specific support such as by messenger wire, direct burial, or embedment in concrete is not noted as a special type of support. Installation through holes and notches is covered by 300.4.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 8-20.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-75 Log #1850 NEC-P08 **Final Action: Reject**
(352.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete the last sentence.
Substantiation: Superfluous. This particular type of support is not prohibited by this section. Other specific support such as by messenger wire, direct burial, or embedment in concrete is not noted. Installation through holes and notches is covered by 300.4. Support requirements of this section already apply whether or not by holes or notches.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 8-20.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-76 Log #1919 NEC-P08 **Final Action: Reject**
(352.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: ~~Horizontal~~ Runs of PVC conduit shall be permitted to be supported by openings ~~through~~ in framing members ~~at intervals not exceeding those in Table 352.30 and securely fastened within 900 mm (3 ft) of terminations shall be permitted~~ where support and fastening comply with this section.
FPN: See 300.4.
Substantiation: Whether vertical or horizontal, runs can be supported by holes and notches and other openings. Support is not necessarily the same as fastening. This section requires fastening at specified intervals which applies and not negated where support is by holes, notches or other openings. This fastening is necessary especially where PVC is run through large openings in bar joists or metal studs. Vertical runs of Type AC and MC cables through openings in metal studs are commonly installed and accepted. Reference to 300.4 is pertinent to this section.
Panel Meeting Action: Reject
Panel Statement: See panel actions and statements on Proposals 8-19 and 8-63.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-77 Log #699 NEC-P08 **Final Action: Reject**
(352.30(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
352.30 Securing and Supporting.
PVC conduit shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 352.30(A) and (B), or permitted to be unsupported in accordance with 352.30(C).
(A) Securely Fastened. *[unchanged by this Proposal]*
(B) Supports. *[unchanged by this Proposal]*
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, PVC conduit shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.
Substantiation: Requirements in existing 250.97 Exception and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the knockout opening is oversized or not. “Oversized knockouts”, however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-78.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-78 Log #2202 NEC-P08 **Final Action: Accept**
(352.30(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this provision. Also, delete the clause “or permitted to be unsupported in accordance with 352.30(C)” from the last sentence of 352.30.
Substantiation: The concept of a special support rule for short lengths of raceway run between enclosures of various sorts was added to the 2008 NEC for the first time in the history of the NEC with negligible technical substantiation and no evidence of loss experience, and remains at variance from routine trade practice. The existence of a coupling now immediately provokes a support requirement, even on a 6-inch and a 4-inch long heavy-wall 4 trade size steel nipples put together to make an 11-inch (approx.) combined raceway. A 90 degree sweep roughly 2 trade size or larger (any centerline length over 18 in.) now requires intermediate support. The literal text now requires support to structure on a 3-in. nipple if even one of its ends “encounters” a concentric knockout.

Although there are those who believe the new rule simply offers limited relief from a rule that required all raceways to be independently supported, routine field experience throughout the history of rigid raceway wiring methods does not substantiate such assertions. We are unaware of any significant attempts to require supports on short nipples. All rigid raceways under NEC rules must be listed, including their couplings; is it conceivable that a coupling between two segments of a short (3 ft or less) nipple so seriously degrades the stability of the raceway that such a support is needed? Concentric knockouts in enclosures are reviewed as part of the UL 50 process, and as anyone working these enclosures recently should be aware, those standards have been strengthened and these knockouts are now more robust than in previous decades; is this the time to require even more support?

Raceways generally require support within 3 ft of terminations, and when the entire length is just that long or shorter, no additional support should be needed. In effect, the locknuts and bushings or connectors and locknuts at each end are supports. This is not a new concept for the NEC: CMP 7 just added the wording “(wiring method) fittings shall be permitted as a means of cable support” in a number of cable articles. If carried to its logical conclusion and routinely enforced (however unlikely), this new support rule will likely drive the market in the direction of cabled wiring methods without any technical justification.

It should be remembered that supports to structure are not infallible. Many raceways hang from threaded rod of indefinite length every 10 ft or so and within 3 ft (5 ft. in some cases) of enclosures, depending on the specific rules for the size and character of the supported raceway. Such support clearly meets the rules in this section, but would it add anything to a nipple between enclosures? Further, even when rigid supports such as one-hole clips are used, the raceway beyond the last clip can have an indefinite number of couplings and enter the center knockout of an indefinite number of concentric knockouts; how is this arrangement so inherently more secure than a nipple between enclosures? This new NEC provision was without precedent, and addressed a nonexistent problem.
Panel Meeting Action: Accept
Panel Statement: CMP-8 does not necessarily agree with the submitter’s substantiation. Securement requirements are found in 352.30(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: See my explanation of negative vote on Proposal 8-24a.
Comment on Affirmative:
DABE, J.: See my statement for 8-24(a).

8-79 Log #3069 NEC-P08 **Final Action: Reject**
(352.30(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered,~~ PVC conduit shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceway shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: This requirement is overly restrictive.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-78.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-80 Log #3629 NEC-P08 **Final Action: Reject**
(352.30(C))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered~~, Type PVC shall be permitted to be unsupported where the raceway is not more than ~~450 mm (18 in.)~~ 900 mm (3 ft) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The change for the 2008 code is too restrictive. Under the provisions of 352.30(A,) we could have concentric or eccentric knockouts in a raceway installation and still not provide support for up to five ft from the enclosure. The metal deck roof areas allowing you to go up to five ft are more subject to vibration than switchboard or panelboard installations.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-78.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-81 Log #4618 NEC-P08 **Final Action: Reject**
(352.44)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Expansion fittings for PVC conduit shall be provided to compensate for thermal expansion and contraction where the length change will exceed, in accordance with Table 352.44, 3 mm (1/8 in) at securely mounted items such as boxes, cabinets, elbows, or other conduit terminations.
Substantiation: The main problem with the existing wording is that one cannot assume the problem is only between two securely mounted boxes, etc. If that is the case, then the panel approach (1/4 inch) is fine because the box at each end only moves 1/8 inch. Suppose, however, the conduit 90's away from a brick inside corner on the left to a box on the right. The left side cannot move, so how much distance is allowed for the box? The full 1/4-inch will break the supports free of the box, as the submitter has verified by test. The proposed wording is silent on this common occurrence. Another related problem in the wording concerns boxes mounted on either end of reverse 90's or the like. The conduit may expand and contract over its length much more than 1/4 inch and not put very much pressure on the boxes at all.

The point is, how much displacement should any fixed termination tolerate? The rule should be written to prevent, under any circumstances, RNC movement that will tend to displace a securely fastened item more than 1/8-inch due to field temperature fluctuation. CMP 8 has seen this proposal before in various forms, and has failed to respond to the central technical issue: How is ¼-in. of movement a tolerable length of movement when it occurs entirely at a single raceway/enclosure interface? Again, this submitter has bench tested enclosures with this degree of expansive movement (or contraction force on cooling) and the results are not acceptable.
Panel Meeting Action: Reject
Panel Statement: The current language of this section has for several cycles adequately conveyed the requirement. In addition, there is not enough technical substantiation to revise the requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-82 Log #2152 NEC-P08 **Final Action: Reject**
(352.46)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text as follows:
Where a conduit <u>terminates or</u> enters a box, fitting, or other enclosure, a bushing or adapter shall be provided to protect the wire from abrasion unless the box, fitting, or enclosure design provides equivalent protection.
Substantiation: Conduit that stubs up or enters an enclosure without a bushing or adapter are denting, cutting or even skinning the insulation off the conductors or cables. The edge of the conduits are damaging the conductors on wire pulls occasionally stripping the insulation as it continues into the PVC.
Panel Meeting Action: Reject
Panel Statement: The code text as written already ensures that the PVC conduit even as a stub up would require a bushing or equivalent to protect the conductors from abrasion. The submitter's concern is already covered in section 300.15.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-83 Log #1317 NEC-P08 **Final Action: Reject**
(352.48 and Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
~~All joints between lengths of conduits and between conduits and couplings~~ <u>in a run of conduit</u> shall be made by ~~an approved method~~ <u>identified means and adhesives</u>.
Exception: An adhesive shall not be provided for the movable part of an expansion fitting.
Substantiation: "Approved" is not the same as "identified" and present text does not require an adhesive.
Panel Meeting Action: Reject
Panel Statement: The panel agrees with the submitter that "approved" does not mean "Identified" as defined in Article 100. It is the intent of the panel to have PVC conduit joints acceptable to the authority having jurisdiction. In addition, PVC joints are usually solvent cemented and do not use "adhesives".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-84 Log #1866 NEC-P08 **Final Action: Reject**
(352.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where equipment grounding is ~~required~~ <u>provided</u>, a separate equipment grounding conductor shall be installed in the conduit.
Exceptions No. 1 and 2 no change.
Add: Exception No. 3: Where an equipment bonding jumper is installed in parallel with the conduit.
Substantiation: Where for example a PVC conduit is interposed in a run of RMC used as an equipment grounding conductor, a bonding jumper should be acceptable. The requirement should apply where grounding is done by choice; 356.60 uses the term "or installed".
Panel Meeting Action: Reject
Panel Statement: The current language of this section adequately conveys the requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-85 Log #3618 NEC-P08 **Final Action: Reject**
(352.120)

Submitter: Terrence V. Wendt, City of Omaha
Recommendation: Add new text to read as follows:
Each length of RNC shall be clearly and durably marked at least every 3 m (10 ft) as required in the first sentence of 110.21. The type of material shall also be included in the marking unless it is visually identifiable. <u>Schedule 40 RNC shall have a continuous white stripe down its entire length and Schedule 80 RNC shall have a continuous black stripe down its entire length.</u>
Substantiation: As an inspector, it's very hard to tell the difference between Schedule 80 and 40 when installed and only required to be marked every 10 ft. When installed above ground its usually in shorter pieces which end up with no markings. Requiring continuous colored stripes would make identification quick and reliable.
Panel Meeting Action: Reject
Panel Statement: The marking requirements for Rigid PVC conduit are found in Underwriters Laboratories Inc., Standard UL651. Schedule 40 and Schedule 80 PVC conduit are currently marked with the words "Schedule 40" or "Schedule 80" every 10 ft. The panel recognizes that a proposal to UL 651 to address this issue has been submitted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
BURNS, J.: **Panel action should have been Accept in Principle and Part and wording should be;**
<u>Schedule 40 RNC shall have a continuous</u> ~~white~~ <u>identifiable stripe down its entire length.</u> ~~and Schedule 80 RNC shall have a continuous black stripe down its entire length.~~
I understand the panel's statement that the UL "White Book" does address the marking requirements, however the NEC in Section 352.120 also address "Marking". It is not clear or for certain that UL 651 standard will make any changes requiring manufactures to identify the different types of RNC and it is a problem and concern in the electrical industry that after installation the differentiation between Schedule 40 and Schedule 80 cannot be determined.
DABE, J.: Whether it is a white or black stripe, or some other form of identification there is a need for a quick and reliable means of telling schedule 40 from schedule 80 PVC.

ARTICLE 353 — HIGH DENSITY POLYETHYLENE CONDUIT: TYPE HDPE CONDUIT

8-85a Log #CP801 NEC-P08 **Final Action: Accept**
(353.10)

Submitter: Code-Making Panel 8,
Recommendation: Revise 353.10 to add a new section 6.
(6) Conductors or cables rated at a temperature higher than the listed temperature rating of HDPE conduit shall be permitted to be installed in HDPE conduit, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the HDPE conduit.
Delete section 353.12 (5) and the exception in it's entirety
~~(5) For conductors or cables operating at a temperature higher than the HDPE conduit listed operating temperature rating~~
~~Exception: Conductors or cables rated at a temperature higher than the HDPE conduit listed temperature rating shall be permitted to be installed in HDPE conduit, provided they are not operated at a temperature higher than the HDPE conduit listed temperature rating.~~

Substantiation: Moving the conductor operating temperature requirements makes it clear for the code user that conductors marked with a rated temperature higher than that of the raceway can be used when the conductors are operated within the raceway temperature rating. The exception was redundant to the current requirement in the uses not permitted. This proposal removes the exception per the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-86 Log #918 NEC-P08 **Final Action: Reject**
(353.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
The use of HDPE conduit shall be ~~permitted under~~ limited to the following conditions: (remainder unchanged).
Substantiation: Edit. "Permitted" does not impose any requirements. See 90.5(B).
Panel Meeting Action: Reject
Panel Statement: "Shall be permitted" is an acceptable term used in accordance with 90.5(B).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-87 Log #3165 NEC-P08 **Final Action: Reject**
(353.12(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 353.12, delete ~~(3) In any hazardous (classified) location, except as permitted by other articles in this Code.~~
Renumber 353.12(4) and (5) as 353.12(3) and (4,) respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-88 Log #1711 NEC-P08 **Final Action: Accept in Principle**
(353.12(4) and (5))

TCC Action: The Technical Correlating Committee understands that the panel statement should refer to Proposal 8-85a.
Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
353.12(4) ~~Where subject to ambient temperatures in excess of 50°C (122°) unless listed otherwise.~~ Where any combination of ambient and conductor temperature produces an operating temperature in excess of that for which the material is listed.
~~(5) For conductors or cables operating at a temperature higher than the HDPE conduit listed operating temperature rating. Exception: Conductors or cables rated at a temperature higher than the HDPE conduit listed temperature rating shall be permitted to be installed in HDPE conduit, provided they are not operated at a temperature higher than the HDPE conduit listed temperature rating.~~
Substantiation: The NEC style manual rule concerning use of exceptions states: "Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule." As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from operating at a higher temperature than the HDPE conduit listed operating temperature rating. The proposed new wording consolidates the ambient and insulation temperature limitations into one sentence and eliminates the need for the exception. This is the same wording found currently in 350.12 and would provide consistency with the other articles addressing the operating temperatures of raceways. Similar proposals are submitted for: 352.12, 355.12, and 362.12.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-67a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-89 Log #1688 NEC-P08 **Final Action: Accept in Principle**
(353.12(5) Exception)

TCC Action: The Technical Correlating Committee understands that the panel statement should refer to Proposal 8-85a.
Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
353.12
(5) For conductors or cables operating at a temperature higher than the HDPE conduit listed operating temperature rating.
~~Exception~~ FPN: Conductors or cables rated at a temperature higher than the HDPE conduit listed temperature rating shall be permitted to be installed in HDPE conduit, provided they are not operated at a temperature higher than the HDPE conduit listed temperature rating.
Substantiation: The NEC style manual rule concerning use of exceptions states: "Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule." As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from **operating** at a higher temperature than the HDPE conduit listed operating temperature rating. The exception should be deleted or changed to a fine print note.
Similar proposals are submitted for: 352.12(E), 355.12(E), and 362.12(4).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-67a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-90 Log #4619 NEC-P08 **Final Action: Accept**
(353.24)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the following additional sentence: "For conduits of metric designators 129 and 155 (trade sizes 5 and 6) the allowable radii of bends shall be in accordance with specifications provided by the manufacturer."
Substantiation: This wiring method is now permitted in the larger trade sizes, but Table 354.24 stops at metric designator 103 (trade size 4). This proposal provides a method of addressing this lack of correlation.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-91 Log #1047 NEC-P08 **Final Action: Reject**
(353.60 Exception No. 3 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
GROUNDING. Where equipment grounding is provided, ~~required~~ a separate grounding conductor shall be installed in the conduit.
Exception No. 1: The equipment grounding conductor shall be permitted ~~to be run separately from the conduit where sued for grounding dc circuits as permitted~~. Installed in accordance with 250.134.
Exception No. 2: No change.
Exception No. 3: An equipment grounding conductor shall not be required where an equipment bonding conductor is installed in parallel with the conduit.
Substantiation: The provision should apply where grounding is done by choice and not required. Proposed Exception No. 1 revision eliminates unnecessary wording; 250.134 applies to equipment grounding not circuit grounding. A bonding jumper should be permitted in lieu of an equipment grounding conductor where it complies with the Code.
Panel Meeting Action: Reject
Panel Statement: The current language of this section adequately conveys the requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-92 Log #1067 NEC-P08 **Final Action: Reject**
(353.100)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. This section is essentially a definition covered by 353.2. "Sufficient" is subjective and a term to be avoided per the Style Manual. 353.6 requires listing which should be enough to cover the requirements of this section. It is difficult to determine future conditions of loading. Other wiring methods require to be listed generally do not specify such particulars.
Panel Meeting Action: Reject
Panel Statement: The language used in Section 353.100 is prudent for the development of the product standards. Similar language is used in Section 352.100 for PVC conduit and 355.100 for Type RTRC conduit.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 354 — NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS: TYPE NUCC

8-93 Log #3166 NEC-P08 **Final Action: Reject**
(354.12(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 354.12, delete ~~(3) In any hazardous (classified) location, except as permitted by other articles of this Code.~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-94 Log #2778 NEC-P08 **Final Action: Reject**
(354.26)

Submitter: Travis Kummer, Kummer Electric LLC
Recommendation: Delete text as follows:
~~354.26 Bends — Number in One Run. There shall not be more than the equivalent of four quarter bends (360 degrees total) between termination points.~~
Substantiation: Since NUCC is a listed factory assembly with the conductors already installed in the raceway, there should be no requirement for the maximum number of bends between termination points such as there is not for AC or /MC cables. In short, the conductor are already installed and do not have to be pulled in.
Panel Meeting Action: Reject
Panel Statement: For NUCC conductors must be able to be removed and replaced at a later date. The requirement for the number of bends is needed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 355 — REINFORCED THERMOSETTING RESIN CONDUIT: TYPE RTRC

8-95 Log #2176 NEC-P08 **Final Action: Accept**
(355.2.Reinforced Thermosetting Resin Conduit (RTRC))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
355.2 Definition.
Reinforced Thermosetting Resin Conduit (RTRC). A rigid nonmetallic conduit ~~(RNC)~~ of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables.
Substantiation: The reference to "RNC" is not needed, as it is not used anywhere in the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-96 Log #2992 NEC-P08 **Final Action: Accept**
(355.2.Reinforced Thermosetting Resin Conduit (RTRC))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
355.2 Definition.
Reinforced Thermosetting Resin Conduit (RTRC). A rigid nonmetallic conduit ~~(RNC)~~ of circular cross section, with integral or associated couplings, connectors, and fittings for the installation of electrical conductors and cables.
Substantiation: The reference to "RNC" is not needed, as it is not used anywhere in the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-96a Log #CP802 NEC-P08 **Final Action: Accept**
(355.10)

Submitter: Code-Making Panel 8,
Recommendation: Revise 355.10 to add a new section "I"
(I) Insulation Temperature Limitations. Conductors or cables rated at a temperature higher than the listed temperature rating of RTRC conduit shall be permitted to be installed in RTRC conduit, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the RTRC conduit.
Delete section 355.12 (E) and the exception in it's entirety
~~(E) Insulation Temperature Limitations. For conductors or cables operating at a temperature higher than the RTRC listed operating temperature rating.~~
~~Exception: Conductors or cables rated at a temperature higher than the RTRC listed temperature rating shall be permitted to be installed in RTRC, provided they are not operated at a temperature higher than the RTRC listed temperature rating.~~
Substantiation: Moving the conductor operating temperature requirements makes it clear for the code user that conductors marked with a rated temperature higher than that of the raceway can be used when the conductors are operated within the raceway temperature rating. The exception was redundant to the current requirement in the uses not permitted. This proposal removes the exception per the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-97 Log #2659 NEC-P08 **Final Action: Reject**
(355.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: RTRC shall only be permitted in walls, floors, and ceilings.
Substantiation: Edit. This provision is not a requirement per 90.5(B).
Panel Meeting Action: Reject
Panel Statement: RTRC is not restricted to concealed applications "only". 355.10(F) permits RTRC to be used exposed. The addition of the word "only" would confuse the user.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-98 Log #1340 NEC-P08 **Final Action: Accept in Principle**
(355.10(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
RTRC shall be permitted for exposed work ~~where not subject to physical damage if~~ identified for such use.
Substantiation: Physical damage is covered by Uses not Permitted. Is RTRC.
Panel Meeting Action: Accept in Principle
Revise text to read as follows, keeping the word "if":
RTRC shall be permitted for exposed work ~~where not subject to physical damage~~ if identified for such use.
Panel Statement: The panel concludes that they have met the submitter's intent without removing the word "if".
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-99 Log #3167 NEC-P08 **Final Action: Reject**
(355.12(A))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 355.12, delete ~~(A) Hazardous (Classified) Locations~~
~~(1) In any hazardous (classified) location, except as permitted by other articles in this Code~~
~~(2) In Class 1, Division 2 locations, except as permitted in 501.10(B)(3)~~
Renumber 355.12(B), (C), (D), (E), and (F) as 355.12(A), (B), (C), (D), and (E).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-100 Log #1712 NEC-P08 **Final Action: Accept in Principle**
(355.12(D) and (E))

TCC Action: The Technical Correlating Committee understands that the panel statement should refer to Proposal 8-96a.
Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
355.12(D) ~~**Ambient Temperatures.** Where subject to ambient temperatures in excess of 50°C (122°) unless listed otherwise.~~
<u>**Operating Temperature.** Where any combination of ambient and conductor temperature produces an operating temperature in excess of that for which the material is listed.</u> ~~**(E) Insulation Temperature Limitations** For conductors or cables operating at a temperature higher than the RTRC listed operating temperature rating. Exception: Conductors or cables rated at a temperature higher than the RTRC listed temperature rating shall be permitted to be installed in RTRC, provided they are not operated at a temperature higher than the RTRC listed temperature rating.~~
Substantiation: The NEC style manual rule concerning use of exceptions states: “Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule.” As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from operating at a higher temperature than the RTRC listed operating temperature rating. The proposed new wording consolidates the ambient and insulation temperature limitations into one sentence and eliminates the need for the exception. This is the same wording found currently in 350.12 and would provide consistency with the other articles addressing the operating temperatures of raceways. Similar proposals are submitted for: 352.12, 353.12, and 362.12.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-67a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-101 Log #1689 NEC-P08 **Final Action: Accept in Principle**
(355.12(E) Exception)

TCC Action: The Technical Correlating Committee understands that the panel statement should refer to Proposal 8-96a.
Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
355.12
(E) Insulation Temperature Limitations For conductors or cables operating at a temperature higher than the RTRC listed operating temperature rating.
~~Exception~~ <u>FPN:</u> Conductors or cables rated at a temperature higher than the RTRC listed temperature rating shall be permitted to be installed in RTRC, provided they are not operated at a temperature higher than the RTRC listed temperature rating.
Substantiation: The NEC style manual rule concerning use of exceptions states: “Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule.” As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from **operating** at a higher temperature than the RTRC listed operating temperature rating. The exception should be deleted or changed to a fine print note.
Similar proposals are submitted for: 352.12.(E), 353.12(5), and 262.12(4).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-67a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-102 Log #1339 NEC-P08 **Final Action: Reject**
(355.22)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
The number of conductors, <u>cables, and flexible cords</u> shall not exceed that permitted by the percentage fill specified in Table 1 Chapter 9.
Delete the last sentence.
Substantiation: The provision should include single and multiconductor cables. Flexible cords should be included. Notes 5 and 9 to Table 1 refer to multiconductor cables and flexible cord.
Panel Meeting Action: Reject
Panel Statement: Cables are permitted to be installed per the second sentence (right after the sentence with the proposed revision) of 355.22. Note 5 of Table 1 in Chapter 9 refers to cables only and does not apply to flexible cords. Note 9 does reference flexible cord, but a proposal with the technical substantiation to support the addition of cords to 355.22 has not been submitted nor submitted to the other raceway articles.
Flexible cords are not permitted to be installed in raceways “except as otherwise permitted in this code” per Section 400.8(6).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-103 Log #2623 NEC-P08 **Final Action: Reject**
(355.30(A) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
<u>Exception: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).</u>
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-104 Log #700 NEC-P08 **Final Action: Reject**
(355.30(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
355.30 Securing and Supporting.
RTRC shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 355.30(A) and (B), or permitted to be unsupported in accordance with 355.30(C).
(A) Securely Fastened. *[unchanged by this Proposal]*
(B) Supports. *[unchanged by this Proposal]*
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, RTRC shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
<u>FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.</u>
Substantiation: Requirements in existing 250.97 Exception and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the knockout opening is oversized or not. “Oversized knockouts”, however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-105.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-105 Log #2203 NEC-P08 **Final Action: Accept**
(355.30(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this provision. Also, delete the clause "or permitted to be unsupported in accordance with 355.30(C)" from the last sentence of 355.30.
Substantiation: The concept of a special support rule for short lengths of raceway run between enclosures of various sorts was added to the 2008 NEC for the first time in the history of the NEC with negligible technical substantiation and no evidence of loss experience, and remains at variance from routine trade practice. The existence of a coupling now immediately provokes a support requirement, even on a 6-inch and a 4-inch long heavy-wall 4 trade size steel nipples put together to make an 11-inch (approx.) combined raceway. A 90 degree sweep roughly 2 trade size or larger (any centerline length over 18 in.) now requires intermediate support. The literal text now requires support to structure on a 3-in. nipple if even one of its ends "encounters" a concentric knockout.

Although there are those who believe the new rule simply offers limited relief from a rule that required all raceways to be independently supported, routine field experience throughout the history of rigid raceway wiring methods does not substantiate such assertions. We are unaware of any significant attempts to require supports on short nipples. All rigid raceways under NEC rules must be listed, including their couplings; is it conceivable that a coupling between two segments of a short (3 ft or less) nipple so seriously degrades the stability of the raceway that such a support is needed? Concentric knockouts in enclosures are reviewed as part of the UL 50 process, and as anyone working these enclosures recently should be aware, those standards have been strengthened and these knockouts are now more robust than in previous decades; is this the time to require even more support?

Raceways generally require support within 3 ft of terminations, and when the entire length is just that long or shorter, no additional support should be needed. In effect, the locknuts and bushings or connectors and locknuts at each end are supports. This is not a new concept for the NEC: CMP 7 just added the wording "(wiring method) fittings shall be permitted as a means of cable support" in a number of cable articles. If carried to its logical conclusion and routinely enforced (however unlikely), this new support rule will likely drive the market in the direction of cabled wiring methods without any technical justification.

It should be remembered that supports to structure are not infallible. Many raceways hang from threaded rod of indefinite length every 10 ft or so and within 3 ft (5 ft. in some cases) of enclosures, depending on the specific rules for the size and character of the supported raceway. Such support clearly meets the rules in this section, but would it add anything to a nipple between enclosures? Further, even when rigid supports such as one-hole clips are used, the raceway beyond the last clip can have an indefinite number of couplings and enter the center knockout of an indefinite number of concentric knockouts; how is this arrangement so inherently more secure than a nipple between enclosures? This new NEC provision was without precedent, and addressed a nonexistent problem.
Panel Meeting Action: Accept
Panel Statement: CMP-8 does not necessarily agree with the submitter's substantiation. Securement requirements are found in 355.30(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: See my explanation of negative vote on Proposal 8-24a.
Comment on Affirmative:
DABE, J.: See my statement for 8-24(a).

8-106 Log #3070 NEC-P08 **Final Action: Reject**
(355.30(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered,~~ Type RTRC shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: This requirement is overly restrictive.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-105.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-107 Log #3630 NEC-P08 **Final Action: Reject**
(355.30(C))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered~~, Type RTRC shall be permitted to be unsupported where the raceway is not more than ~~450 mm (18 in.)~~ 900 mm (3 ft) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The change for the 2008 code is too restrictive. Under the provisions of 355.30(A), we could have concentric or eccentric knockouts in a raceway installation and still not provide support for up to five ft from the enclosure. The metal deck roof areas allowing you to go up to five ft are more subject to vibration than switchboard or panelboard installations.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-105.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 356 — LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT: TYPE LFNC

8-108 Log #4175 NEC-P08 **Final Action: Accept**
(356.10(6))

Submitter: David Mercier, Southwire Company
Recommendation: Revise text to read as follows:
(6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through ~~27~~ 103 (trade size 1/2 through ~~1~~ 4) conduit.
Substantiation: This change would expand the use of prewired assemblies to allow conductors sized large enough for feeder and service applications.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
DABE, J.: More information is needed about product before blanket inclusion.
GRIFFITH, M.: The panel should have "Rejected" this proposal for consistency with Panel Action on Proposal 8-54.

8-109 Log #1757 NEC-P08 **Final Action: Reject**
(356.12(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where likely to be subject to physical damage which impairs its functional capabilities.
Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. "Damage" is not defined; a small dent is damage, but unless it affects watertight integrity or other function it has not impaired functional capabilities.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-110 Log #3168 NEC-P08 **Final Action: Reject**
(356.12(5))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 356.12, delete ~~(5) In any hazardous (classified) location, except as permitted by other articles in this Code.~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating CommitteeC is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-111 Log #1338 NEC-P08 **Final Action: Reject**
(356.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete the first sentence.
Substantiation: Superfluous; already covered by the second paragraph which has no limitation of "flexibility". Additionally, a bonding jumper may be installed in parallel with the LFNC to connect together two equipment grounding conductors such as RMC which negates the need for an EGC in the conduit.
Panel Meeting Action: Reject
Panel Statement: First sentence of 356.30 directs users to one of the four options and is necessary. Section 356.30 deals with securing and supporting, not flexibility or grounding.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-112 Log #931 NEC-P08 **Final Action: Reject**
(356.30(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new (5): Intermediate support shall not be required if the conduit is not more than 300 mm (12 in.) in length between boxes, cabinets, or other enclosures securely fastened in place, and securely fastened to the enclosures. Where conduit is connected at knockouts with segments larger than the conduit, reducing washers larger than the largest knockout segment shall be installed.
Substantiation: If the provisions of 342.30(C), 344.30(C), and 352.30(C) are deemed necessary, a similar provision should apply for Type AC cable.
Panel Meeting Action: Reject
Panel Statement: The provision for shorter lengths of conduits between terminations applies to "rigid conduits" only. There was not a substantiation to allow flexible conduits or tubings to be allowed for the same provision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-113 Log #2624 NEC-P08 **Final Action: Reject**
(356.30 Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add to first paragraph:
Exception: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 358 — ELECTRICAL METALLIC TUBING: TYPE EMT

8-114 Log #874 NEC-P08 **Final Action: Reject**
(358.10(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "severe".
Substantiation: Permitted use should not be limited to corrosive conditions which are "severe" which is subjective and not defined. Present literal wording does not cover areas which are less than severely corrosive, but can cause damage and the requirement for protection should apply to those areas.
Panel Meeting Action: Reject
Panel Statement: The current text reflects the panel's understanding of the proper use of EMT. The determination between corrosive influences and severe corrosive influences remains with the authority having jurisdiction. EMT is provided with corrosion protection in accordance with the listing.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-115 Log #1258 NEC-P08 **Final Action: Reject**
(358.10(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of text: "... and judged suitable identified for the condition."
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-116 Log #3649 NEC-P08 **Final Action: Reject**
(358.10(C))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Relocate 358.10(C) and its FPN to 358.30.
Substantiation: 358.10(C) has nothing to do with the permitted uses for EMT. This rule belongs 358.30, the section for securing and supporting.
Panel Meeting Action: Reject
Panel Statement: "Wet locations" belongs as an approved use for EMT. Section 358.10(C) expands on the use by indicating that the accessories used with EMT in a wet location shall be of approved materials.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-117 Log #3169 NEC-P08 **Final Action: Reject**
(358.12(4))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 358.12, delete ~~(4) In any hazardous (classified) location except as permitted by the other articles in this Code~~
Renumber 358.12(5) and (6) as 358.12(4) and (5,) respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.

Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-118 Log #3471 NEC-P08 **Final Action: Reject**
(358.17)

Submitter: David E. Watters, H. F. Lenz Company
Recommendation: Add the following text:
Ampacity of Conductors: The ampacity adjustment factors in 310.15(B)(2) shall apply to conductors installed in Electrical Metallic Tubing.
(A) Raceway Fill: Raceways filled with 20 or more conductors loaded to 50% capacity or more shall be limited to a maximum fill capacity of 35%.
Substantiation: Testing was performed on $1\frac{1}{2}$ in. Electrical Metallic Tubing, in free air, at Nationally Recognized Testing Laboratories. The ETL SEMKO Laboratory was used to test 20 Active conductors at 50% load capacity, and the OnSpex Laboratory was used to test 30 Active conductors at 45% capacity. In both cases, the conductors were loaded to the limits allowed by Table 310.15(B)(2). In both cases, at least one of the conductors, within the raceway, exceeded the 90° temperature limitation of the insulation. Both tests failed according to the reports I have provided. For these reasons, additional loading or raceway fill restrictions should be applied, and we recommend approval of the code changes listed above.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: No substantiation that 35 percent fill would solve the alleged problem described by the submitter
This proposal is based on two tests where only one test was at both maximum ampacity and maximum fill. A more complete series of tests on all standard EMT sizes, and their various fill and current-carrying conductor adjustment factors is required for consideration of this proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-119 Log #3898 NEC-P08 **Final Action: Reject**
(358.30(A))

Submitter: Anatoliy Yefremenkov, E Light Electric Services
Recommendation: Revise text as follows:
EMT shall be securely fastened in place at least every 3 m (10 ft). Supports shall be placed so that at least one support is within 900 mm (3 ft) of each coupling. In addition, each EMT run between termination points shall be securely fastened within 900 mm (3 ft) of each outlet box, junction box, device box cabinet, conduit body or other tubing termination
Substantiation: Very often we experience shorts in conductors where EMT has come apart at the coupling after installation. By requiring a support within 3 ft of each coupling we can help ensure that EMT does not separate over time and protect the conductors from shorts and arcing.
Panel Meeting Action: Reject
Panel Statement: The submitter has given no substantiation for the proposal, only an anecdotal statement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-120 Log #2630 NEC-P08 **Final Action: Reject**
(358.30(A) Exception No. 3 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Exception No. 3: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-121 Log #1907 NEC-P08 **Final Action: Reject**
(358.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: ~~Horizontal~~ Runs of EMT shall be permitted to be supported by openings or notches ~~through~~ in framing members ~~at intervals not exceeding those in Table 352.30(B) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.~~ where support and fastening comply with this section.
FPN: See 300.4.
Substantiation: Whether vertical or horizontal, runs can be supported by holes and notches and other openings. Support is not necessarily the same as fastening. This section requires fastening at specified intervals which applies and not negated where support is by holes, notches or other openings. This fastening is necessary especially where EMT is run through large openings in bar joists or metal studs. Vertical runs of Type AC and MC cables through openings in metal studs are commonly installed and accepted. Feference to 300.4 is pertinent to this section. Vertical runs on the side of the studs are supported because they are required to be fastened.
Panel Meeting Action: Reject
Panel Statement: See panel actions and statements on Proposals 8-19 and 8-63.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-122 Log #3895 NEC-P08 **Final Action: Reject**
(358.30(B))

Submitter: Michael Arledge, E Light Electric Services
Recommendation: Revise text as follows:
Horizontal funs of EMT supported by openings through framing members, concrete walls, or other substantial construction components at intervals not greater than 3 m (10 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.
Substantiation: If we can use framing member as support means then why do we limit it to just framing members. We should apply the allowances to anything in the building that can substantially support the conduit.
Panel Meeting Action: Reject
Panel Statement: Present language is clear and adequately covers the intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-123 Log #693 NEC-P08 **Final Action: Reject**
(358.30(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
358.30 Securing and Supporting.
EMT shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 358.30(A) and (B), or permitted to be unsupported in accordance with 358.30(C).
(A) Securely Fastened. *[unchanged by this Proposal]*
(B) Supports. *[unchanged by this Proposal]*
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, EMT shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
FPN: An example of an oversized knockout is a field-fabricated knockout where minor tool misalignment or tool drift during fabrication results in an enclosure or box hole larger than that permitted by the product Listing standard for a factory-fabricated knockout in Listed equipment.
Substantiation: Requirements in existing 250.97 Exception and requirements added to the 2008 *NEC*® in 342.30(C), 344.30(C), 352.30(C), 355.30(C), and 358.30(C) are predicated upon whether or not the knockout opening is oversized or not. “Oversized knockouts”, however, are not defined either dimensionally or descriptively, nor are they defined comparatively to standard, NON-oversized knockouts, which are also undefined dimensionally either directly in the *NEC*® or indirectly by reference to other standards.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-124 Log #1702 NEC-P08 **Final Action: Reject**
(358.30(C))

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise 358.30(C) as follows:
(C) Unsupported Raceways. Where oversized, concentric or eccentric knockouts are not encountered, Type IMC shall be permitted to be unsupported where the raceway is not more than 5 ft or 20 times the trade size, whichever is less, ~~450 mm (18 in.)~~ and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The proposed revision will make the unsupported length, between enclosures, dependent on the raceway OD, which is a factor in how well a given raceway will resist bending.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-125 Log #2204 NEC-P08 **Final Action: Accept**
(358.30(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this provision. Also, delete the clause “or permitted to be unsupported in accordance with 358.30(C)” from the last sentence of 358.30.
Substantiation: The concept of a special support rule for short lengths of raceway run between enclosures of various sorts was added to the 2008 NEC for the first time in the history of the NEC with negligible technical substantiation and no evidence of loss experience, and remains at variance from routine trade practice. The existence of a coupling now immediately provokes a support requirement, even on a 6-inch and a 4-inch long heavy-wall 4 trade size steel nipples put together to make an 11-inch (approx.) combined raceway. A 90 degree sweep roughly 2 trade size or larger (any centerline length over 18 in.) now requires intermediate support. The literal text now requires support to structure on a 3-in. nipple if even one of its ends “encounters” a concentric knockout.

Although there are those who believe the new rule simply offers limited relief from a rule that required all raceways to be independently supported, routine field experience throughout the history of rigid raceway wiring methods does not substantiate such assertions. We are unaware of any significant attempts to require supports on short nipples. All rigid raceways under NEC rules must be listed, including their couplings; is it conceivable that a coupling between two segments of a short (3 ft or less) nipple so seriously degrades the stability of the raceway that such a support is needed? Concentric knockouts in enclosures are reviewed as part of the UL 50 process, and as anyone working these enclosures recently should be aware, those standards have been strengthened and these knockouts are now more robust than in previous decades; is this the time to require even more support?

Raceways generally require support within 3 ft of terminations, and when the entire length is just that long or shorter, no additional support should be needed. In effect, the locknuts and bushings or connectors and locknuts at each end are supports. This is not a new concept for the NEC: CMP 7 just added the wording “(wiring method) fittings shall be permitted as a means of cable support” in a number of cable articles. If carried to its logical conclusion and routinely enforced (however unlikely), this new support rule will likely drive the market in the direction of cabled wiring methods without any technical justification.

It should be remembered that supports to structure are not infallible. Many raceways hang from threaded rod of indefinite length every 10 ft or so and within 3 ft (5 ft. in some cases) of enclosures, depending on the specific rules for the size and character of the supported raceway. Such support clearly meets the rules in this section, but would it add anything to a nipple between enclosures? Further, even when rigid supports such as one-hole clips are used, the raceway beyond the last clip can have an indefinite number of couplings and enter the center knockout of an indefinite number of concentric knockouts; how is this arrangement so inherently more secure than a nipple between enclosures? This new NEC provision was without precedent, and addressed a nonexistent problem.
Panel Meeting Action: Accept
Panel Statement: CMP-8 does not necessarily agree with the submitter’s substantiation. Securement requirements are found in 358.30(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: See my explanation of negative vote on Proposal 8-24a.
Comment on Affirmative:
DABE, J.: See my statement for 8-24(a).

8-126 Log #2592 NEC-P08 **Final Action: Reject**
(358.30(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Intermediate support shall not be required where the raceway is not more than 450 mm (18 in.) in unbroken length (without coupling) between enclosures secured in place, and connected to threaded hubs or openings, or through a knockout with no segments larger than the raceway connector or with reducing washers larger than the largest knockout segment and the raceway is bonded by means of a bonding jumper.
Substantiation: Since terminal connections do provide support the provision should address intermediate support. The proposal provides for such installations at cabinets, panelboards, switches, and other enclosures with knockout provisions larger than the raceway which cannot be used with this provision. “Enclosures: covers boxes and other types.”
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-127 Log #3071 NEC-P08 **Final Action: Reject**
(358.30(C))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered,~~ Type EMT shall be permitted to be unsupported where the raceway is not more than 450 mm (18 in.) and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: This requirement is overly restrictive.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-128 Log #3631 NEC-P08 **Final Action: Reject**
(358.30(C))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
(C) Unsupported Raceways. ~~Where oversized, concentric or eccentric knockouts are not encountered~~, Type EMT shall be permitted to be unsupported where the raceway is not more than ~~450 mm (18 in.)~~ <u>900 mm (3 ft)</u> and remains in unbroken lengths (without coupling). Such raceways shall terminate in an outlet box, junction box, device box, cabinet, or other termination at each end of the raceway.
Substantiation: The change for the 2008 code is too restrictive. Under the provisions of 358.30(A), we could have concentric or eccentric knockouts in a raceway installation and still not provide support for up to five ft from the enclosure. The metal deck roof areas allowing you to go up to five ft are more subject to vibration than switchboard or panelboard installations.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 8-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-129 Log #237a NEC-P08 **Final Action: Reject**
(358.60)

Submitter: Sprague Owings, Nassau County, Florida
Recommendation: Revise as follows:
~~358.60 Grounding. EMT shall be permitted as an equipment grounding conductor.~~
<u>358.60 Grounding. When equipment grounding is required, a separate equipment grounding conductor shall be installed in the raceway.</u>
Substantiation: As concern grows for having a reliable grounding path (the return of a separate equipment ground to dryers and ranges, etc.) it would seem to follow that it may be time to delete the use of EMT without an equipment ground simply because this use depends on many mechanical connections (each and every connector and coupling). One run of EMT could easily have 10 or more couplings in the run and just one loose screw or compression fitting could jeopardize the ability of the conduit to carry a short back to source. This is not so much a problem with flex or cables where there are only 2 mechanical connections in the path (at the beginning and end of the run.)
I have submitted a companion proposal to 250.118(4).
Panel Meeting Action: Reject
Panel Statement: EMT is tested and listed for grounding. EMT complies with Article 250 for grounding. The submitter provided no technical substantiation to prove otherwise. EMT is not permitted for use where subject to severe physical damage. Any damaged EMT should be replaced.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: The IEEE believes Panel action for this proposal should be to “Accept”. Industry experience indicates that, for several reasons including the one presented by the submitter, metallic conduit systems do not always provide adequate equipment grounding. As a result, ANSI/IEEE Standard 142-2007 (the “Green Book”), section 2.2.3, recommends installation of a separate equipment grounding conductor (EGC) in conduit.
With regard to the Panel statement that EMT is tested and listed for grounding, there does not appear to any reference to a test method for establishing the adequacy of EMT as an equipment grounding conductor in the UL White Book either in the section on EMT or in the NEC Correlation Index. Further, if there is such a UL test, the current level used and resulting voltage drop would both be of interest as factors in determining the suitability of EMT as an EGC for all installations.
Finally, if the proposed change is ultimately accepted it would have to be correlated with other sections of the NEC that presently recognize EMT as a grounding means. Similarly, Article 342 for IMC would require revision. (See also my Comments on Proposal 8-39).

8-130 Log #1506 NEC-P08 **Final Action: Reject**
(358.60)

Submitter: Bill Higgins, Lookout Mtn., GA
Recommendation: Revise text to read as follows:
EMT shall (not) be permitted as an equipment grounding conductor.
Exception No. 1: Where an installation of EMT consists of less than 10 connectors or couplings, from beginning to end.
Substantiation: A long run of EMT depends on too many set screws and locknuts to assure a solid, low-impedance path to ground. Many times I have discovered EMT runs that have accidentally come apart, effectively nullifying the grounding path.
Panel Meeting Action: Reject
Panel Statement: No evidence has been provided that 10 or less couplings or connectors is any safer than a properly installed raceway with more than 10 such fittings. No evidence of raceway failure has been presented; merely a testament to poor installation practice has been submitted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 360 — FLEXIBLE METALLIC TUBING: TYPE FMT

8-131 Log #3893 NEC-P08 **Final Action: Reject**
(360.10(4))

Submitter: Yonas Mebrahtu, E Light Electric Services
Recommendation: Revise text as follows:
FMT shall be permitted to be used for branch circuits as follows: (1) In dry locations (2) Where concealed (3) In accessible locations (4) For system voltages of ~~1000~~ 600 volts maximum.
Substantiation: 600 volts is the divider between Low voltage and Medium voltage. It is commonly used throughout the NEC as the dividing point for voltage limitations. This change will make this provision more in line with the remainder to the NEC.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been provided to reduce the allowable voltage from 1000 to 600 thereby placing a restriction on the product use without evidence of a safety concern or product failure in the 601 to 1000 volt range.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-132 Log #3170 NEC-P08 **Final Action: Reject**
(360.12(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 360.12, delete ~~(3) In hazardous (classified) locations unless otherwise permitted under other articles in this Code.~~
Renumber 360.12(4), (5), and (6) as 360.12(3), (4), and (5), respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-133 Log #1756 NEC-P08 **Final Action: Reject**
(360.12(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where likely to be subject to physical damage which impairs its functional capabilities.
Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. "Damage" is not defined; a small dent is damage, but unless it affects watertight integrity or other function it has not impaired functional capabilities.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-134 Log #2591 NEC-P08 **Final Action: Reject**
(360.12(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Where likely to be subject to physical damage.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-135 Log #2590 NEC-P08 **Final Action: Reject**
(360.24(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Where FMT is ~~may~~ likely to be infrequently flexed in service after installation.... (remainder unchanged).
Substantiation: Edit. "Likely" is defined as such a nature or circumstances as to make something probable and a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: Suggested language does not add clarity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-136 Log #1257 NEC-P08 **Final Action: Accept**
(360.40)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 110.12(A).
Panel Meeting Action: Accept
Panel Statement: The submitter's reference of 110.12(A) is incorrect. Section 314.17(A) mandates that openings through which conductors enter shall be adequately closed. The performance measurement is contained in the UL standard 514B clause 5.4.1.4.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
DABE, J.: 110.12(A) relates to unused openings. Whereas 360.40 refers to the termination of a connection.

8-137 Log #1256 NEC-P08 **Final Action: Reject**
(360.56)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Applicable provisions of 300.15 and other sections already apply.
Panel Meeting Action: Reject
Panel Statement: Section 360.56 is harmonized with the other raceway articles. The panel concludes that the reference is useful to code users.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-138 Log #1255 NEC-P08 **Final Action: Reject**
(360.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Already covered in 250.118(7) which applies.
Panel Meeting Action: Reject
Panel Statement: Section 360.60 is harmonized with the other raceway articles. The panel concludes that the reference is useful to code users.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-139 Log #930 NEC-P08 **Final Action: Reject**
(360.62 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
360.XX Connections. Where FMT is connected to boxes, cabinets or other enclosures securely fastened in place, at knockouts with segments larger than the tubing, reducing washers larger than the largest knockout segment shall be installed and the tubing shall be bonded to the enclosure by identified means.
Substantiation: Since there are no specific support requirements, the support provided by attachment to enclosures should be specific.
Panel Meeting Action: Reject
Panel Statement: Fittings used with FMT are evaluated and listed for the support of the tubing at termination points.
Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 362 — ELECTRICAL NONMETALLIC TUBING: TYPE EMT

8-139a Log #CP803 NEC-P08 **Final Action: Accept**
(362.10)

Submitter: Code-Making Panel 8,
Recommendation: Revise 362.10 to add a new section "9"
(9) Conductors or cables rated at a temperature higher than the listed temperature rating of ENT shall be permitted to be installed in ENT, provided the conductors or cables are not operated at a temperature higher than the listed temperature rating of the ENT.
Delete section 362.12 (4) and the exception in it's entirety
~~(4) For conductors or cables operating at a temperature higher than the ENT listed temperature rating~~
~~Exception to (4): Conductors or cables rated at a temperature higher than the ENT listed temperature rating shall be permitted to be installed in ENT, provided they are not operated at a temperature higher than the ENT listed temperature rating.~~
Substantiation: Moving the conductor operating temperature requirements makes it clear for the code user that conductors marked with a rated temperature higher than that of the raceway can be used when the conductors are operated within the raceway temperature rating. The exception was redundant to the current requirement in the uses not permitted. This proposal removes the exception per the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-140 Log #1331 NEC-P08 **Final Action: Reject**
(362.12 (10) and (11))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (10):
where <u>likely to be</u> subject to physical damage.
Add (11):
<u>Where likely to be exposed to chemical or corrosive agents unless identified for the use.</u>
Substantiation: Specific provisions should be provided as they are for other wiring methods.
Panel Meeting Action: Reject
Panel Statement: For revision to 362.12(10) see panel statement on Proposal 8-134. The addition of 362.12(11) was rejected because 362.10(3) already covers the requirement for corrosive agents.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-141 Log #3171 NEC-P08 **Final Action: Reject**
(362.12(1))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 362.12, delete ~~(1) In any hazardous (classified) location, except as permitted by other articles in this Code.~~
Renumber 362.12(2) through (10) as 362.12(1) through (9).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-142 Log #1755 NEC-P08 **Final Action: Reject**
(362.12(10))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where <u>likely to be</u> subject to physical damage <u>which impairs its functional capabilities.</u>
Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. "Damage" is not defined; a small dent is damage, but unless it affects watertight integrity or other function it has not impaired functional capabilities.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-143 Log #1709 NEC-P08 **Final Action: Accept in Principle**
(362.12(3) and (4))

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
362.12(3) ~~Where subject to ambient temperatures in excess of 50°C (122°) unless listed otherwise.~~ <u>Where any combination of ambient and conductor temperature produces an operating temperature in excess of that for which the material is listed.</u>
~~**(4)** For conductors or cables operating at a temperature higher than the ENT listed temperature rating. Exception to (4): Conductors or cables rated at a temperature higher than the ENT listed temperature rating shall be permitted to be installed in ENT, provided they are not operated at a temperature higher than the ENT listed temperature rating.~~
Substantiation: The NEC style manual rule concerning use of exceptions states: "Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule." As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from operating at a higher temperature than the ENT listed operating temperature rating. The proposed new wording consolidates the ambient and insulation temperature limitations into one sentence and eliminates the need for the exception. This is the same wording found currently in 350.12 and would provide consistency with the other articles addressing the operating temperatures of raceways. Similar proposals are submitted for: 352.12, 353.12, and 355.12
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-139a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-144 Log #1690 NEC-P08 **Final Action: Accept in Principle**
(362.12(4) Exception)

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
362.12
(4) For conductors or cables operating at a temperature higher than the ENT listed temperature rating.
~~Exception~~ <u>FPN:</u> Conductors or cables rated at a temperature higher than the ENT listed temperature rating shall be permitted to be installed in ENT, provided they are not operated at a temperature higher than the ENT listed temperature rating.
Substantiation: The NEC style manual rule concerning use of exceptions states: "Exceptions to *NEC* rules shall be used sparingly. If used, exceptions shall convey alternatives or differences to a basic code rule." As written, this exception does not convey alternatives or differences, it just gives an example of an installation that would be allowed under the basic rule. The basic code rule prohibits conductors or cables (regardless of their insulation temperature rating) from **operating** at a higher temperature than the ENT listed operating temperature rating. The exception should be deleted or changed to a fine print note.
Similar proposals are submitted for: 252.12(E), 353.12(5), and 355.12(4).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel statement on 8-139a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-145 Log #917 NEC-P08 **Final Action: Reject**
(362.30(A) Exception No. 4 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add Exception No. 4: Lengths not exceeding 600 mm (3 ft) between boxes, cabinets or other enclosures securely fastened in place, and securely fastened to the enclosures. Where ENT fittings are attached to knockouts with segments larger than the fitting reducing washers larger than the largest knockout segment shall be installed.
Substantiation: If the provisions of 342.30(C), 344.30(C), and 352.30(C) are deemed necessary, a similar provision should be in this article.
Panel Meeting Action: Reject
Panel Statement: The provision for shorter lengths of conduits between terminations applies to "Rigid Conduits" only. There was not a substantiation to allow ENT to be allowed for the same provision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-146 Log #929 NEC-P08 **Final Action: Reject**
(362.30(A) Exception No. 4 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows:
Exception No. 4: Lengths not exceeding 600 mm (3 ft) between boxes, cabinets, or other enclosures securely fastened in place, and securely fastened to the enclosure. Where ENT is attached at knockouts with segments larger than the ENT, reducing washers larger than the largest knockout segment shall be installed.
Substantiation: If the provisions of 342.30(C), 344.30(C), and 352.30(C) are deemed necessary, a similar provision should apply for Type AC cable.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 8-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-147 Log #2629 NEC-P08 **Final Action: Reject**
(362.30(A) Exception No. 4 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
<u>Exception No. 4: Fastening shall not be required where installed in continuous runs in cable trays except as required in 392.8(B).</u>
Substantiation: The provision should address installations in cable trays.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-31.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-148 Log #2652 NEC-P08 **Final Action: Reject**
(362.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where equipment grounding is provided ~~required~~ a separate equipment grounding <u>or bonding conductor</u> shall be installed. In ~~compliance with Article 250 Part VI~~
Substantiation: Edit. The provision should apply where grounding is done by choice. Bonding conductors should be permitted as part of the grounding path. Article 250 already applies and covers installation.
Panel Meeting Action: Reject
Panel Statement: The current language of this section adequately conveys the requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 366 — AUXILIARY GUTTERS

8-149 Log #873 NEC-P08 **Final Action: Accept**
(366.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Auxiliary gutters shall not be used: ~~under the following conditions~~
(remainder unchanged)
Substantiation: Edit. The prohibitions appear to be uses (per heading) not conditions.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
DABE, J.: The proposed changes do not improve clarity, or content of existing text.

8-150 Log #1754 NEC-P08 **Final Action: Reject**
(366.12(3) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: (3) Where likely to be subject to physical damage which impairs its functional capabilities.
Substantiation: One reason for using this wiring method is to provide a degree of physical protection for contained conductors which should not preclude use where damage which may occur is negligible. “Damage” is not defined; a small dent is damage, but unless it affects watertight integrity or other function it has not impaired functional capabilities.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to substantiate the change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
DABE, J.: This proposal should have been a “Accept in Principle” with the exact language that appears in 376.12(1) used. There are very little differences between Auxiliary Gutters and Metal Wireways

8-151 Log #1785 NEC-P08 **Final Action: Reject**
(366.12(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: (3) Where concealed, except unbroken portions not longer than necessary to pass through walls, floors, or other partitions shall be permitted.
Substantiation: Provisions for uses not permitted should include concealed installation as does 376.10(4). “Partitions” is intended to include ceilings.
Panel Meeting Action: Reject
Panel Statement: The function of auxiliary gutters is to supplement wiring space at a specific location not to pass through walls or ceilings.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-152 Log #477 NEC-P08 **Final Action: Reject**
(366.22)

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:
Section 366.22 Number of Conductors.
(A) Sheet Metal Auxiliary Gutters. The sum of the cross-sectional areas of all contained conductors at any cross-section of a sheet metal auxiliary gutter shall not exceed 20 percent of the interior cross-sectional area of the sheet metal auxiliary gutter. The derating factors in Section 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.
<u>Proposed Exception: Where the sum of the cross-sectional areas of all contained conductors at any cross-section of a sheet metal auxiliary gutter does not exceed 20 percent of the interior cross-sectional area of the wireway and when the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of Section 310.15(B)(4), exceeds 30, the application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required for sheet metal auxiliary gutters where all of the following conditions are met:</u>
<u>(1) Labeled metallic devices are inserted in the sheet metal auxiliary gutter that provide elevation, separation, and spacing among the current-carrying conductors by dividing the sheet metal auxiliary gutter into channels. Not more than nine current-carrying conductors shall be placed within a channel.</u>
<u>(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the current-carrying conductors throughout the length of the sheet metal auxiliary gutter in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.</u>
<u>(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the sheet metal auxiliary gutter and conductors within one channel may come into contact with other conductors in the same channel.</u>
<u>(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the sheet metal auxiliary gutter in order to conduct heat to the walls and floor of the sheet metal auxiliary gutter and shall be connected to the sheet metal auxiliary gutter in a manner consistent with the limitations of their labeling.</u>
<u>(5) Where contact between the current-carrying conductors and the edges of the metallic devices used for elevation, separation, and spacing poses the risk of abrasion to the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.</u>
Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.

From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.

Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm^2 (4in.^{2}) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, “UF,” noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, “WW,” denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors' insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The submitter has provided installation requirements that are not suitable for inclusion into the NEC. The proposal contains terms that are not in accordance with the NEC Style Manual.

The submitter's test data does not support the proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

BERMAN, R.: The submitter has proposed a relaxation of required conductor ampacity adjustments where a new wire support system provides separation between conductors and is intended to reduce the heating effect of the wiring at load. This wire support system was proposed for several different types of raceways, including auxiliary gutters in Article 366.

From a technical standpoint, it is agreed that there may be installations where heating can be reduced or application of ampacity adjustment factors can be relaxed. However, in order for this to be demonstrated, specific test data would have to be presented on each raceway proposed, per the submitter's substantiation. The test data provided is extremely limited to only a few tests on underfloor raceway and wireway, and not at full ampacity in accordance with the NEC.

From an installation standpoint, the feasibility of such an installation has not been demonstrated, as it is difficult to imagine how conductors would be laid into each raceway employing the wire support system. It is also difficult to understand how conductors could be removed or new conductors added after installation of the supports. The submitted test data for one of the tests indicates that there was shifting of the wire support system during test, allowing conductors to move in closer proximity to one another.

8-153 Log #2993 NEC-P08 **Final Action: Accept**
(366.22)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

366.22 Number of Conductors.

(A) Sheet Metal Auxiliary Gutters. The sum of the cross-sectional areas of all contained conductors at any cross section of a sheet metal auxiliary gutter shall not exceed 20 percent of the interior cross-sectional area of the sheet metal auxiliary gutter. The <u>adjustment</u> ~~derating~~ factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-154 Log #2177 NEC-P08 **Final Action: Accept**
(366.22(A))

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

366.22 Number of Conductors.

(A) Sheet Metal Auxiliary Gutters. The sum of the cross-sectional areas of all contained conductors at any cross section of a sheet metal auxiliary gutter shall not exceed 20 percent of the interior cross-sectional area of the sheet metal auxiliary gutter. The <u>adjustment</u> ~~derating~~ factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-155 Log #3072 NEC-P08 **Final Action: Accept**
(366.22(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by the panel relative to the actions taken on Proposals 6-59, 8-155, 8-194 and 8-204.

The Technical Correlating Committee directs the Chairs of Code-Making Panels 6 and 8 form a Task Group to correlate Proposals 6-59, 8-155, 8-194 and 8-204, and submit comments, if deemed appropriate.

This action will be considered by the panel as a public comment.

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

366.22 Number of Conductors.

(A) Sheet Metal Auxiliary Gutters. The sum of the cross-sectional areas of all contained conductors at any cross section of a sheet metal auxiliary gutter shall not exceed 20 percent of the interior cross-sectional area of the sheet metal auxiliary gutter. The derating factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. ~~Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.~~

Substantiation: This is a companion proposal to move this code language to 310.15(B)(2)(a), where it is more appropriate. Similar proposals are made to sections 376.22(A) and 378.22, please correlate the proposals.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-156 Log #4481 NEC-P08 **Final Action: Accept**
(366.22(A))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
366.22 Number of Conductors.
(A) Sheet Metal Auxiliary Gutters. The sum of the cross-sectional areas of all contained conductors at any cross section of a sheet metal auxiliary gutter shall not exceed 20 percent of the interior cross-sectional area of the sheet metal auxiliary gutter. The ~~derating~~ <u>adjustment</u> factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.
[remainder of 366.22 unchanged by this Proposal]
Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term “adjustment factors”, not the unspecific generalization “derating factors”.
366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term “correction factors” and imprecise term “derating factors”, respectively, to “adjustment factors”, the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-157 Log #478 NEC-P08 **Final Action: Reject**
(366.23(A))

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:
Section 366.23(A) Sheet Metal Auxiliary Gutters - Where the number of current-carrying conductors contained in the sheet metal auxiliary gutter is 30 or less, the correction factors specified in Section 310.15(B)(2)(a) shall not apply. The current carried continuously in bare copper bars in sheet metal auxiliary gutters shall not exceed 1.55 amperes/mm2 (1000 amperes/in.2) of cross section of the conductor. For aluminum bars, the current carried continuously shall not exceed 1.09 amperes/mm2 (700 amperes/in.2) of cross section of the conductor.
<u>Proposed Exception: Where the number of current-carrying conductors, including neutral conductors classified as current-carrying conductors under the provisions of Section 310.15(B)(4), contained in a sheet metal auxiliary gutter exceeds 30 and the sum of the cross-sectional areas of all contained conductors at any cross-section of a sheet metal auxiliary gutter does not exceed 20 percent of the interior cross-sectional area of the sheet metal auxiliary gutter, the application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required where all of the following conditions are met:</u>
<u>(1) Labeled metallic devices are inserted in the sheet metal auxiliary gutter that provide elevation, separation, and spacing among the current-carrying conductors by dividing the sheet metal auxiliary gutter into channels. Not more than nine current-carrying conductors shall be placed within a channel.</u>
<u>(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the current-carrying conductors throughout the length of the sheet metal auxiliary gutter in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.</u>
<u>(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the sheet metal auxiliary gutter and conductors within one channel may come into contact with other conductors in the same channel.</u>
<u>(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the sheet metal auxiliary gutter in order to conduct heat to the walls and floor of the sheet metal auxiliary gutter and shall be connected to the sheet metal auxiliary gutter in a manner consistent with the limitations of their labeling.</u>
<u>(5) Where contact between the current-carrying conductors and the edges of the metallic devices used for separation and spacing poses the risk of abrasion of the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.</u>
Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family’s electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code (“NEC”) that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm’s Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.
From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.
Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, “UF,” noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, “WW,” denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors’ insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on proposal 8-152.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-158 Log #2178 NEC-P08 **Final Action: Accept**

(366.23(B))

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

(B) Nonmetallic Auxiliary Gutters. The adjustment ~~derating~~ factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors in the nonmetallic auxiliary gutter.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-159 Log #2994 NEC-P08 **Final Action: Accept**

(366.23(B))

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

(B) Nonmetallic Auxiliary Gutters. The adjustment ~~derating~~ factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors in the nonmetallic auxiliary gutter.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-160 Log #4482 NEC-P08 **Final Action: Accept**

(366.23(B))

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Revise text to read as follows:

366.23 Ampacity of Conductors.

(A) Sheet Metal Auxiliary Gutters. *[366.23(A) unchanged by this Proposal]*

(B) Nonmetallic Auxiliary Gutters. The ~~derating~~ adjustment factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors in the nonmetallic auxiliary gutter.

Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".

366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.

A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-161 Log #872 NEC-P08 **Final Action: Accept**

(366.30(A) and (B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Insert:

"and secured" after "supported".

Substantiation: Edit. Supporting does not necessarily include securing; gutters laid on a floor are supported.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-162 Log #357 NEC-P08 **Final Action: Reject**

(366.58(A))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise text to read as follows:

"...dimensions corresponding to one wire attached to a ~~per~~ terminal in Table 312.6(A) shall apply."

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Reject

Panel Statement: The NEC style manual does not restrict the use of the word "per" in this code section. The proposed change does not add clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 368 — BUSWAYS

8-163 Log #1501 NEC-P08 **Final Action: Reject**

(368.2.Busways, Exception No. 1 (New))

Submitter: Tori C. Poppenheimer, Inventive Product Design

Recommendation: Add an exception as indicated:

368.2 Definition.

Busways. A grounded metal enclosure containing factory mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes.

Exception No. 1: Polymeric enclosures shall be permitted where internal bonding means are provided.

Substantiation: This brings Busway enclosure materials in line with Article 312 Cabinets, Cutout Boxes, and Meter Socket Enclosures, Section 312.10(C), Article 314 Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhold Enclosures, section 314.3, and Article 366 Auxiliary Gutters, Section 366.2. This exception further correlates Busway enclosure materials with Approved Conduit Systems constructed of nonmetallic materials covered in Articles 352, 353, 354, and 355.

Polymeric enclosures are more resistant to corrosion in wet locations and corrosive environments providing a significant improvement in safety over time. Polymeric enclosures also provide an additional discrete layer of electrical insulation preventing contact with live parts, and allow for greater installation and design flexibility.

Panel Meeting Action: Reject

Panel Statement: The panel notes that busway is defined by the product standard as a "grounded metal enclosure containing factory mounted conductors". The product standard does not include text similar to the proposed exception for polymeric enclosures. The proposer may wish to address this issue with the standards writing organizations. Definitions cannot contain requirements. Submitter did not provide technical substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

BERMAN, R.: As indicated in the Panel Statement, definitions should not contain requirements and the submitter did not provide any technical substantiation to demonstrate that polymeric busways can be installed and used safely. Only generic statements regarding improvement in safety and design flexibility were offered. CMP-8 and the submitter should consider two additional issues: (1) The definition in Section 368.2 presently contains requirements - one being that busways are constructed with grounded metal enclosures. Rather than expanding this requirement, one consideration may be to remove this existing, and incorrectly located, requirement. (2) The panel suggested that the submitter address this issue with the standards writing organization. However, it is noted that Article 368 does not presently require product listing. Furthermore, any proposed revision of the product standard definition to include polymeric busways presents a compliance issue that could permit product listing of a construction that does not comply with the definition for busways as indicated in Section 368.2. If provided with sufficient technical substantiation to accept polymeric busways, CMP-8 revision to this code language is the first step to creating favorable conditions for the Standards Technical Panel to consider revisions to the standard.

8-164 Log #4620 NEC-P08 **Final Action: Accept in Principle**
(368.10(A))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Retitle this part “(A) Behind Access Panels.”
Substantiation: These applications are not concealed, as the term is defined in Article 100. It is long past the time when this error should have been corrected. This is somewhat different wording that previously proposed.
Panel Meeting Action: Accept in Principle
Revise Title of 368.10(B) to read as follows:
(B) Behind Access Panels.
Remainder of text unchanged.
Panel Statement: Panel recognizes that the wrong section was referenced in the proposal. The panel agrees to change the title of 368.10(B) to “Behind Access Panels.”
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-165 Log #1753 NEC-P08 **Final Action: Reject**
(368.12(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Busways shall not be installed where <u>likely to be</u> subject to corrosive <u>agents</u> ~~vapors~~ or ~~severe~~ physical damage <u>which impairs its functional capabilities.</u>
Substantiation: “Severe” is not defined; damage should be that which impairs any of its functional capabilities. A small dent or scratch is damage, but not likely to impair functions. “Likely” is defined as such a nature or circumstance as to make something probable and is a term used in many sections. Corrosive liquids and solids should be included.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-166 Log #1803 NEC-P08 **Final Action: Reject**
(368.12(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Busways shall not be installed where <u>likely to be</u> subject to ~~severe~~ physical damage or corrosive <u>agents</u>. ~~vapors.~~
Substantiation: “Severe” is subjective and not defined; corrosive solids and liquids should be included. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-167 Log #3172 NEC-P08 **Final Action: Reject**
(368.12(C))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 368.12, delete ~~(C) Hazardous Locations, Busways shall not be installed in any hazardous (classified) location, unless specifically approved for such use,~~
FPN: See 501.10(B)
Renumber 368.12(D) and (E) as 368.12(C) and (D), respectively.
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-168 Log #3237 NEC-P08 **Final Action: Reject**
(368.13 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add the follow text:
Listing. Busways and associated components shall be listed.
Substantiation: Busways are critical components of a wiring system and should be listed, as are many other wiring systems.
Panel Meeting Action: Reject
Panel Statement: Per the 2000 and 2008 ROCs, CMP-8 continues to reaffirm its position that it is not the intent of the panel to require listing of all busways. The submitter has not provided evidence that a safety issue exists that would warrant this additional code requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
BERMAN, R.: The Authority Having Jurisdiction does not have the means available to determine the safety of the design, manufacture, installation, and operation of a busway in accordance with NEC Section 110.3(A). Busways and their associated fittings, as with any wiring method, should be evaluated and listed by a nationally recognized third party certification organization. Field fabrication and modification of factory-produced components can also be hazardous and should be properly examined and evaluated by a nationally recognized testing organization.
DABE, J.: The panel should reconsider the listing of Busways. At present we require listing of empty metal conduit, (RMC, IMC, and EMT). Busways are a grounded metal enclosure containing factory mounted, bare or insulated conductors, why would this not be required to be listed.

8-169 Log #4720 NEC-P08 **Final Action: Reject**
(368.44)

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Add new text as follows:
368.44 Expansion Fittings. Flexible or expansion connections shall be provided in long straight runs of bus to allow for temperature expansion or contraction or where the busways run across building vibration joints
Substantiation: It mirrors the over 600 volt requirement of 368.244. It is needed for under 600 volt as well, as the manufacturers require them.
Panel Meeting Action: Reject
Panel Statement: The panel notes that 110.3(B) requires equipment to be installed in accordance with the manufacturers instructions. Such instructions specify if and when expansion joints are required based on the particular construction and type of busway. CMP-8 recognizes that busways rated for over 600 volts are designed and built to a different product standard and may have different installation requirements than low voltage busways.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-170 Log #1871 NEC-P08 **Final Action: Reject**
(368.320(3) and (5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (3): Rated frequency <u>if for alternating current</u>.
Revise (5): Rated ~~60~~ HZ withstand voltage (dry).
Substantiation: Edit. Some busways are used on dc systems and other frequencies.
Panel Meeting Action: Reject
Panel Statement: The panel concludes that adding the term “if for alternating current” does not improve the clarity or usability of the Code. The rated withstand voltage in 368.320(5) is a value determined through testing and does not indicate the operating frequency of the busway.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 370 — CABLEBUS

8-171 Log #3173 NEC-P08 **Final Action: Reject**
(370.3)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 370.3, first paragraph, delete ~~or hazardous (classified) locations~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-172 Log #1617 NEC-P08 **Final Action: Accept**
(370.4(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Table 310.17” to “Table 310.15(B)(2)”.
Change “Table 310.19” to “Table 310.15(B)(4)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-173 Log #1633 NEC-P08 **Final Action: Accept**
(370.4(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Table 310.69 and Table 310.70” to “Table 310.60(C)(3) and Table 310.60(C)(4)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.67 through 310.86 as Tables 310.60(C)(1) through 310.60(C)(20) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-174 Log #1870 NEC-P08 **Final Action: Reject**
(370.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “approved” to “identified”.
Substantiation: Edit. “Approved” is not necessarily the same as “identified”.
Panel Meeting Action: Reject
Panel Statement: Approved is subject to the AHJ. Identification marks may be a method of approval. Listing may be another. Simple identification creates a manufacturers self certification that neither requires AHJ approval or listing.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 372 — CELLULAR CONCRETE FLOOR RACEWAYS

8-175 Log #488 NEC-P08 **Final Action: Reject**
(372, 374, 380, 390, and 392)

Submitter: Brenson (Ben) Kingren, Louisville Electrical Joint Apprenticeship Training Committee
Recommendation: Revise text as follows:
Change the article’s sections for Uses Permitted and Uses Not Permitted to reflect.10 for Uses Permitted and.12 for Uses Not Permitted as in other subsequent articles for uniformity.
Substantiation: The above mentioned Articles do not conform to a standard section as elsewhere in the code for Uses Permitted and Uses Not Permitted to conform to what other article’s sections are numbered for the same titles.
Panel Meeting Action: Reject
Panel Statement: The panel would consider proposals that showed the proposed revisions and section renumbering. This is in accordance with the guidelines for Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-176 Log #2669 NEC-P08 **Final Action: Reject**
(372.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows: <u>A</u> transverse metal raceway ~~for electrical conductors~~ providing access to predetermined cells of a precast cellular concrete floor, thereby permitting the installation of electrical conductors <u>and coaxial cables</u> from a distribution center to the floor cells.
Substantiation: Edit. Raceway use is already defined in the definition of raceway. Coaxial cables should be included.
Panel Meeting Action: Reject
Panel Statement: Installation of coaxial cables is covered in Chapter 8.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-177 Log #3174 NEC-P08 **Final Action: Reject**
(372.4(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 372.4, delete ~~(2) In any hazardous (classified) location, except as permitted by other articles in this Code.~~
Renumber 372.4(3) as 372.4(2).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-178 Log #4746 NEC-P08 **Final Action: Accept in Principle**
(372.12)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel actions on this proposal to comply with 3.1.3 of the NEC Style Manual regarding mandatory language in Fine Print Notes.
This action will be considered by the panel as a public comment.
Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
372.12 Splices and Taps.
Splices and taps shall be made only in header access units or junction boxes.
<u>FPN:</u> For the purposes of this section, so-called loop wiring (continuous unbroken conductor connecting the individual outlets) shall not be considered to be a splice or tap.
Substantiation: Change this statement to a fine pint note. The language provides clarity but is not enforceable as per 3.5.1 for explanatory information from the NFPA style manual and 3.1.3 of the NEC style manual.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
372.12 Splices and Taps.
Splices and taps shall be made only in header access units or junction boxes.
FPN: For the purposes of this section, so-called loop wiring (continuous unbroken conductor connecting the individual outlets) is not considered to be a splice or tap.
Panel Statement: Panel removed “shall not be” and replaced with “is not” to ensure that a requirement was not placed in a FPN.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
CAMPBELL, D.: I agree with the Panel, however the TCC should review 374.6 and 390.6 to correlate the same FPN change.

8-179 Log #2609 NEC-P08 **Final Action: Reject**
(372.17 Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
Exception: Where more than one outlet on the same circuit is individually supplied by one set of conductors it shall be permitted to count only the current-carrying conductors of one such set of conductors for the purpose of ampacity adjustment.
Substantiation: The present derating factors discourage installation of individual sets of conductors on the same circuit which reduces voltage drop, increases efficiency and does not increase heating effect. The proposal would encourage compliance with 372.13.
Panel Meeting Action: Reject
Panel Statement: The current text is clear. It is the intent of the panel to have the adjustment factors of 310.15(B)(2) apply to cellular concrete floor raceways.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: Panel action on this proposal should be to "Accept in Principle".
To clarify submitter's intent, the proposed language should have been revised to read – "Add Exception: Where multiple outlets on the same circuit are supplied by separate conductor sets it shall be permitted to count only one such set of current-carrying conductors for the purpose of ampacity adjustment."
To permit such a conductor count for purposes of determining circuit ampacity (adjustment factor) in a raceway is no different than where only current carrying conductors are permitted to be counted in other code sections. See, for example, 392.11(A)(1) & 392.11(B), both of which permit omission of non-load-carrying cable conductors for conductor count in tray and 310.15(B)(4) which permits omission of the non-load-carrying neutral conductor in the conductor count. Further, no additional conductor heating in the same raceway is introduced if the current associated with the circuit is instead assumed to be distributed across the separate conductor sets. In fact, the heating is less in this case since the heating varies as the current magnitude squared and the sum of the current in all sets is limited to the circuit rating. For example, if the total current on a 30 Ampere circuit was assumed to be equally divided between two conductor sets, the total heating would be one-fourth of that seen if the entire 30 Amperes was assumed to be carried by a single set (the set to be counted by this proposal). The adjustment factors of 310.15(B)(2) would still apply according to Panel's stated intent. Only the method of counting conductors would change to become consistent with that permitted elsewhere in the code to accurately recognize the actual current loading of conductors.

ARTICLE 374 — CELLULAR METAL FLOOR RACEWAYS

8-180 Log #3175 NEC-P08 **Final Action: Reject**
(374.3(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 374.3, delete ~~(2) In any hazardous (classified) location, except as permitted by other articles in this Code~~
Renumber 374.3(3) as 374.3(2).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-181 Log #8 NEC-P08 **Final Action: Reject**
(374.17)

NOTE: This proposal appeared as Comment 8-68 on Proposal 8-148 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-148 was:
Add a new Exception as follows:
Exception: Where more than one outlet is individually supplied by a set of conductors on the same circuit, it shall be permitted to count only one set of current-carrying conductors of that circuit for derating purposes.
Submitter: John J. Michlovic, H.H. Robertson Floor Systems
Recommendation: Revise text to read as follows:
Ampacity of conductors. The ampacity adjustment factors in ~~310.15(B)(2)~~ Table 374.17 shall apply to conductors installed in cellular metal floor raceways.
Substantiation: ROP 8-148 (Log #1057) seeks an exception to 374.17 so as to eliminate the perceived need to use "loop wiring" and "violate 374.7" in relation to multiple outlets on the same circuit. In lieu of adopting an isolated exception to address the proponent's particular concern, this Comment suggests that NFPA amend 374.17 more comprehensively to establish an ampacity reduction table specifically applicable to cellular metal floor raceways.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The adjustment factors in Article 310 apply to all raceways. Section 374.17 was added as a clarification to indicate that Table 310.15(B)(2)(a) applied to cellular metal floor raceways. Test data provided failed to support the values in the proposed table of adjustment factors.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-182 Log #479 NEC-P08 **Final Action: Reject**
(374.17)

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:
Section 374.17 Ampacity of Conductors. The ampacity adjustment factors in 310.15(B)(2) shall apply to conductors installed in cellular metal floor raceways.
Proposed Exception: The application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required for cellular metal floor raceways where all of the following conditions are met:
(1) Labeled metallic devices are inserted in the cellular metal floor raceways that provide elevation, separation, and spacing among the current-carrying conductors by dividing the cellular metal floor raceway into channels. Not more than nine current-carrying conductors shall be placed within a channel.
(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the current-carrying conductors throughout the length of the cellular metal floor raceway in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.
(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the cellular metal floor raceway and conductors within one channel may come into contact with other conductors in the same channel.
(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the cellular metal floor raceway in order to conduct heat to the walls and floor of the cellular metal raceway and shall be connected to the cellular metal floor raceway in a manner consistent with the limitations of their labeling.
(5) Where contact between the current-carrying conductors and the edges of the metallic devices used for elevation, separation, and spacing poses the risk of abrasion of the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.
Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.

From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.

Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, "UF," noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, "WW," denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors' insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on proposal 8-152.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-183 Log #2874 NEC-P08 **Final Action: Reject**

(374.17)

Submitter: John J. Michlovic, H.H. Robertson Floor Systems

Recommendation: Revise text to read as follows:

374.17 Ampacity of Conductors. The Ampacity adjustment factors in 310.15(B)(2)(a) shall NOT apply to conductors installed in Cellular Metal Floor Raceways.

Substantiation: The inclusion of 374.17 in Article 374 in the 2005 NEC signaled a steep decline in the use of this raceway system.

In placing this conduit Ampacity adjustment table in Article 374, Panel-8 members and later, the NFPA Standards Council relied on only one piece of evidence for justification. Under the General Requirements for Article 300 (Wiring Methods) the first sentence states: "This article covers wiring methods for all wiring installations unless modified by other articles."

This one sentence allowed Panel-8 to justify the inclusion of the conduit Ampacity Adjustment Table into Article 374 since cellular Metal Floor Raceway is a "wiring method". Thus, the code writers' desire for a "one size fits all" solution to conductor heating became a convenient reason to misapply the conduit table to all raceways, regardless of size. Since Table 310.15(B)(2)(a) considers only the number of conductors but not the area available within the raceway, it favors small raceways and penalizes larger ones when such raceways compete in the marketplace.

Following is a list of reasons which justify the removal of the conduit Ampacity adjustment table from Article 374 by the addition of the word "not" in the text.

A. There is no evidence of a safety problem nor any record of overheated conductors, fires, or electrocution in any cellular metal floor raceway system over the 77 year span of use of this system in over 100,000 buildings.

This record of safe performance is unmatched by any other building component in the industry.

A code change as devastating as Table 310.15(B)(2)(a) should be based upon a demonstrated safety problem. None has ever existed.

B. In 1956, a comprehensive test program was sponsored by AIEE and performed by four renowned industry experts at Underwriters Laboratories. The resulting report was entitled:

"The heating and mechanical effects of installing insulated conductors in steel raceways".

This report for many years served as the guideline for Ampacity adjustments for small and large raceways. Cellular metal floor raceways were tested along with five (5) other raceway systems.

Page 12 of that report (Attachment #1) shows the conduit conductor fill and corresponding Ampacity reductions which are part of Table 310.15(B)(2)(a) and apply specifically to round steel conduit and not to Cellular Metal Floor Raceway components.

Figure 14 of that report (Attachment #2) shows that no Ampacity reduction was required for cellular metal floor fed by a small header duct with 40 percent conductor fill for at least the first 28 conductors, using 75°C insulation. Today's trench headers can be 10 times as large as header duct and 90°C insulation is commonly used. These two factors would have significantly increased the number of conductors carrying current before Ampacity reductions would apply. This offers further proof that Table 310.15(B)(2)(a) does not apply to Article 374 raceways.

C. As required by the NEC code writers, HH Robertson tested each level of Ampacity reduction in Table 310.15(B)(2)(a) in a Cellular Metal Floor Raceway encased in concrete. These tests (Attachment #3) proved that the "Table" required Ampacity reductions were exceeded at every level of wire fill. This data was later rejected since the tests, run at a Nationally Recognized Testing Laboratory (NRTL), were performed for 3 hrs. (defined as Continuous Load by NEC definitions) while the Code writers "preferred" 24 hour testing.

D. Raceways such as Metal Wireways (Article 376) and Surface Nonmetallic Raceways (Article 388) are permitted 30 current carrying conductors with no Ampacity adjustment yet these raceways can be only 10 percent of the size of a Trench Header commonly used in a Cellular Metal Floor Raceway.

This explains why these raceways fail conductor heating tests run at NRTLs (Attachment #4). The 30 conductor exemption allowed for 6 raceway systems that are smaller in area than a trench header were apparently exempted from Table 310.15(B)(2)(a) without a heating test requirement. NFPA could not supply test data for any of these raceways.

H. H. Robertson has tried in good faith to comply with the code writer's need for test proof of our TIAs but none of the many passing tests have been acceptable. There is undoubtedly an Ampacity reduction table applicable to Article 374 but none submitted to the code writers was acceptable. Therefore, H.H. Robertson is resigned to this Proposal for removal of the Conduit Ampacity table and submits the aforementioned proof that it does not apply to Article 374, and never did. Safety problems with overheating do exist...but with other smaller raceways as shown in Attachment #4.

Attachment - 1 1956 Test Report excerpt (Pg-12)

Attachment - 2 1956 Test Report excerpt (Fig-14)

Attachment - 3 Intertek/ETL Heating Tests - #1 thru #7

Attachment - 4 Intertek/ETL Tests 206, 109, 107 ONSPEX Tests 30006564-2, 30006564

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The submitter has proposed that the ampacity adjustment factors in Table 310.15(B)(2)(a) shall not apply to cellular metal floor raceways. CMP-8 has not been provided with test data using a variety of worst-case scenarios sufficient to support this proposal. CMP-8 would expect to see test data without diversity for representative wire sizes permitted in section 374.4, and conductor types within cellular metal floor raceway installations constructed in accordance with Section 374.5, which allows a maximum number of conductors up to 40 percent of the interior cross-sectional area of the cell or header.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-184 Log #2875 NEC-P08 **Final Action: Reject**
(374.17)

Submitter: John J. Michlovic, H.H. Robertson Floor Systems
Recommendation: Revise text to read as follows:
374.17 Ampacity of Conductors. The Ampacity adjustment factors in 310.15(B)(2)(a) shall apply to conductors installed in cellular metal floor raceways only where the number of conductors in cells or header compartments exceeds 30. The maximum Ampacity reduction shall be 40 percent when conductors fills are 15 percent, or less, of the cross sectional area.
Substantiation: The Ampacity adjustment factors in Table 310.15(B)(2)(a) were derived for conduit and other circular raceways that encapsulate current generated heat. The history of this table is well documented throughout the NEC ROP/ROC comment history and is particularly clear in the 1956 AIEE conductor heating test report. A copy of page 12 (Attachment #1) of that report clearly illustrates the current reduction for 3 to 9 “wire” in conduit in free air.
The application of this table to square and flat bottomed raceways was a quantum leap not justified by test but, rather by a desire for a “one size fits all” solution to current adjustment. This was accomplished by one sentence at the beginning of Article 300 - Wiring Methods which states:
“This article covers wiring methods for all wiring installation unless modified by other articles.” This statement alone allowed Panel-8 to place the conduit Ampacity adjustment table in Article 374.
For 77 years of use in over 100,000 buildings, there have been no reports of conductor overheating, fires, or electrocutions in any cellular metal floor raceway system with no Ampacity adjustment table in place.
In order to reverse the severe impact of the Conduit Table, H.H. Robertson has been required to perform numerous conductor heating tests, all of which justified less restrictive Ampacity reductions than required by Table 310.10(B)(2)(a).
Several other smaller raceway systems are permitted 30 full Ampacity conductors before Ampacity reduction are required. Article 366, Article 376, Article 384, and Article 386 are examples of these exceptions.
The above stated proposal requests that 30 conductors be permitted in cells or trench header compartments since all cells and compartments are larger than the 4 sq in. minimum size required in the four listed Articles. Also, a conductor heating test run at a Nationally Recognized Test Laboratory (NRTL) is supplied for the smallest cell (5.5 in.^{2}) typically used in Article 374 assemblies. This test cell (see Attachment #2) carried 30 conductors at full current for 3 hours (see definition of Continuos Load in Chapter 1 of NEC) without exceeding the allowable temperature for THHN insulation (90°C).
The last sentence of the Proposal requests a 5 percent increase in maximum Ampacity reduction (40 percent vs. 35 percent) and is justified by a decrease in conductor fill from the 40 percent level stated in 374.5 to 15 percent. A test report (Attachment #3) is provided which verifies that a 14 percent wire fill will pass the 40 percent maximum Ampacity reduction criteria.
In summary, the request for 30 non de-rated conductors in Article 374 is conservative compared to other currently listed, but smaller, raceways. The 40 percent maximum Ampacity reduction is also conservative when coupled with the 15 percent maximum conductor fill requirement. NFPA’s desire to include an Ampacity Reduction Table in Article 374 is, therefore, accomplished by the Proposal.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The submitter has proposed that the ampacity adjustment factors in Table 310.15(B)(2)(a) only apply in certain conditions to cellular metal floor raceways. CMP-8 concludes that the test data provided does not correlate with the proposal. As an example, the submitter’s substantiation indicates that a test report (attachment #3) verifies that a 14 percent wire fill will pass a 40 percent maximum ampacity reduction criteria. The test data in attachment #3 shows a wire fill of approximately 5 percent (not 15 percent).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-185 Log #3472 NEC-P08 **Final Action: Reject**
(374.17)

Submitter: David E. Watters, H. F. Lenz Company
Recommendation: ~~**Ampacity of Conductors: The ampacity adjustment factors in 310.15(B)(2) shall apply to conductors installed in cellular metal floor raceways.**~~
Ampacity of Conductors: The ampacity adjustment factors listed in Table 374.17(A) shall apply to cables installed in cellular metal floor raceway headers under the following conditions:
(A) The header has a cross sectional area of at least 30 sq in. with removable metal covers.
(B) All conductors must have a 90°C insulation rating and be evenly distributed and unbundled.
(C) The maximum conductor stacking shall not exceed three layers, and the sum of the cross-sectional area of all contained conductors shall not exceed 15 percent of the interior cross-sectional area of the header.
(D) All branch circuits shall be #10 conductors protected by 30A breakers, or #12 conductors protected by 20A breakers.
(E) All current carrying conductors must originate from the same three phase panel board with 42 or less branch circuits, and with main bussing protected for 225 A maximum.
Cellular Floor Applications that do not meet this criteria, or exceed 85 active conductors, shall comply with Table 310.15(B)(2).

Table 374.17(A) Adjustment Factors for More Than Three Current-Carrying Conductors in a Header

Number of Current Carrying Conductors	Percent of Values in Tables 310.16 through 310.19 as Adjusted for Ambient Temperature if Necessary
4 - 6	80
7 - 24	70
25 - 42	60
43 - 85	50

Substantiation: At least two manufacturers of cellular metal floor systems have indicated that the present requirement of 374.17 has had an adverse affect on their business. The 35% reduction multiplier required by Table 310.15(B)(2) for 41 or more conductors has forced the end user to oversize active conductors installed in trench headers. With the present cost of copper, the requirement to oversize conductors in cellular metal floor raceway systems has made the application of this product cost prohibitive ever since paragraph 374.17 appeared in the 2005 National Electrical Code (NEC). Prior to the 2005 Code, Cellular Metal Floor Trench Headers were installed since the 1930’s with no conductor derating, and no known, verifiable, cable heating problems were reported to the NFPA, during the next 76 years.
The proposed Table 374.17(A) appears in Annex B, of the NEC as Table B.310.11 where diversity restrictions are required if that table is to be used. The conditions listed above imply diversity. For example, a single 225A - 3p - panel board can deliver no more than 16A per conductor on average to 84 active conductors. This condition meets the 50% adjustment requirement listed above for #10 and #12 conductors. The proposed 15% fill limitation, and the three layer stacking limitation will provide an additional reduction in heating. The 30 sq in. cross sectional area requirement, which represents a 20 in. × 1-1/2 in. standard panel board header duct, will also reduce heating by its relatively large cross sectional area. For further substantiation, please refer to the following Table which was developed by UL, when they tested cellular floor systems, and published the results in a 1956 AIEE Report:

CODE REDUCTION FACTORS		
Table XIX		**1956 AIEE Report**
Cellular Metal Floor Raceway System (In Concrete) – 40% raceway fill capacity		
No. of Current-Carrying Conductors (Note 1)	**60°C Conductor Current Reduction Factor**	**75°C Conductors Current Reduction Factor**
6 – 20	72.8%	74.9%
21 – 26	63.2%	62.9%
27 – 54	51.7%	65%
55 – 68	43.7%	53.3%
69 – 122	42.6%	48%
123 – 136	39.3%	47.3%
Notes: 1. Two thirds of the conductors were loaded during the test.		

Since this report was published, the AIEE has changed its name to the Institute of Electrical and Electronic Engineers (IEEE). Cable insulation is readily available at 90°C now, compared to 60°C and 75°C which was commonly used in 1956. One concept has not changed in that two thirds of the conductors are usually active and one third are usually inactive grounding conductors. Considering the fact that the 1956 test utilized a 40% fill instead of a 15% raceway fill, and it used lower temperature wiring than the 90°C proposed, the derate factors are surprisingly similar to the derate factors listed in proposed Table 317.17(A). It is also believed that the present Table B.310.11 originated from various tables published in the 1956 AIEE Report.
In 2006, one of the major manufacturers of Cellular Metal Floor Systems, conducted extensive testing to verify the data in Tables B.310.11, Table 310.15(B)(2), AIEE Table XIX, and proposed Table 374.17(A). Testing was performed at the ETL SEMKO Laboratory and at the OnSpex Laboratory. Both laboratories are Nationally Recognized Testing Laboratories (NRTL) facilities. Testing was done under a variety of conditions above and beyond the requirements of these four tables. The results of these tests are too numerous to be attached to this document, however, they were submitted to NEC Panel No 8 during the calendar year 2006-2007 time frame, and they can be made available if requested and approved. The testing generally proved that all four of these tables are quite conservative and usable for Trench headers with a cross sectional area of at least 25 sq in. Table 310.15(B)(2) is the most conservative based on the fact that 41 conductors were tested with a 60% derating multiplier, which showed no sign of overheating, where Table 310.15(B)(2) requires a 35% derating factor. This proves that Table 310.15(B)(2) is too conservative for Trench Header cable installations, and it has had an adverse affect on suppliers of that product by requiring the conductors to

be oversized in order to meet code. For these reasons, we recommend that the above listed code change proposals be approved.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation was provided for permissions or restrictions included within the proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-186 Log #2608 NEC-P08 **Final Action: Reject**
(374.17 Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
Exception: Where more than one outlet on the same circuit is individually supplied by one set of conductors it shall be permitted to count only the current-carrying conductors of one such set of conductors for the purpose of ampacity adjustment.
Substantiation: The present derating factors discourage installation of individual sets of conductors on the same circuit which reduces voltage drop, increases efficiency and does not increase heating effect. The proposal would encourage compliance with 374.7.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 8-179.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: See my explanation of negative vote on Proposal 8-179.

ARTICLE 376 — METAL WIREWAYS

8-186a Log #CP805 NEC-P08 **Final Action: Accept**
(376.10)

Submitter: Code-Making Panel 8,
Recommendation: Revise 376.10 to read as follows:
376.10 Uses Permitted. The use of metal wireways shall be permitted as follows:
(1) For exposed work
(2) In any hazardous (classified) locations as permitted by other Articles of this Code.
(3) Wet locations, wireways shall be listed for the purpose.
(4) In concealed spaces as an extension to pass transversely through walls if the length passing through the wall is unbroken. Access to the conductors shall be maintained on both sides of the wall.
Substantiation: The current text for 376.10 Uses Permitted was revised to address several or incorporate a series of proposals to address the uses permitted for Metal Wireways.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-187 Log #9 NEC-P08 **Final Action: Accept in Principle**
(376.10)

NOTE: This proposal appeared as Comment 8-72 on Proposal 8-157a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-157a was:
Insert a new 376.100 as follows:
376.100 Construction.
(A) Electrical and Mechanical Continuity. Wireways shall be constructed and installed so that adequate electrical and mechanical continuity of the complete system is secured.
(B) Substantial Construction. Wireways shall be of substantial construction and shall provide a complete enclosure for the contained conductors. All surfaces, both interior and exterior, shall be suitably protected from corrosion. Corner joints shall be made tight, and where the assembly is held together by rivets, bolts, or screws, such fasteners shall be spaced not more than 300 mm (12 in.) apart.
(C) Smooth Rounded Edges. Suitable bushings, shields, or fittings having smooth, rounded edges shall be provided where conductors pass between wireways, through partitions, around bends, between wireways and cabinets or junction boxes, and at other locations where necessary to prevent abrasion of the insulation of the conductors.
(D) Covers. Covers shall be securely fastened to the wireway.
Submitter: Nicholas P. Ludlam, FM Approvals
Recommendation: Revise as follows:
376.10 Uses Permitted. The use of metal wireways shall be permitted in the following:
(1) For exposed work.
(2) In concealed spaces as permitted in 376.10(4).
(3) In hazardous (classified) locations as permitted by 501.10(B) for Class I, Division 2 locations; 502.10(B) for Class II, Division 2 locations ~~and~~ 504.20, 505.15(A) and 506.15(A) for intrinsically safe wiring; 505.15(C) for Class I Zone 2 locations; and 506.15(C) for Zone 22. Where installed in wet locations, wireways shall be listed for the purpose.
(4) As extensions to pass transversely through walls if the length passing through the wall is unbroken. Access to the conductors shall be maintained on both sides of the wall.
Substantiation: Articles 505 and 506 include additional hazardous classified locations which are not addressed by this wiring technique.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel Proposal 8-186a.
Hazardous locations was revised to utilize harmonized language used in other raceway articles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-188 Log #2668 NEC-P08 **Final Action: Accept in Principle in Part**
(376.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
The use of metal wireways shall only be permitted as follows: ~~in the following~~
Substantiation: Edit. Present wording is not a requirement; 90.5(B) states "permitted" identifies actions allowed but not required. Present wording does not limit use other than specified except as covered in 376.12. 322.10 and others use the word "only" in prescribing wiring methods.
Panel Meeting Action: Accept in Principle in Part
The panel accepts in principle "as follows:" and rejects "only". Uses permitted is not an all inclusive list and the word "only" would make the uses permitted overly restrictive.
Panel Statement: See Panel Proposal 8-186a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-189 Log #3176 NEC-P08 **Final Action: Reject**
(376.10(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 376.10, delete ~~(3) In hazardous (classified) locations as permitted by 501.10(B) for Class I, Division 2 locations; 502.10(B) for Class II, Division 2 locations; and 504.20 for intrinsically safe wiring.~~
Relocate "Where installed in wet locations, wireways shall be listed for the purpose." after (1) For exposed work.
Renumber 376.10(4) as 376.10(3).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-190 Log #1794 NEC-P08 **Final Action: Reject**
(376.10(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: See my proposal for 376.12 which, if accepted, incorporates this provision.
Panel Meeting Action: Reject
Panel Statement: See panel proposal 8-186a. The requirement for concealed locations was revised to better describe the uses permitted. CMP-8 disagrees with the submitter that this requirement belongs in uses not permitted per the submitter's companion proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-191 Log #1795 NEC-P08 **Final Action: Reject**
(376.12(3) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: (3) Where concealed, except unbroken portions not longer than necessary to pass transversely through walls, floors, or other partitions shall be permitted.
Substantiation: Provisions for not permitted use should include concealed installation. Present 376.10(4) does not specifically prohibit concealed installation, merely permission to pass through a wall.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-190 and panel proposal 8-186a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-192 Log #480 NEC-P08 **Final Action: Reject**
(376.22)

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:
Section 376.22 Number of Conductors. The sum of the cross-sectional areas of all contained conductors at any cross-section of a wireway shall not exceed 20 percent of the interior cross-sectional area of the wireway. The derating factors in Section 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.
<u>Proposed Exception: Where the sum of the cross-sectional areas of all contained conductors at any cross-section of a metal wireway does not exceed 20 percent of the interior cross-sectional area of the wireway and when the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of Section 310.15(B)(4), exceeds 30, the application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required for metal wireways where all of the following conditions are met:</u>
<u>(1) Labeled metallic devices are inserted in the metal wireway that provide elevation, separation, and spacing among the current-carrying conductors by dividing the metal wireway into channels. Not more than nine current-carrying conductors shall be placed within a channel.</u>
<u>(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the current-carrying conductors throughout the length of the metal wireway in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.</u>
<u>(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the metal wireway and conductors within one channel may come into contact with other conductors in the same channel.</u>
<u>(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the metal wireway in order to conduct heat to the walls and floor of the metal wireway and shall be connected to the metal wireway in a manner consistent with the limitations of their labeling.</u>
<u>(5) Where contact between the current-carrying conductors and the edges of the metallic devices used for elevation, separation, and spacing poses the risk of abrasion to the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.</u>
Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.
From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.
Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, "UF," noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, "WW," denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors' insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on proposal 8-152.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-193 Log #2562 NEC-P08 **Final Action: Reject**
(376.22(B))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise text as follows:
Adjustment Factors. The adjustment factors in 310.15(B)(4) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30 <u>at any cross sectional area of the wireway.</u>
Substantiation: This change would add clarity to the text. As written, it is left to the code user to determine how exactly to count the conductors in the wireway for the purpose of derating. While the proposed wording is explicitly spelled out in 376.22(A), it should also be applied to 376.22(B).
Panel Meeting Action: Reject
Panel Statement: After reviewing the 2005 NEC, which was prior to the separation of the section into two paragraphs, the intent was clear, and the current code correctly reflects that.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-194 Log #3073 NEC-P08 **Final Action: Accept**
(376.22(B))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by the panel relative to the actions taken on Proposals 6-59, 8-155, 8-194 and 8-204.
The Technical Correlating Committee directs the Chairs of Code-Making Panels 6 and 8 to form a Task Group to correlate Proposals 6-59, 8-155, 8-194 and 8-204, and submit comments, if deemed appropriate.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(B) Adjustment Factors. The adjustment factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30. ~~Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.~~
Substantiation: This is a companion proposal to move this code language to 310.15(B)(2)(a), where it is more appropriate. Similar proposals are made to sections 366.22(A) and 378.22, please correlate the proposals.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-195 Log #3074 NEC-P08 **Final Action: Reject**
(376.22(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(B) Adjustment Factors. The adjustment factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying under the provisions of 310.15(B)(4), exceeds 30 <u>in any cross-sectional area</u>. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.
Substantiation: This proposal is intended to clarify that the ampacity adjustment provisions apply only to where there are over 30 current carrying conductors in a given cross section of the wireway. A very common installation practice is to convert from a cable wiring method to a raceway wiring method for exposed work. When this occurs, it is not uncommon to have literally hundreds of conductors in a wireway, but only for a few inches. It appears that this is in violation of this section.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 8-193.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-196 Log #3473 NEC-P08 **Final Action: Reject**
(376.22(B))

Submitter: David E. Watters, H. F. Lenz Company
Recommendation: Revise text as follows:
Adjustment Factors: ~~The adjustment factors in 310.15(B)(2)(a) shall be applied only where the number of current carrying conductors, including neutral conductors classified as current carrying under the provisions of 310.15(B)(4), exceeds 30.~~ <u>The ampacity adjustment factors in 310.15(B)(2) shall apply to conductors installed in Metal Wireways.</u>
Substantiation: Testing was performed on 2.75 in. × 1.5 in. Metal Wireway at Nationally Recognized Testing Laboratories. The ETL SEMKO Laboratory and the OnSpex Laboratory were used to test 30 active conductors at rated capacity as permitted by 376.22(B), and as listed above. In both cases, 24 amps was applied to #10 conductors which is the continuous current limit for a 30 A breaker required by code. In both cases, at least one of the conductors, within the raceway, exceeded the 90°C temperature limitation of the insulation. Both tests failed according to the test reports I have provided. For these reasons, additional loading or raceway fill restrictions should be applied. In particular, the wording which allows 30 conductors to operate without de-rating should be removed. For these reasons, we recommend approval of the code changes listed above.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The tests were incorrect because they were done in a surface metal raceway instead of a metal wireway.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-197 Log #4771 NEC-P08 **Final Action: Reject**
(376.22(B))

Submitter: William Benard, Gemini Electric Inc.
Recommendation: Revise text to read as follows:
376.22(B) Adjustment Factors. The adjustment factors in 310.15(B)(2)(a) shall be applied only where the number of current-carrying conductors, including neutral conductors classified as current-carrying of the wire under the provisions of 310.15(B)(4), exceeds 30 <u>at any cross-section of the wireway</u>. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.
Substantiation: The changes made to the 2008 NEC revised the paragraph in section 376.22 into two sub sections. The revision made changes to the section that identified the two prescriptive measures associated with the section language. The addition of two subsections took away the general concern of conductors in any cross section of the wireway. The “cross section” language now only exists in sub-section: “A) Cross-Sectional Areas of Wireways.” Where subsection, “(B) Adjustment Factors,” does not specifically identify “any cross section of the wireway,” by rule the number of conductors to be considered must be the total counted and not necessarily the amount found in any cross section. It is clear that the intent has always been to limit “any cross section” count of conductors to 30 or fewer but the language no longer supports this intent. The words: “at any cross-section of the wireway” must be added into subsection (B) so that the prescriptive measure applies to the intended concept.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 8-193.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-198 Log #358 NEC-P08 **Final Action: Reject**
(376.23(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
“...dimensions corresponding to one wire <u>attached to a</u> ~~per~~ terminal in Table 312.6(A) shall apply.”
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-162.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-199 Log #2536 NEC-P08 **Final Action: Reject**
(376.56)

Submitter: Marcus R. Sampson, Lysistrata Electric
Recommendation: Revise text to read as follows:
376.56 Splices, Taps, and Power Distribution Blocks.
(A) Splices and Taps. Splices and taps shall be permitted within a wireway, provided they are accessible. The conductors, including splices and taps, shall not fill the wireway to more than 75 percent of its area at that point.
(B) Power Distribution Blocks.
(1) Installation. Power distribution blocks installed in metal wireways shall be listed.
(2) Size of Enclosure. In addition to the wiring space requirement in <u>376.56(A)</u>, the power distribution block shall be installed in a wireway with dimensions not smaller than specified in the installation instructions of the power distribution block.
(3) Wire Bending Space. Wire bending space at the terminals of power distribution blocks shall comply with <u>312.6(B)</u>.
(4) Live Parts. ~~Power distribution blocks shall not have uninsulated live parts exposed within a wireway, whether or not the wireway cover is installed.~~ <u>Uninsulated live parts shall not be exposed within a wireway.</u>
Substantiation: While the current language does seem to make the point, the multiple negatives are crude and make the language awkward. While the proposed language does not change the requirement, it is a simpler, cleaner way of expressing it.

The requirement should apply to splices, taps AND distribution blocks.

The statement "whether or not the cover is installed" is unnecessary because of the word "within" - if the cover was on, the uninsulated live parts would no longer be "within" the wireway.

Panel Meeting Action: Reject

Panel Statement: Section 376.56(B)(4) pertains to power distribution blocks only and should not be referred to splices and taps. It is the panel's intent that power distribution blocks be insulated whether the cover is on or off of the wireway. This is a safety issue.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-200 Log #2605 NEC-P08 **Final Action: Reject**
(376.100(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Wireways shall be constructed and installed so that ~~adequate~~ effective electrical and mechanical continuity and mechanical strength of the complete system is ~~secured~~ provided.

Substantiation: Edit. "Adequate" is a term to be avoided per the Style Manual. Mechanical strength is a factor in judging equipment per 110.3.

Panel Meeting Action: Reject

Panel Statement: Proposed changes do not improve clarity or content of existing text.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 378 — NONMETALLIC WIREWAYS

8-201 Log #3177 NEC-P08 **Final Action: Reject**
(378.12(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds

Recommendation: In 378.12, delete ~~(2) In any hazardous (classified) location, except as permitted by other articles in this Code~~

Renumber 378.12(3), (4) and (5) as 378.12(2), (3), and (4).

Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.

Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 8-41.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-202 Log #2179 NEC-P08 **Final Action: Accept**
(378.22)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

378.22 Number of Conductors.

The sum of cross-sectional areas of all contained conductors at any cross section of the nonmetallic wireway shall not exceed 20 percent of the interior cross-sectional area of the nonmetallic wireway. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

The ~~derating~~ adjustment factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors up to and including the 20 percent fill specified above.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-203 Log #2995 NEC-P08 **Final Action: Accept**
(378.22)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

378.22 Number of Conductors.

The sum of cross-sectional areas of all contained conductors at any cross section of the nonmetallic wireway shall not exceed 20 percent of the interior cross-sectional area of the nonmetallic wireway. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

The ~~derating~~ adjustment factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors up to and including the 20 percent fill specified above.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-204 Log #3075 NEC-P08 **Final Action: Accept**
(378.22)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by the panel relative to the actions taken on Proposals 6-59, 8-155, 8-194 and 8-204.

The Technical Correlating Committee directs the Chairs of Code-Making Panels 6 and 8 to form a Task Group to correlate Proposals 6-59, 8-155, 8-194 and 8-204, and submit comments, if deemed appropriate.

This action will be considered by the panel as a public comment.

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

378.22 Number of Conductors.

The sum of cross-sectional areas of all contained conductors at any cross section of the nonmetallic wireway shall not exceed 20 percent of the interior cross-sectional area of the nonmetallic wireway. ~~Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.~~
The derating factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors up to and including the 20 percent fill specified above.

Substantiation: This is a companion proposal to move this code language to 310.15(B)(2)(a), where it is more appropriate. Similar proposals are made to sections 366.22(A) and 376.22(B), please correlate the proposals.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-205 Log #4483 NEC-P08 **Final Action: Accept**
(378.22)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Revise text to read as follows:

378.22 Number of Conductors.

The sum of cross-sectional areas of all contained conductors at any cross section of the nonmetallic wireway shall not exceed 20 percent of the interior cross-sectional area of the nonmetallic wireway. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

The ~~derating~~ adjustment factors specified in 310.15(B)(2)(a) shall be applicable to the current-carrying conductors up to and including the 20 percent fill specified above.

Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".

366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.

A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-206 Log #359 NEC-P08 **Final Action: Reject**
(378.23(A))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise text to read as follows:

"...dimensions corresponding to one wire attached to a ~~per~~ terminal in Table 312.6(A) shall apply."

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 8-162.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-207 Log #2604 NEC-P08 **Final Action: Reject**
(378.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Where an equipment grounding conductor is ~~required~~ provided ~~a separate equipment grounding conductor~~ it shall be installed in the nonmetallic raceway.
Substantiation: Edit. The provision should apply where an equipment grounding conductor is installed by choice and not "required".
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 380 — MULTIOUTLET ASSEMBLY

8-208 Log #2996 NEC-P08 **Final Action: Accept in Principle**
(380)

TCC Action: It was the action of the Technical Correlating Committee that the definition of "multioutlet assembly" remains in Article 100 according to 2.2.2.1 of the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Renumber Article 380 as follows, and relocate the Article 100 definition to a new 380.2 section.
ARTICLE 380 Multioutlet Assembly
380.1 Scope.
This article covers the use and installation requirements for multioutlet assemblies.
380.2 Definitions.
Multioutlet Assembly. A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.
380.10~~2~~ Uses Permitted.
~~(A) Permitted.~~ The use of a multioutlet assembly shall be permitted in dry locations.
~~380.12 Uses Not Permitted.~~
~~(B) Not Permitted.~~ A multioutlet assembly shall not be installed as follows:
(1) Where concealed, except that it shall be permissible to surround the back and sides of a metal multioutlet assembly by the building finish or recess a nonmetallic multioutlet assembly in a baseboard
(2) Where subject to severe physical damage
(3) Where the voltage is 300 volts or more between conductors unless the assembly is of metal having a thickness of not less than 1.02 mm (0.040 in.)
(4) Where subject to corrosive vapors
(5) In hoistways
(6) In any hazardous (classified) location, except as permitted by other articles in this Code
~~380.3~~380.*xxx* Metal Multioutlet Assembly Through Dry Partitions.
It shall be permissible to extend a metal multioutlet assembly through (not run within) dry partitions if arrangements are made for removing the cap or cover on all exposed portions and no outlet is located within the partitions.
Substantiation: This Code article is not consistent with the rest of the chapter three wiring method articles. This proposal is intended to assist in the parallel numbering system that has been strived for by panels 7 and 8.
Panel Meeting Action: Accept in Principle
Renumber Article 380 as follows, and relocate the Article 100 definition to a new 380.2 section.
ARTICLE 380 Multioutlet Assembly
I. General
380.1 Scope.
This article covers the use and installation requirements for multioutlet assemblies.
380.2 Definitions.
Multioutlet Assembly. A type of surface, flush, or freestanding raceway designed to hold conductors and receptacles, assembled in the field or at the factory.
II. Installation
380.10~~2~~ Uses Permitted.
~~(A) Permitted.~~ The use of a multioutlet assembly shall be permitted in dry locations.
380.12 Uses Not Permitted.
~~(B) Not Permitted.~~ A multioutlet assembly shall not be installed as follows:
(1) Where concealed, except that it shall be permissible to surround the back and sides of a metal multioutlet assembly by the building finish or recess a nonmetallic multioutlet assembly in a baseboard
(2) Where subject to severe physical damage
(3) Where the voltage is 300 volts or more between conductors unless the assembly is of metal having a thickness of not less than 1.02 mm (0.040 in.)
(4) Where subject to corrosive vapors
(5) In hoistways
(6) In any hazardous (classified) location, except as permitted by other articles in this code
~~380.3~~380.*76* Metal Multioutlet Assembly Through Dry Partitions.
It shall be permissible to extend a metal multioutlet assembly through (not run within) dry partitions if arrangements are made for removing the cap or cover on all exposed portions and no outlet is located within the partitions.
Panel Statement: The panel recognizes that the submitter struck out proposed language 380.12 Uses Not Permitted when in fact it should have been underlined. The panel assigned 380.76 for the 380.xxx. The panel also assigned part numbers in accordance with the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-209 Log #3178 NEC-P08 **Final Action: Reject**
(380(B)(6))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 380(B), delete ~~(6) In any hazardous (classified) location, except as permitted by other articles in this Code.~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41. The panel recognizes that the correct reference is 380.2(B)(6).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-210 Log #2607 NEC-P08 **Final Action: Reject**
(380.2(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Where likely to be subject to ~~severe~~ physical damage.
Substantiation: Edit. "Severe" is subjective and not defined. "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-211 Log #1809 NEC-P08 **Final Action: Reject**
(380.2(B)(2)and (B)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (2) Where likely to be subject to severe physical damage.
Revise: (4) Where likely to be subject to corrosive agents. ~~Vapors.~~
Substantiation: "Severe" is subjective and not defined; many sections re: damage do not use the word severe. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections. Substances other than vapors can be corrosive.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-212 Log #2866 NEC-P08 **Final Action: Accept in Principle**
(380.23)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Add new text to read as follows:
380.23 Insulated Conductors.
Insulated conductors installed in multi-outlet assemblies shall comply with 380.23(A) and (B).
(A) Deflected Insulated Conductors. Where insulated conductors are deflected within a multi-outlet assembly, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the multi-outlet assembly, or where the direction of the multi-outlet assembly is deflected greater than 30 degrees, dimensions corresponding to one wire per terminal in Table 312.6(A) shall apply.
(B) Multi-outlet Assemblies Used as Pull Boxes. Where insulated conductors 4 AWG or larger are pulled through a multi-outlet assembly, the distance between raceway and cable entries enclosing the same conductor shall not be less than that required by 314.28(A)(1) for straight pulls and 314.28(A)(2) for angle pulls.

When transposing cable size into raceway size, the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.
Substantiation: With the increased use and larger sizes of multi-outlet assemblies there are no safeguards for over fill with a limitation of the number of conductors that can be installed in multi-outlet assemblies. Due to size of multi-outlet assemblies it is possible to create a temperature factor that could be greater than the conductor rating. There are no current provisions for derating as allowed in similar raceway system types (wireways). Some manufacturers provide surface raceways 2 ½ inches to 10 inches wide and 1 inch to 5 inches deep. The only limitation appears to be that raceway is identified for 600 volts or less. These raceways have dividers so that multiple line voltage and low voltage cables can be installed within the multi-outlet assembly.
Panel Meeting Action: Accept in Principle
Add new text to read as follows:
380.23 Insulated Conductors.
For field assembled multioutlet assemblies, insulated conductors shall comply with 380.23(A) and (B).
(A) Deflected Insulated Conductors. Where insulated conductors are deflected within a multioutlet assembly, either at the ends or where conduits, fittings, or other raceways or cables enter or leave the multioutlet assembly, or where the direction of the multioutlet assembly is deflected greater than 30 degrees, dimensions corresponding to one wire per terminal in Table 312.6(A) shall apply.
(B) Multioutlet Assemblies Used as Pull Boxes. Where insulated conductors 4 AWG or larger are pulled through a multioutlet assembly, the distance between raceway and cable entries enclosing the same conductor shall not be less than that required by 314.28(A)(1) for straight pulls and 314.28(A)(2) for angle pulls. When transposing cable size into raceway size, the minimum metric designator (trade size) raceway required for the number and size of conductors in the cable shall be used.
Panel Statement: Panel wanted to differentiate between field assembled vs listed multioutlet assemblies.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 382 — NONMETALLIC EXTENSIONS

7-143 Log #2704 NEC-P07 **Final Action: Reject**
(382.2.Concealable Nonmetallic Extension)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
A listed insulated assembly of two, three, or four insulated circuit conductors and an equipment grounding conductor within a... (remainder unchanged).
Substantiation: An equipment grounding conductor should be specified since 382.10(A) relates to grounding or the lack thereof.
Panel Meeting Action: Reject
Panel Statement: The last sentence in 382.10 (A) provides the installation requirements for nonmetallic extensions from an existing non-grounding-type receptacle. Refer to the UL listing guide PZMX of the 08 White Book. The definition is written to recognize a product without a equipment grounding conductor, which is limited to replacement use only. See 382.104(C).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-144 Log #4464 NEC-P07 **Final Action: Reject**
(382.2, 382.10(C), 382.15(B), and 382.30(B))

Submitter: Richard Temblador, Southwire Company
Recommendation: Revise text to read as follows:
382.2 Definitions.
Concealable Nonmetallic Extension. A listed assembly of two, three, or four insulated circuit conductors within a nonmetallic jacket, an extruded thermoplastic covering, or a sealed nonmetallic covering. The classification includes surface extensions intended for installation under flooring materials, mounting directly on the surface of walls or ceilings, and concealed with paint, texture, joint compound, plaster, wallpaper, tile, wall paneling, or other similar materials.
382.10 Uses Permitted.
(C) Residential or Offices. For nonmetallic surface extensions mounted directly on the surface of walls or ceilings, the building shall be occupied for residential or office purposes and shall not exceed three floors abovegrade. ~~Where identified for the use, concealable nonmetallic extensions shall be permitted more than three floors abovegrade.~~
Concealable Nonmetallic Extensions, where identified for the use, shall be permitted to be used in the following:
(1) More than three floors above grade
(2) Under flooring materials when installed on hard, sound, smooth, continuous floor surfaces made of concrete, ceramic, or composition flooring, wood, and similar materials.
382.15 Exposed.
(B) Concealable Nonmetallic Extensions. One or more extensions shall be permitted to be run in any direction from an existing outlet. Where identified for the use, nonmetallic extensions may be concealed ~~with~~ under flooring materials or wall materials such as paint, texture, concealing compound, plaster, wallpaper, tile, wall paneling, or other similar materials ~~and installed per 382.15(A)~~.
382.30 Securing and Supporting.
(B) Concealable Nonmetallic Extensions. All surface-mounted concealable nonmetallic extension components shall be firmly anchored to the subfloor, wall or ceiling using an adhesive or mechanical anchoring system identified for this use.
Substantiation: This proposal seeks to revise Article 382 to recognize the use of concealable nonmetallic extensions that can be concealed under flooring materials.
The proposed expanded use of concealable nonmetallic extensions broadens its use to serve as a safe alternative to extension cords. Branch circuit wiring can be safely extended using concealable flat wire nonmetallic extension for power or lighting where needed, and as needed, to accommodate decorating schemes, placement of specific equipment or furniture to suit ever-changing lifestyles.
Panel Meeting Action: Reject
Panel Statement: The product is not listed at this time and no technical information on the installation of this product has been provided.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-145 Log #1589 NEC-P07 **Final Action: Reject**
(382.10)

Submitter: Craig D. Jennings, CDJA
Recommendation: Add 382.10(D) and revise 382.10 as indicated:
382.10 Uses Permitted. Nonmetallic extensions shall be permitted either with (A), (B), and (C), or (C), and (D).
(D) Hard Wired. Hard wired extensions specifically Listed for the intended use, shall be permitted in wet locations where run exposed, or concealed as permitted in 382.15.
Substantiation: The inclusion of hard wiring for extensions is already covered in 314.22, and hard wiring is an installation option for these systems that is safe for wet locations, providing the extension construction is suitable and Listed for this intended use. Permanently installed extensions are considerably safer than temporary wiring methods described in Article 590 when used in wet locations.
The current Code in 382.10(A) implies that nonmetallic extensions are only to be plugged in to an existing outlet, however, other sections such as 314.22, 374.11, 376.70, an 378.70 describe and allow hardwired extensions (not expressly nonmetallic) additionally used in wet locations. Adding the option (C) and (D) better supports the original (A), (B), and (C) requirements as they pertain to these other sections.
Panel Meeting Action: Reject
Panel Statement: 382.10(B) stipulates that nonmetallic extensions shall be installed in a dry location. No technical substantiation or fact finding report was provided to support the use of nonmetallic extensions in wet locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-146 Log #2705 NEC-P07 **Final Action: Reject**
(382.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence and substitute:
Where a concealable nonmetallic extension originates from an outlet that does not provide an equipment grounding conductor means in accordance with 250.130(C) or GFCI protection shall be provided for the outlet and the outlet shall be durable marked "GFCI protected" and "no equipment ground". No equipment ground shall be connected between two outlets or to the GFCI protective device.
FPN: See 250.130(C) and 406.3(D)(2)(3). The proposed FPN seems pertinent.
Substantiation: Edit. The first sentence states "outlet" which is not necessarily a receptacle outlet.
Panel Meeting Action: Reject
Panel Statement: The existing text provides the installation requirements for nonmetallic extensions from an existing outlet. The proposed revised text does not add clarity and adds a FPN where the existing text has the same requirements in positive code text in accordance with the NEC Style Manual. The panel assumes that the proposed FPN should have read "406.3(D)(2) and 406.3(D)(3)". The substantiation does not support the proposal. The substantiation states "outlet" is not necessarily a receptacle outlet; however, the proposal does not include the word "receptacle" and continues the use of "outlet" alone.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-147 Log #2965 NEC-P07 **Final Action: Reject**
(382.10(A))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise as follows:
382.10 Uses Permitted.
Nonmetallic extensions shall be permitted only in accordance with 382.10(A), (B), and (C).
(A) From an Existing Outlet. The extension shall be from an existing outlet on a 15- or 20-ampere branch circuit. Where a concealable nonmetallic extension originates from a non–grounding-type receptacle, <u>that non–grounding-type receptacle shall be replaced by a grounding-type receptacle and</u> the installation shall comply with 250.130(C), 406.3(D)(3)(b), or 406.3(D)(3)(c).
[remainder of 382.10(B) and 382.10(C) unchanged by this Proposal]
Substantiation: Correlation issue. Sections 250.130(C), 406.3(D)(3)(b), and 406.3(D)(3)(c), referenced by 382.10(A), provide <u>mandatory</u> protective requirements for the <u>optional</u> replacement ("… shall be permitted to be replaced …") of existing nongrounding receptacles, <u>contingent</u> on that replacement having actually occurred. By contrast, 382.10(A) invokes these requirements without also invoking the condition necessary to make them mandatory (actual replacement of the originating, existing nongrounding receptacle with a grounding-type receptacle). Therefore, a <u>new</u> installation of a concealable nonmetallic extension (CNE) branch-circuit extension having <u>new</u> receptacles mandated to be of the grounding type could leave those grounding-type CNE receptacles with neither connection to ground nor GFCI protection, UNLESS that nongrounding receptacle where the CNE originates is actually replaced.

Indirect correlation issue. Regardless of whether or not CNEs are involved, Section 406.3(D)(3) recognizes the requirements of 406.3(D)(3)(a), 406.3(D)(3)(b), and 406.3(D)(3)(c) as ALTERNATIVES for the replacement of existing nongrounding receptacles. As the 2008 *NEC*® is presently worded and structured outside of 382.10(A), the requirements of Section 250.130(C), however, appear to be IN ADDITION to the Section 406.3(D)(3) ALTERNATIVES for the replacement of existing nongrounding receptacles. As the 2008 *NEC*® is presently worded and structured outside of 382.10(A), the requirements of Section 250.130(C) AND the requirements of EITHER 406.3(D)(3)(a), 406.3(D)(3)(b), OR 406.3(D)(3)(c) appear to apply to replacement of existing nongrounding receptacles. A companion Proposal, however, revises Section 406.3(D)(3) to structure the requirements of Section 250.130(C) as another ALTERNATIVE [new 406.3(D)(3)(d)] to 406.3(D)(3)(b) and 406.3(D)(3)(c). If that companion Proposal is accepted, the 382.10(A) reference to "250.130(C)" can be changed to "406.3(D)(3)(d)", structured to reference 250.130(C) as an alternative.

Panel Member explanations of negatives to Proposal 7-98 (Log #3450) during the last *Code* cycle indicate reservations regarding protection of CNE against physical damage (driving nails through CNE conductors). The Submitter's Substantiation indicates "The cable itself is a symmetrical design providing two levels of protection on both sides of the flat wire cable via outer grounding conductor layers and inner grounded (neutral) conductor layers. This design insures that if the cable is damaged, punctured or penetrated, it will trip the over-current protection device (OCPD) and safely open the circuit." While this outer grounding conductor layer, required by 382.100 and 382.104(C), may be valid where the CNE originates from branch circuits with equipment grounding conductors, what remains inconsistent is that the CNE definition in 382.2 permits CNEs to have only TWO conductors and that when the CNE originates from an existing nongrounding receptacle, 406.3(D)(3)(b) and 406.3(D)(3)(c) cited by 382.10(A) specifically indicate that the equipment grounding conductor is NOT connected to the grounding-type CNE receptacles. If the grounding conductor of the CNE cable is left floating, how is this outer-layer protection then provided? Perhaps, CNEs originating from nongrounding-type receptacles should be limited SOLELY to the 250.130(C) method, with NO reference to 406.3(D)(3)(b) and 406.3(D)(3)(c) alternatives appropriate for wiring methods other than CNEs.
Panel Meeting Action: Reject
Panel Statement: The product is designed so that it will not energize if there is no ground available. The present requirement addresses the submitter's proposal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-148 Log #1555 NEC-P07 **Final Action: Reject**
(382.15 Exception No. 1 (New))

Submitter: Mark Blackford, LITE360
Recommendation: Add new text as follows:
<u>*Exception No. 1: Floor mounted runs shall be permitted if Listed for the intended use.*</u>
Substantiation: Commonly used alternatives to nonmetallic extensions, exposed (as applied to wiring methods) 100, such as cord and plug connected devices or extension cords covered in 400 do not meet the level of safety found in extensions specifically engineered for this purpose. By providing an alternative to the common practice of flexible cords and cables being run directly on the ground, this will provide a means to comply with 400.8(7).
Panel Meeting Action: Reject
Panel Statement: No technical substantiation or fact finding report was provided to support the new application of nonmetallic extensions as floor-mounted runs. The current usage is limited to walls and ceilings where the risk of physical damage is significantly lower than on floors.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-149 Log #360 NEC-P07 **Final Action: Accept**
(382.15(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
"…or other similar materials and installed <u>in accordance with</u> ~~per~~ 382.15(A).
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-150 Log #1590 NEC-P07 **Final Action: Reject**
(382.30(A) Exception (New))

Submitter: Peping Dee, LITE360
Recommendation: Add an exception No. 1 to 382.30(A) as indicated:
<u>Exception No. 1: Unless Listed for other support intervals. Shall not have more than one joint between supports. Adjoining sections shall be securely fastened together to provide a rigid joint.</u>
Substantiation: 300.11(B)(1) and (3) define systems where a raceway can be a means of support not requiring additional support. As an extension could incorporate a raceway or be constructed in a similar fashion, thus self-supporting systems do not require support intervals as described in 382.30(A) provided that mechanical continuity exists.
Panel Meeting Action: Reject
Panel Statement: Nonmetallic extensions are not raceways. There would not be any need for joints or splices in nonmetallic extensions. Also, nonmetallic extensions are limited to mounting directly on the surface of walls or ceilings.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-151 Log #361 NEC-P07 **Final Action: Accept**
(382.104(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
The ungrounded conductor shall consist of one or more ungrounded flat conductor(s) enclosed <u>in accordance with</u> ~~per~~ 382.104(B) and (C) and identified in accordance with 310.12(C).
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard. This revision will also provide consistency with the remainder of the sentence.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 384 — STRUT TYPE CHANNEL RACEWAY

8-213 Log #3179 NEC-P08 **Final Action: Reject**
(384.10(6))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 384.10, delete ~~(6) In Class I, Division 2 hazardous (classified) locations as permitted in 501.10(B)(3).~~
Renumber 384.10(7) and (8) as 384.10(6) and (7).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.

Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-214 Log #481 NEC-P08 **Final Action: Reject**
(384.22)

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:

Section 384.22 Number of Conductors. The number of conductors permitted in strut-type channel raceways shall not exceed the percentage fill using Table 384.22 and applicable outside diameter (O.D.) dimensions of specific types and sizes of wire given in the tables in Chapter 9.

The derating factors of 310.15(B)(2)(a) shall not apply to conductors installed in strut-type channel raceways where all of the following conditions are met:

(1) The cross-sectional area of the raceway exceeds 2500 mm2 (4 in2).

(2) The current-carrying conductors do not exceed 30 in number.

Add new text to read as follows:

(3) The sum of the cross-sectional areas of all contained conductors does not exceed 20 percent of the interior cross-sectional area of the strut-type channel raceways, calculated in accordance with the following formula for wire fill:
$n = ca/wa$

where:

n = number of wires
ca = channel area in square inches
wa = wire area

Proposed Exception: Where the percentage fill requirements of Table 384.22 and the applicable outside diameter (O.D.) dimensions of specific types and sizes of wire given in the tables in Chapter 9 are met and where conditions (1) and (3), above, are present, but the number of conductors exceeds 30, the application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required for strut-type channel raceway where all of the following conditions are met:
(1) Labeled metallic devices are inserted in the strut-type channel raceway that provide elevation, separation, and spacing among the current-carrying conductors by dividing the strut-type channel raceway into channels. Not more than nine current-carrying conductors shall be placed within a channel.
(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the current-carrying conductors throughout the length of the strut-type channel raceway in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.
(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the strut-type channel raceway and conductors within one channel may come into contact with other conductors in the same channel.
(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the strut-type channel raceway in order to conduct heat to the walls and floor of the strut-type channel raceway and shall be connected to the strut-type channel raceway in a manner consistent with the limitations of their labeling.
(5) Where contact between the current-carrying conductors and the edges of the metal devices used for elevation, separation, and spacing poses the risk of abrasion of the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.

Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.

From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.

Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, “Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity....” have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, "UF," noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, "WW," denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.
In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.
In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.
Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.
During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.
The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.
After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.
This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.
However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.
The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.
The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.
After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.
The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.
After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.
After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.
The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.
The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.
The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.
The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors' insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel statement on proposal 8-152.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-215 Log #2180 NEC-P08 **Final Action: Accept**
(384.22)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
The <u>adjustment</u> ~~derating~~ factors of 310.15(B)(2)(a) shall not apply to conductors installed in strut-type channel raceways where all of the following conditions are met.
Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a), not "derating factor".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-216 Log #2997 NEC-P08 **Final Action: Accept**
(384.22)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
The <u>adjustment</u> ~~derating~~ factors of 310.15(B)(2)(a) shall not apply to conductors installed in strut-type channel raceways where all of the following conditions are met:
Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a), not "derating factor".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-217 Log #4484 NEC-P08 **Final Action: Accept**
(384.22)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
384.22 Number of Conductors.
[First sentence of 384.22 and Table 384.22 unchanged by this Proposal]
The ~~derating~~ <u>adjustment</u> factors of 310.15(B)(2)(a) shall not apply to conductors installed in strut-type channel raceways where all of the following conditions are met:
[remainder of 384.22 unchanged by this Proposal]
Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".
366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-218 Log #285 NEC-P08 **Final Action: Accept in Principle**
(384.22(3))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "equation".
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression, which follows in the section.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 8-219. The term "formula" has been removed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-219 Log #2819 NEC-P08 **Final Action: Accept**
(384.22(3))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise text as follows:
(3) The sum of the cross-sectional area of all contained conductors does not exceed 20 percent of the interior cross-sectional area of the strut-type channel raceways ~~calculated in accordance with the following formula for wire fill~~
~~n= ca/wa~~
~~Where~~
~~n = number of conductors ca = channel area in square inches, was = wire area~~
Substantiation: The deleted text is unnecessary and confusing. Unnecessary because there is no similar language for conductor fill in conduits, auxiliary gutters, wireways, or cellular concrete or metal floor raceways. The text is confusing because the formula sited does not give the desired result. That is, n = ca/wa does not give the number of conductors permitted at 20 percent fill. Eliminating this text will add clarity and consistency.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
CAMPBELL, D.: The deleted information may be beneficial for the NEC handbook.

ARTICLE 386 — SURFACE METAL RACEWAYS

8-220 Log #3180 NEC-P08 **Final Action: Reject**
(386.10(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 386.10, delete ~~(2) In Class I, Division 2 hazardous (classified) locations as permitted in 501.10(B)(3).~~
Renumber 386.10(3) and (4) as 386.10(2) and (3).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating CommitteeC is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-221 Log #482 NEC-P08 **Final Action: Reject**
(386.22)

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:
Section 386.22 Number of Conductors or Cables. The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles.
The derating factors of 310.15(B)(2)(a) shall not apply to conductors installed in surface metal raceways where all of the following conditions are met:
(1) The cross-sectional area of the raceway exceeds 2500 mm2 (4 in.2).
(2) The current-carrying conductors do not exceed 30 in number.
(3) The sum of the cross-sectional areas of all contained conductors does not exceed 20 percent of the interior cross-sectional area of the surface metal raceway.
<u>Proposed Exception: When the number of conductors installed in a surface metal raceway is not greater than the number for which the raceway is designed and where conditions (1) and (3), above, are present, but the number of conductors exceeds 30, the application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required for surface metal raceways where all of the following conditions are met:</u>
<u>(1) Labeled metallic devices are inserted in the surface metal raceways that provide elevation, separation, and spacing among the conductors by dividing the surface metal raceway into channels. Not more than nine current-carrying conductors shall be placed within a channel.</u>
<u>(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the conductors throughout the length of the surface metal raceway in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.</u>
<u>(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the surface metal raceway and conductors within one channel may come into contact with other conductors in the same channel.</u>
<u>(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the surface metal raceway in order to conduct heat to the walls and floor of the surface metal raceway and shall be connected to the surface metal raceway in a manner consistent with the limitations of their labeling.</u>

(5) Where contact between the conductors and the edges of the metallic devices used for elevation, separation, and spacing presents the risk of abrasion of the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.

Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.

From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.

Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, "UF," noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, "WW," denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors' insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel statement on proposal 8-152.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-222 Log #2181 NEC-P08 **Final Action: Accept**

(386.22)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

386.22 Number of Conductors or Cables.

The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles.

The ~~derating~~ <u>adjustment</u> factors of 310.15(B)(2)(a) shall not apply to conductors installed in surface metal raceways where all of the following conditions are met:

(1) The cross-sectional area of the raceway exceeds 2500 mm^2 (4 in.^{2}).

(2) The current-carrying conductors do not exceed 30 in number.

(3) The sum of the cross-sectional area of all contained conductors does not exceed 20 percent of the interior cross-sectional area of the surface metal raceway.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-223 Log #2998 NEC-P08 **Final Action: Accept**

(386.22)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

386.22 Number of Conductors or Cables.

The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles.

The ~~derating~~ <u>adjustment</u> factors of 310.15(B)(2)(a) shall not apply to conductors installed in surface metal raceways where all of the following conditions are met:

(1) The cross-sectional area of the raceway exceeds 2500 mm2 (4 in.2).

(2) The current-carrying conductors do not exceed 30 in number.

(3) The sum of the cross-sectional areas of all contained conductors does not exceed 20 percent of the interior cross-sectional area of the surface metal raceway.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-224 Log #3474 NEC-P08 **Final Action: Reject**

(386.22)

Submitter: David E. Watters, H. F. Lenz Company

Recommendation: Revise as follows:

~~**Number of Conductors or Cables.** The number of conductors or cables installed in surface metal raceway shall not be greater than the number for which the raceway is designed. Cables shall be permitted to be installed where such use is not prohibited by the respective cable articles. The derating factors of 310.15(B)(2)(a) shall not apply to conductors installed in surface metal raceways where all of the following conditions are met:~~

~~(1) The cross sectional area of the raceway exceeds 2500 mm2 (4 in.2)~~

~~(2) The current carrying conductors do not exceed 30 in number.~~

~~(3) The sum of the cross-sectional areas of all contained conductors does not exceed 20 percent of the interior cross-sectional area of the surface metal raceway.~~

<u>**Number of Conductors.** The sum of cross-sectional area of all contained conductors at any cross section of the surface metal raceway shall not exceed</u>

20 percent of the interior cross-sectional area of the surface metal raceway. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current-carrying conductors.

The derating factors specified in 310.15(B)(2)(a) shall be applied to the current-carrying conductors up to and including the 20 percent fill specified above.

Substantiation: Surface Metal Raceways and Metal Wireways are similar in size, construction, and performance when they are surface mounted in free air. It is assumed that conductor heating tests performed in one of these products would represent similar results in the other. Testing was performed on 2.75 in. × 1.5 in. Metal Wireway at Nationally Recognized Testing Laboratories. The ETL SEMKO Laboratory and the OnSpex Laboratory were used to test 30 active conductors at rated capacity as permitted by 376.22(B), and as listed above. In both cases, 24 amps was applied to #10 conductors which is the continuous current limit for a 30A breaker required by code. In both cases, at least one of the conductors, within the raceway, exceeded the 90°C temperature limitation of the insulation. Both tests failed according to the test reports I have provided. For these reasons, additional loading or raceway fill restrictions should be applied. In particular, the wording which allows 30 conductors to operate without de-rating should be removed. The proposed changes will make the wording of this section of the code more consistent with Articles 376 and 378. For these reasons, we recommend approval of the code changes listed above.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The first test by ETL has exceeded the maximum fill of 20 percent by 2 wires, therefore this test will not be considered. The test by OnSpex (CSA) appears to show the surface metal raceway to exceed the temperature allowed for THHN conductors. CMP-8 rejects the proposal based on only one test of a surface metal raceway.

A more complete series of tests on surface metal raceways and their various fill and current-carrying conductor adjustment factors is required for consideration of this proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-225 Log #4485 NEC-P08 **Final Action: Accept**

(386.22)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Revise text to read as follows:

386.22 Number of Conductors.

[First paragraph of 386.22 unchanged by this Proposal]

The ~~derating~~ adjustment factors of 310.15(B)(2)(a) shall not apply to conductors installed in surface metal raceways where all of the following conditions are met:

[remainder of 386.22 unchanged by this Proposal]

Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term “adjustment factors”, not the unspecific generalization “derating factors”.

366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term “correction factors” and imprecise term “derating factors”, respectively, to “adjustment factors”, the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.

A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 388 — SURFACE NONMETALLIC RACEWAYS

8-226 Log #3181 NEC-P08 **Final Action: Reject**

(388.12(5))

Submitter: A. W. Ballard, Cooper Crouse-Hinds

Recommendation: In 388.12, delete ~~(5) In any hazardous (classified) location, except as permitted by other articles in this Code.~~

Renumber 388.12(6) and (7) as 388.12(5) and (6).

Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.

Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 8-41.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-227 Log #3475 NEC-P08 **Final Action: Reject**

(388.22)

Submitter: David E. Watters, H. F. Lenz Company

Recommendation: Revise text as follows:

~~Number of Conductors or Cables. The number of conductors or cables installed in surface nonmetallic raceway shall not be greater than the number for which the raceway is designed. Cable shall be permitted to be installed where such use is not prohibited by the respective code articles.~~

Number of Conductors. The sum of cross-sectional area of all contained conductors at any cross section of the surface nonmetallic raceways shall not exceed 20 percent of the interior cross-sectional area of the surface nonmetallic raceways. Conductors for signaling circuits or controller conductors between a motor and its starter and used only for starting duty shall not be considered as current carrying conductors.

The derating factors specified in 310.15(B)(2)(a) shall be applied to current-carrying conductors up to and including the 20 percent fill specified above.

Substantiation: Testing was performed on a 1-5/8 in. × 5-1/8 in., double compartment, surface nonmetallic raceway at the ETL SEMKO Laboratory. Each compartment was filled with sixty (60) - #10 conductors of which forty (40) were active with a continuous load of 16 amps. This condition represented a conductor fill of 34%, which complied with the manufacturer’s recommendations, and the current load complied with Table 310.15(B)(2) of the National Electrical Code. In this case, multiple conductors within the raceway compartments, exceeded the 90°C temperature limitation of the insulation. In fact, the raceway itself experienced damage due to internal cable heating. Obviously, this test failed according to the test report I have provided. For these reasons, additional loading and raceway fill restrictions should be applied. In particular, the wording which allows raceway fills to exceed 20% based on the wording “for which the raceway is designed” should be removed. The proposed changes will make the wording of this section of the code more consistent with Articles 376 and 378, and help to mitigate problems associated with excessive raceway fill. For these reasons, we recommend approval of the code changes listed above.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The submitter provided an invalid test that did not follow manufacturer’s specifications, which is part of the listing criteria.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-228 Log #2589 NEC-P08 **Final Action: Reject**

(388.30)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Surface nonmetallic raceways shall be ~~supported~~ securely fastened to supports at intervals.... (remainder unchanged).

Substantiation: Edit. “Supported” is not necessarily the same as “fastened”. A raceway laid on the floor is supported.

Panel Meeting Action: Reject

Panel Statement: “Securely fastened” is not restricted to supports only. Securing to concrete walls, cable trays, and other approved means are acceptable.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

8-229 Log #2603 NEC-P08 **Final Action: Reject**

(388.60)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Where an equipment grounding conductor is ~~required~~ provided ~~a separate equipment grounding conductor~~ it shall be installed in the nonmetallic raceway.

Substantiation: Edit. The provision should apply where an equipment grounding conductor is installed by choice and not “required”.

Panel Meeting Action: Reject

Panel Statement: Proposed changes do not improve clarity or content of existing text.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 390 — UNDERFLOOR RACEWAYS

8-230 Log #3357 NEC-P08 **Final Action: Accept in Principle**
(390.2 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
390.XX Definition. An enclosure designed and intended for installation in floors an installation of cables and electrical conductors and which may have provisions for access to the interior at intervals of length.
Substantiation: There is no definition as is common for other raceways. A conduit may literally be an underfloor raceway.
Panel Meeting Action: Accept in Principle
Add new section 390.2 as follows and renumber remaining sections accordingly.
390.2 Definition.
Underfloor Raceway. A raceway and associated components designed and intended for installation beneath or flush with the surface of a floor for the installation of cables and electrical conductors.
Panel Statement: Panel concludes that a definition was needed for Article 390 and the revised text meets the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-231 Log #2706 NEC-P08 **Final Action: Reject**
(390.2(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The installation of underfloor raceways shall only be permitted beneath the surface of concrete or other flooring material ~~in office occupancies~~ where ~~laid~~ installed flush with the ~~concrete~~ floor ~~and covered with linoleum or equivalent floor covering~~.
Substantiation: "Shall be permitted" does not impose a requirement; 90.5 (B) that term describes options or alternatives. Office occupancies or floor covering is not pertinent to the use or safety of underfloor raceways. The second word "concrete" should be deleted since the provision includes "other flooring material". "Equivalent" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: There are different rules for installation depending on occupancy type.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-232 Log #3182 NEC-P08 **Final Action: Reject**
(390.2(B))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 390.2(B), delete ~~(1) and or (2) In any hazardous (classified) locations, except as permitted by 504.20 and in Class I, Division 2 locations as permitted in 501.10(B)(3)~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-233 Log #2638 NEC-P08 **Final Action: Reject**
(390.15)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Connections from underfloor raceway to distribution ~~centers~~ equipment and ~~wall~~ outlets shall be made by ~~approved~~ identified fittings or by any of the identified wiring methods in Chapter 3.
Substantiation: Edit. Extensions may be made to outlets not on a wall. All wiring methods of Chapter 3 may not be suitable.
Panel Meeting Action: Reject
Panel Statement: This is not editorial. The submitter did not provide substantiation for the changes.
Approved is subject to the AHJ. Identification marks may be method of approval. Listing may be another. Simple identification creates a manufacturer's self certification that neither requires AHJ approval or listing.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-234 Log #483 NEC-P08 **Final Action: Reject**
(390.17)

Submitter: Carl V. Cardi, III, CVC 1 Limited LLC
Recommendation: Add new text to read as follows:
Section 390.17 Ampacity of Conductors. The ampacity adjustment factors, in 310.15(B)(2), shall apply to conductors in underfloor raceways.
Proposed Exception: The application of the adjustment factors set forth in Table 310.15(B)(2)(a) shall not be required for underfloor raceways where all of the following conditions are met:
(1) Labeled metallic devices are inserted in the underfloor raceways that provide elevation, separation, and spacing among the conductors by dividing the underfloor raceway into channels. Not more than nine current-carrying conductors shall be placed within a channel.
(2) The metallic devices used for elevation, separation, and spacing shall enable air to flow within and between the channels in order to provide cooling of the conductors throughout the length of the underfloor raceway in a manner sufficient to allow the transient and steady-state temperatures of the conductors to remain below the rated temperatures for their insulation as specified in the applicable column of Table 310.16.
(3) The metallic devices used for elevation, separation, and spacing shall provide sufficient support and separation of the current-carrying conductors so that conductors in one channel shall not come into contact with conductors in another channel, except that such conductors may come into contact with conductors in another channel upon entering or exiting the underfloor raceway and conductors within one channel may come into contact with other conductors in the same channel.
(4) The metallic devices used for elevation, separation, and spacing shall be secured so as to prevent movement of the devices and so as to maintain contact with the walls and floor of the underfloor raceway in order to conduct heat to the walls and floor of the underfloor raceway and shall be connected to the underfloor raceway in a manner consistent with the limitations of their labeling.
(5) Where contact between the conductors and the edges of the metallic devices used for elevation, separation, and spacing presents the risk of abrasion of the insulation of the conductors, the edges of the devices shall be protected so as to avoid that risk.
Substantiation: The ampacity derating factors of Section 310.15(B)(2)(a) severely limit the ampacities of conductors placed in sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways. This proposal establishes exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17 that allow for the placement of metallic devices to elevate, separate, and space the current-carrying conductors in those raceways so as to increase the number permitted by taking full advantage of the cooling capacity in the entire cross-sectional area of the raceway and the heat conducting properties of the metallic devices. The exception tendered for each of those sections contains five stringent conditions under which the devices may be used for such purpose. The report issued by INTERTEK, ETL SEMKO dated June 4, 2007, that accompanies this proposal provides test results that support the proposal.

I. Introduction:

A. Carl Cardi, III:

Mr. Cardi is presently a city electrical inspector for the city of Columbus, Ohio, a former electrical contractor, and an inventor. He is also President of CVC 1 Limited, LLC, the manufacturer of Cool Wire products.

B. Arnold E. Shaheen, Jr., Esq.:

Mr. Shaheen is counsel for CVC 1 Limited, LLC, and the author of this Proposal. Mr. Shaheen is licensed to practice law in the state of Ohio and received his Juris Doctorate Degree from Capital University in Columbus, Ohio, and a Bachelor of Science Degree in Electrical Engineering from The Ohio State University. Before, during, and after his attending college and law school, Mr. Shaheen also worked from childhood until 1985 in his family's electrical construction business, which engaged in commercial and industrial electrical construction. Between 1971 and 1985, Mr. Shaheen was licensed as an electrical contractor in Columbus, Ohio.

C. The Proposal:

Mr. Cardi has submitted this Proposal in an effort to provide suggested revisions to the National Electric Code ("NEC") that respect the intent and purpose of Section 310.15(B)(2)(a), but which allow for more flexibility in the design of electrical wiring systems that incorporate the use of sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, surface metal raceways, and underfloor raceways by allowing for new technologies that provide elevation, separation, and spacing of current-carrying conductors within those wiring systems. In so doing, it is submitted that these new technologies will provide better ambient cooling within those wiring systems by taking full advantage of all of the airspace within their cross-sectional areas as well as the heat conductive properties of the metallic devices that incorporate these new technologies and will allow for the placement of more current-carrying conductors in a raceway than would otherwise be permitted by the application of Section 310.15(B)(2)(a).

II. Heat Generated By Current-Carrying Conductors:

Well known principles of physics that govern the transfer of heat energy establish that heat energy cannot be dissipated without a thermal gradient. The principles of heat transfer are analogous to the concepts of current, resistance, and voltage embodied in Ohm's Law. Heat, like current, cannot flow unless there is a thermal gradient, as in the case of a difference in electrical potential, or voltage, in an electrical circuit. If there is no thermal gradient, or if the heat source is surrounded by insulation, the heat source will not cool or may even grow warmer if the heat source is, itself, a generator of heat energy. When current flows through a wire, the wire becomes a heat source that generates heat energy because the flow of electricity encounters resistance, the degree of which is a function of both the size of the wire and the conductivity of the material from which the wire is manufactured.

From a fire prevention perspective, the danger, of course, is that a wire will become so hot that its insulation degrades resulting in the potential for a short circuit between a bare spot on a current-carrying conductor and a bare spot on another current-carrying conductor or between a bare spot on a current-carrying conductor and the metallic enclosure in which the conductor is placed. Even where adequate overcurrent protection exists, the potential for a fire or for further degradation of the insulation of surrounding conductors exists if the temperature of current-carrying conductors is allowed to rise above the rated temperature limitation of their insulation.

Insulated, current-carrying conductors that are bundled together or which lie in contact with one another, particularly those that are totally surrounded by and in contact with other current-carrying conductors, will rise in temperature because there exists no thermal gradient through which to dissipate the heat. Section 310.10, FPN No.1, subparagraph 4, recognizes this physical phenomenon.

III. Section 310.15(B)(2)(a):

Section 310.15(B)(2)(a) requires that the ampacity derating factors of Table 310.15(B)(2)(a) shall apply to any raceway that contains more than three current-carrying conductors. On its face, Section 310.15(B)(2)(a) was meant to apply to all systems defined as raceways in Article 100. The traditional practice in the electrical industry was to readily apply this section to all forms of conduit. However, confusion arose in the enforcement and application of articles of the NEC that applied to other types of raceways because those articles contained only fill limitations and not ampacity derating requirements. The result, in many cases, was that the fill requirements of a particular article were allowed to trump the requirements of Section 310.15(B)(2)(a) and, thus, create the risk of overheated raceways because of the number of current-carrying conductors placed within them, resulting in the commensurate risk of short circuits and fire.

To resolve the confusion and to better clarify the NFPA's intent regarding the application and enforcement of Section 310.15(B)(2)(a), the 2005 edition of the NEC added ampacity derating requirements within articles pertaining to specific types of raceways. Section 374.17 pertaining to cellular metal floor raceways and Section 390.17 pertaining to underfloor raceways are but two examples.

However, underlying the application and enforcement of Section 310.15(B)(2)(a) is the assumption that the conductors in a raceway will all lie at the bottom of the raceway and in close proximity to or in contact with one another. This assumption fails to take into account the cooling effect that the surrounding ambient **within the raceway** will have when the current-carrying conductors are elevated, separated, and spaced within the raceway nor does it account for the benefit of the heat conductive properties of the metallic devices described in this Proposal.

Many sections of the NEC recognize that spacing promotes the cooling of current-carrying conductors. The requirement to provide spacing between conduits, tubing, or raceways set forth in Section 310.15(B)(2)(b) is one example. The spacing dimensions for electrical ducts depicted in Figure 310.60 of Article 310 and those depicted for single insulated conductors in nonmagnetic underground electrical ducts in FPN Figure B.310.5 of Appendix B are other examples.

However, none of the articles, in their current form, containing sections identified in this Proposal address either the potential benefit of ambient cooling that could be realized by the elevation, separation, and spacing of current-carrying conductors within a raceway or the benefit of the heat conductive properties of the metallic devices described in this Proposal. It is those benefits that this Proposal addresses, while, at the same time, honoring the intent of Section 310.15(B)(2)(a) to prevent the degradation of the insulation of current-carrying conductors due to overheating.

IV. Proposed Changes to Sections 310.15(B)(2)(a), 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17:

This Proposal sets forth exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, each containing five subparagraphs. Those five subparagraphs are discussed in sequence, below:

A. Subparagraph (1):

Metallic devices that provide elevation, separation, and spacing among current-carrying conductors would be allowed in lieu of the application of the derating factors of Table 310.15(B)(2)(a). Those devices would separate raceways into channels, however, no channel would be permitted to hold more than nine conductors, which is the upper limit for the number of conductors to which the 70 percent derating factor of Table 310.15(B)(2)(a) presently applies. This numerical limit recognizes that, even though dividing raceways into channels enables the cooling of current-carrying conductors, there are physical limits to this effect. The devices must be labeled in compliance with the definition of that term as set forth in Article 100 and the requirements of Section 110.3(A)(1) FPN.

B. Subparagraph (2):

The metallic devices that provide elevation, separation, and spacing must also permit convection within a channel and between and among channels such that the transient and steady-state temperatures of the current-carrying conductors within any channel remain below the rated temperature for their insulation as indicated in the applicable column of Table 310.16.

C. Subparagraph (3):

The metallic devices must prevent contact between current-carrying conductors in different channels within the raceway, except at points of egress and ingress. However, because the number of conductors is limited to nine within any given channel, conductors within that channel may be in contact without additional separation within that channel.

D. Subparagraph (4):

The metallic devices must be secured so as to prevent movement of the devices and to maintain contact with the walls and floor of the raceway in order to enable the device to transmit heat away from the current-carrying conductors and to the walls and floor of the raceway so that the raceway may, in turn, transmit the heat either into the air, if the raceway is an auxiliary gutter or wireway, or to concrete, if the raceway is a cellular metal raceway or an underfloor raceway.

E. Subparagraph (5):

In order to prevent abrasion of current-carrying conductors within a channel, this subparagraph provides that all edges of the metallic devices that provide elevation, separation, and spacing of the current-carrying conductors must be protected where those edges would come into contact with the conductors.

F. Section 310.15(B)(2)(a):

The words, "Except as provided for by exceptions to Sections 366.22(A), 366.23(A), 374.17, 376.22, 384.22, 386.22, and 390.17, where there is no load diversity...." have been added. This additional language makes explicit that the exceptions to the application of Section 310.15(B)(2)(a) established by this Proposal apply only to the enumerated sections and only when load diversity is not available.

G. Section 366.22(A):

The preamble to the exception for this section limits its applicability in the case of sheet metal auxiliary gutters to situations where the 20 percent fill limitation prescribed for this type of raceway is not exceeded, but where there are more than 30 current-carrying conductors placed within the raceway.

H. Section 366.23(A):

The preamble to the exception for this section mimics the preamble contained in Section 366.22(A), which also applies to sheet metal auxiliary gutters.

I. Section 374.17:

Since the language of this section contains no limitations upon the applicability of Section 310.15(B)(2)(a) to cellular metal raceways, no preamble was necessary. The exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 374.17 and to cellular metal raceways.

J. Section 376.22:

As in the case of sheet metal auxiliary gutters, the preamble to the exception for this section limits its applicability to those instances in which the 20 percent fill limitation is not exceeded, but where there are also more than 30 current-carrying conductors placed within the metal wireway.

K. Section 384.22:

In the case of strut-type channel raceways, the preamble to the exception limits its applicability to those instances in which the percentage fill requirements of Table 384.22 are not exceeded and where the outside diameter dimensions of types and sizes of wire as set forth in the tables in Chapter 9 are met, but where the cross-sectional area of the raceway exceeds 2500mm² (4in.²) and where the number of current-carrying conductors in the raceway is greater than 30, but where the cross-sectional area of all current-carrying conductors does not exceed 20 percent of the cross-sectional area of the raceway.

L. Section 386.22:

The preamble to the exception for this section mimics that of Section 384.22 and applies to surface metal raceways.

M. Section 390.17:

As in the case of cellular metal raceways, the exception is a direct carveout to the general applicability of Section 310.15(B)(2)(a) to Section 390.17 and to underfloor raceways.

V. Test Evidence Submitted In Support of Proposal:

A. Testing Protocol:

Between May 29, 2007, through June 1, 2007, electrical testing involving metallic devices described in this Proposal was performed by INTERTEK, ETL SEMKO of Cortland, New York. Two different types of raceways and two sizes of conductors, 12 AWG THHN and 10 AWG THHN were tested. Testing was performed for the purpose of: (1) measuring the heating of the conductors under the testing protocol; and, (2) to determine how many conductors could be placed within the raceways without the temperature of the conductors exceeding the 90° C limitation of their insulation. Tests for physical abrasion were not conducted.

In the first instance, a 12 in. x 3 in. x 5 ft underfloor raceway was tested under various scenarios in order to determine the conductor temperatures. Similar testing was performed for an 8 in. x 8 in. x 5 ft metallic wireway. The ends of both raceways were stuffed with styrofoam in order to trap heat so as to create a worst-case scenario. Where it was appropriate to do so, both raceways were tested in a double-blind manner, that is, they were tested under the same conditions with and without the metallic devices described in this Proposal.

Constant loading of the conductors in each instance occurred throughout the duration of each test. No unloaded conductors, or fillers, were placed within the raceways. The time period used as a benchmark in order to attain steady-state temperature conditions was three hours. Thermocouples were placed on one conductor in each channel. One thermocouple was used to measure the room ambient.

The graphs indicating the test results show the temperatures measured by the thermocouples along the Y-axis and the time periods for those temperatures along the X-axis. The temperature recording for each conductor is indicated on each graph by a different color of line. The letters, “UF,” noted in the keys for the graphs for the tests denote conductors in the underfloor raceway. The letters, “WW,” denote conductors in the metal wireway. The maximum temperatures that were recorded for each conductor to which a thermocouple was attached are displayed in a table at the bottom of each graph for either one or both raceways, depending upon how each test was conducted.

B. Test Nos. 1 and 10:

In Test No. 1, the underfloor raceway was wired using 81 #12 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used to elevate, separate, and space the conductors. The test load on each of the conductors was 16 amperes. Upon removal of the underfloor raceway cover it was noted that one of the supports had moved. Thus, this test was redone as Test No. 10 only as to the underfloor raceway.

In Test No. 1, the metallic wireway was wired with 90 #12 THHN conductors in 10 groupings of 9 conductors.

In Test No. 1, the temperatures for all conductors for both raceways, after more than 3 hours, remained below 90°C and in a steady-state condition. The ambient temperature remained at approximately 25°C throughout the test.

Test No.1, as to the underfloor raceway, was repeated in Test No. 10. Again, the test results were the same. After more than three hours and in steady-state condition, the temperatures of all of the conductors remained below 90°. The ambient temperature approximated 22°C throughout the test.

During neither Test No. 1 nor Test No. 10 did the temperature of any of the conductors exceed 90°C at any point in time.

C. Test No. 2:

The same test protocol were used in this test as in Test No. 1 for both raceways. However, the metallic devices described in this Proposal were not used. After 91 minutes, in the case of both raceways, the temperatures of the conductors remain in a transient state and on an upward incline towards their 90°C limitation of their insulation. At that point in time, the highest temperature reached by any conductor in the underfloor raceway was 89.24°C and in the metal wireway was 81.97°C.

D. Test No. 3:

In Test No. 3, the underfloor raceway was wired with 81 #12 THHN conductors using a vertical divider system that did not permit air to flow between the divided chambers within the raceway. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes. After only 64 minutes, the temperatures of all of the conductors in the underfloor raceway remained in a transient state and the temperature of one conductor had exceeded the 90°C limitation of its insulation.

E. Test No. 4:

In Test No. 4, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded with 16 amperes.

After more than 3 hours, the highest temperature reached in the underfloor raceway was 60.45°C and in the case of the metal wireway the highest temperature reached was 52.40°C.

F. Test No. 5.

In Test No. 5, the underfloor raceway was wired with 81 #10 THHN conductors in 9 groupings of 9 conductors. The metal wireway was wired with 90 #10 THHN conductors in 10 groupings of 9 conductors. For both the underfloor raceway and the metallic wireway, the metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

This test demonstrated the upper limit of the cooling effect of the metallic devices described in this Proposal in the case of the underfloor raceway. The transient state temperatures of the underfloor conductors began to approximate 90°C after 33 minutes. At that point the cover of the underfloor raceway was removed.

However, in the case of the metal wireway, the highest temperature of the conductors was 82.03°C in steady-state condition after 190 minutes.

The ambient approximated 22°C throughout the test.

G. Test No. 6:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groups of 9 conductors. The metallic devices described in this Proposal were used. The conductors were loaded at 24 amperes.

The highest temperature reached by a conductor after 203 minutes was 67.74°C in a steady-state condition. The ambient temperature for the test ranged between 22° and 28°C.

H. Test No. 7:

The underfloor raceway was wired with 45 #10 THHN conductors in 5 groupings of 9 conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

After 157 minutes, the temperatures of the conductors remained in a transient state condition. By that time, one of the conductors had reached 89.06°C. The ambient temperature ranged between 22°C and 28°C.

I. Test No. 8:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 16 amperes.

After 126 minutes, the temperatures of the conductors in the underfloor raceway remained in a transient condition and were gradually rising. At that point in time the highest temperature for the underfloor conductors was 75.17°C.

After the same time period, the conductors in the wireway, for the most part, remain in a transient condition with the highest temperature recorded at 71.09°C.

The ambient temperature ranged between 22°C and 25°C.

J. Test No. 9:

The underfloor raceway was wired with 81 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The metal wireway was wired with 90 #10 THHN conductors. The metallic devices described in this Proposal were not used. The conductors were loaded at 24 amperes.

The graph of the temperatures of the conductors in the two types of raceways demonstrates that the temperatures in both raceways were rising rapidly. Within 14 minutes after the commencement of the test, the highest temperature of a conductor in the underfloor raceway is 97.95°C and for the metal wireway is 93.43°C.

The ambient remained at approximately 22°C throughout the test.

K. Test Conclusions:

The use of the metallic devices described in this Proposal demonstrate a marked decrease in the transient and the steady-state temperatures of the conductors within the limitations of the cooling effects of the devices. This can be readily shown by comparing the test results in Test Nos. 6 and 7, the test results in Test Nos. 4 and 8, and by comparing the test results in Test Nos. 1 and 10 with Test No. 2. Within the limitations of the devices, as demonstrated in Test No. 5 as it relates to underfloor raceways, the 90°C limitations of the conductors' insulation is not exceeded during the three hour protocol for the tests where the devices were used.

VI. Conclusion:

This Proposal provides for exceptions to the applicability of Section 310.15(B)(2)(a) to sheet metal auxiliary gutters, cellular metal floor raceways, metal wireways, strut-type channel raceways, and underfloor raceways that impose five conditions so as to preserve the intent of that section to prevent thermal degradation of insulation, but yet allow for more current-carrying conductors to be placed within those raceways. Due to the stringent nature of those conditions, the reasons cited in the narrative, above, and the test results supplied with this Proposal, the Proposer requests that the Proposal be approved.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See panel statement on proposal 8-152.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-235 Log #2606 NEC-P08 **Final Action: Reject**
(390.17 Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:

Exception: Where more than one outlet on the same circuit is individually supplied by one set of conductors it shall be permitted to count only the current-carrying conductors of one such set of conductors for the purpose of ampacity adjustment.

Substantiation: The present derating factors discourage installation of individual sets of conductors on the same circuit which reduces voltage drop, increases efficiency and does not increase heating effect. The proposal would encourage compliance with 390.7.
Panel Meeting Action: Reject
Panel Statement: The current text is clear. It is the intent of the panel to have the adjustment factors of 310.15(B)(2) apply to underfloor raceways.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 392 — CABLE TRAYS

8-235a Log #CP804 NEC-P08 **Final Action: Accept**
(392)

Submitter: Code-Making Panel 8,
Recommendation: Accept "include" file called "Article 392 reformatted". No wording has been added or deleted from existing 392 only change is to renumber to meet the basic style manual.
ARTICLE 392

Cable Trays

I. General

392.1 Scope. This article covers cable tray systems, including ladder, ventilated trough, ventilated channel, solid bottom, and other similar structures.

FPN: For further information on cable trays, see ANSI/NEMA–VE 1-1998, *Metal Cable Tray Systems*; NEMA–VE 2-1996, *Metal Cable Tray Installation Guidelines*; and NEMA–FG-1998, *Nonmetallic Cable Tray Systems.*

392.2 Definition.

Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.

II. Installation

392.10 Uses Permitted. Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits. Cable tray installations shall not be limited to industrial establishments. Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant. Cable trays and their associated fittings shall be identified for the intended use.

(A) Wiring Methods. The wiring methods in Table 392.10(A) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

Table 392.10(A) Wiring Methods

Wiring Method	Article
Armored cable	320
CATV cables	820
CATV raceways	820
Class 2 and Class 3 cables	725
Communications cables	800
Communications raceways	800
Electrical metallic tubing	358
Electrical nonmetallic tubing	362
Fire alarm cables	760
Flexible metal conduit	348
Flexible metallic tubing	360
Instrumentation tray cable	727
Intermediate metal conduit	342
Liquidtight flexible metal conduit	350
Liquidtight flexible nonmetallic conduit	356
Metal-clad cable	330
Mineral-insulated, metal-sheathed cable	332
Multiconductor service-entrance cable	338
Multiconductor underground feeder and branch-circuit cable	340
Network-powered broadband communications cables	830
Nonmetallic-sheathed cable	334
Non-power-limited fire alarm cable	760
Optical fiber cables	770
Optical fiber raceways	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays	
Polyvinyl chloride PVC conduit	352
Power and control tray cable	336
Power-limited fire alarm cable	760
Power-limited tray cable	725
Rigid metal conduit	344
Rigid nonmetallic conduit	352
RTRC	355
Signaling raceway	725

(B) In Industrial Establishments. The wiring methods in Table 392.10(A) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system, any of the cables in 392.10(B)(1) and (B)(2) shall be permitted to be installed in ladder, ventilated trough, solid bottom, or ventilated channel cable trays.

(1) Single-conductor cables shall be permitted to be installed in accordance with (B)(1)(a) through (B)(1)(c).

(a) Single-conductor cable shall be 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays. Where 1/0 AWG through 4/0 AWG single-conductor cables are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).

(b) Welding cables shall comply with the provisions of Article 630, Part IV.

(c) Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and they shall be 4 AWG or larger.

(2) Single and multiconductor medium voltage cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.10(B)(1).

(C) Hazardous (Classified) Locations. Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.

(D) Nonmetallic Cable Tray. In addition to the uses permitted elsewhere in 392.10, nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.
(E) Complete System. Cable trays shall be installed as a complete system. Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained. Cable tray systems shall be permitted to have mechanically discontinuous segments between cable tray runs or between cable tray runs and equipment. The system shall provide for the support of the cables in accordance with their corresponding articles.
Where cable trays support individual conductors and where the conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft). The conductors shall be secured to the cable tray(s) at the transition, and they shall be protected, by guarding or by location, from physical damage.
A bonding jumper sized in accordance with 250.102 shall connect the two sections of cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.
(F) Completed Before Installation. Each run of cable tray shall be completed before the installation of cables.
(G) Covers. In portions of runs where additional protection is required, covers or enclosures providing the required protection shall be of a material that is compatible with the cable tray.
(H) Through Partitions and Walls. Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.
(I) Exposed and Accessible. Cable trays shall be exposed and accessible except as permitted by 392.10(H).
(J) Adequate Access. Sufficient space shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables.
(K) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems. In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1. For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.
For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.
For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.
(L) Cable Installation.
(1) Multiconductor cables rated 600 volts or less shall be permitted to be installed in the same cable tray.
(2) Cables rated over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:
(a) The cables rated over 600 volts are Type MC.
(b) The cables rated over 600 volts are separated from the cables rated 600 volts or less by a solid fixed barrier of a material compatible with the cable tray
(M) Connected in Parallel. Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.
Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies.
(N) Single Conductors. Where any of the single conductors installed in ladder or ventilated trough cable trays are 1/0 through 4/0 AWG, all single conductors shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.
392.12 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.
392.17 Ampacity of Conductors
(A) Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays.
(1) The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.22(A) shall be as given in Table 310.16 and Table 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).
(a) The derating factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.
(b) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not over 95 percent of the allowable ampacities of Table 310.16 and Table 310.18 shall be permitted for multiconductor cables.
(c) Where multiconductor cables are installed in a single layer in uncovered trays, with a maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ambient temperature-corrected ampacities of multiconductor cables, with not more than three insulated conductors rated 0 through 2000 volts in free air, in accordance with 310.15(C).
FPN: See Table B.310.3.
(2) The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:
(a) Where installed according to the requirements of 392.22(B), the ampacities for 600 kcmil and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 600 kcmil and larger cables shall not exceed 70 percent of the allowable ampacities in Table 310.17 and Table 310.19.
(b) Where installed according to the requirements of 392.22(B), the ampacities for 1/0 AWG through 500 kcmil single-conductor cables in uncovered cable trays shall not exceed 65 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG through 500 kcmil cables shall not exceed 60 percent of the allowable ampacities in Table 310.17 and Table 310.19.
(c) Where single conductors are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.17 and Table 310.19.
Exception to (2)(c): For solid bottom cable trays the ampacity of single conductor cables shall be determined by 310.15(C).
(d) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free airspace of not less than 2.15 times one conductor diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities of two or three single insulated conductors rated 0 through 2000 volts supported on a messenger in accordance with 310.15(B).
FPN: See Table 310.20.
(3) Where a cable tray contains a combination of multiconductor and single-conductor cables, the allowable ampacities shall be as given in 392.17(A)(1) for multiconductor cables and 392.17(A)(2) for single-conductor cables, provided that the following conditions apply:
(a) The sum of the multiconductor cable fill area as a percentage of the allowable fill area for the tray calculated per 392.22(A), and the single-conductor cable fill area as a percentage of the allowable fill area for the tray calculated per 392.22(B), totals not more than 100 percent.
(b) Multiconductor cables are installed according to 392.22(A) and single-conductor cables are installed according to 392.22(B) and 392.10(M) and (N).
(B) Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.
The ampacity of cables, rated 2001 volts, nominal, or over, installed according to 392.22(C) shall not exceed the requirements of this section.
(1) The allowable ampacity of multiconductor cables shall be as given in Table 310.75 and Table 310.76, subject to the following provisions:
(a) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not more than 95 percent of the allowable ampacities of Table 310.75 and Table 310.76 shall be permitted for multiconductor cables.
(b) Where multiconductor cables are installed in a single layer in uncovered cable trays, with maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ampacities of Table 310.71 and Table 310.72.
(2) The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), shall comply with the following:
(a) The ampacities for 1/0 AWG and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.69 and Table 310.70. Where the cable trays are covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG and larger single-conductor cables shall not exceed 70 percent of the allowable ampacities in Table 310.69 and Table 310.70.
(b) Where single-conductor cables are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.69 and Table 310.70.

(c) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free air space of not less than 2.15 times the diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.67 and Table 310.68.

392.22 Number of Conductors or Cables

(A) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays.

The number of multiconductor cables, rated 2000 volts or less, permitted in a single cable tray shall not exceed the requirements of this section. The conductor sizes herein apply to both aluminum and copper conductors.

(1) Where ladder or ventilated trough cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed the cable tray width, and the cables shall be installed in a single layer. Where the cable ampacity is determined according to 392.17(A)(1)(c), the cable tray width shall not be less than the sum of the diameters of the cables and the sum of the required spacing widths between the cables.

(b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22(A) for the appropriate cable tray width.

(c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the calculation in Column 2 of Table 392.22(A) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

(2) Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray. A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(3) Where solid bottom cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed 90 percent of the cable tray width, and the cables shall be installed in a single layer.

(b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 3 of Table 392.22(A) for the appropriate cable tray width.

(c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the computation in Column 4 of Table 392.22(A) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

(4) Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray. A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(5) Where ventilated channel cable trays contain multiconductor cables of any type, the following shall apply:

(a) Where only one multiconductor cable is installed, the cross-sectional area shall not exceed the value specified in Column 1 of Table 392.22(A)(5).

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cables shall not exceed the value specified in Column 2 of Table 392.22(A)(5).

Table 392.22(A)(5) Allowable Cable Fill Area for Multiconductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables			
		Column 1 One Cable		Column 2 More Than One Cable	
mm	in.	mm^2	in.^{2}	mm^2	in.^{2}
75	3	1500	2.3	850	1.3
100	4	2900	4.5	1600	2.5
150	6	4500	7.0	2450	3.8

(6) Where solid channel cable trays contain multiconductor cables of any type, the following shall apply:

(a) Where only one multiconductor cable is installed, the cross-sectional area of the cable shall not exceed the value specified in Column 1 of Table 392.22(A)(6).

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cable shall not exceed the value specified in Column 2 of Table 392.22(A)(6).

Table 392.22(A) Allowable Cable Fill Area for Multiconductor Cables in Ladder, Ventilated Trough, or Solid Bottom Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables: Ladder or Ventilated Trough Cable Trays, 392.22(A)(1)				Solid Bottom Cable Trays, 392.22(A)(3)			
		Column 1 Applicable for 392.22(A)(1)(b) Only		Column 2[a] Applicable for 392.22(A)(1)(c) Only		Column 3 Applicable for 392.22(A)(3)(b) Only		Column 4[a] Applicable for 392.22(A)(3)(c) Only	
mm	in.	mm^2	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}
150	6.0	4,500	7.0	4,500 – (30 Sd)[b]	7– (1.2 Sd)[b] 3,500	5.5	3,500–(25 Sd[b]	5.5–Sd[b]	
225	9.0	6,800	10.5	6,800 – (30 Sd)	10.5– (1.2 Sd)	5,100	8.0	5,100–(25 Sd)	8.0–Sd
300	12.0	9,000	14.0	9,000 – (30 Sd)	14– (1.2 Sd)	7,100	11.0	7,100–(25 Sd)	11.0–Sd
450	18.0	13,500	21.0	13,500 – (30 Sd)	21– (1.2 Sd)	10,600	16.5	10,600–(25 Sd)	16.5–Sd
600	24.0	18,000	28.0	18,000 – (30 Sd)	28– (1.2 Sd)	14,200	22.0	14,200–(25 Sd)	22.0–Sd
750	30.0	22,500	35.0	22,500 – (30 Sd)	35– (1.2 Sd)	17,700	27.5	17,700–(25 Sd)	27.5–Sd
900	36.0	27,000	42.0	27,000 – (30 Sd)	42– (1.2 Sd)	21,300	33.0	21,300–(25 Sd)	33.0–Sd

[a]The maximum allowable fill areas in Columns 2 and 4 shall be calculated. For example, the maximum allowable fill in mm^2 for a 150-mm wide cable tray in Column 2 shall be 4500 minus (30 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 7 minus (1.2 multiplied by Sd)].

[b]The term Sd in Columns 2 and 4 is equal to the sum of the diameters, in mm, of all cables 107.2 mm (in inches, of all 4/0 AWG) and larger multiconductor cables in the same cable tray with smaller cables.

Table 392.22(A)(6) Allowable Cable Fill Area for Multiconductor Cables in Solid Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Column 1 One Cable		Column 2 More than One Cable	
mm	in.	mm²	in.²	mm²	in.²
50	2	850	1.3	500	0.8
75	3	1300	2.0	700	1.1
100	4	2400	3.7	1400	2.1
150	6	3600	5.5	2100	3.2

(B) Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays.
The number of single-conductor cables, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes herein apply to both aluminum and copper conductors.

(1) Where ladder or ventilated trough cable trays contain single-conductor cables, the maximum number of single conductors shall conform to the following:

(a) Where all of the cables are 1000 kcmil or larger, the sum of the diameters of all single-conductor cables shall not exceed cable tray width, and the cables shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

(b) Where all of the cables are from 250 kcmil through 900 kcmil, the sum of the cross-sectional areas of all single-conductor cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22(B)(1) for the appropriate cable tray width.

(c) Where 1000 kcmil or larger single-conductor cables are installed in the same cable tray with single-conductor cables smaller than 1000 kcmil, the sum of the cross-sectional areas of all cables smaller than 1000 kcmil shall not exceed the maximum allowable fill area resulting from the computation in Column 2 of Table 392.22(B)(1) for the appropriate cable tray width.

(d) Where any of the single conductor cables are 1/0 through 4/0 AWG, the sum of the diameters of all single conductor cables shall not exceed the cable tray width.

Table 392.22(B)(1) Allowable Cable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays for Cables Rated 2000 Volts or Less

Maximum Allowable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays

Inside Width of Cable Tray		Column 1 Applicable for 392.22(B)(1)(b) Only		Column 2[a] Applicable for 392.22(B)(1)(c) Only	
mm	in.	mm²	in.²	mm²	in.²
150	6	4,200	6.5	4,200 – (28 Sd)[b]	6.5 – (1.1 Sd)[b]
225	9	6,100	9.5	6,100 – (28 Sd)	9.5 – (1.1 Sd)
300	12	8,400	13.0	8,400 – (28 Sd)	13.0 – (1.1 Sd)
450	18	12,600	19.5	12,600 – (28 Sd)	19.5 – (1.1 Sd)
600	24	16,800	26.0	16,800 – (28 Sd)	26.0 – (1.1 Sd)
750	30	21,000	32.5	21,000 – (28 Sd)	32.5 – (1.1 Sd)
900	36	25,200	39.0	25,200 – (28 Sd)	39.0 – (1.1 Sd)

[a]The maximum allowable fill areas in Column 2 shall be calculated. For example, the maximum allowable fill, in mm², for a 150 mm wide cable tray in Column 2 shall be 4200 minus (28 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 6.5 minus (1.1 multiplied by Sd)].
[b]The term Sd in Column 2 is equal to the sum of the diameters, in mm, of all cables 507 mm² (in inches, of all 1000 kcmil) and larger single-conductor cables in the same ladder or ventilated trough cable tray with small cables.

(2) Where 50 mm (2 in.), 75 mm (3 in.), 100 mm (4 in.), or 150 mm (6 in.) wide ventilated channel cable trays contain single-conductor cables, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.

(C) Number of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.
The number of cables rated 2001 volts or over permitted in a single cable tray shall not exceed the requirements of this section.
The sum of the diameters of single-conductor and multiconductor cables shall not exceed the cable tray width, and the cables shall be installed in a single layer. Where single conductor cables are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.

392.30 Securing and Supporting
(A) Securely Fastened. In other than horizontal runs, the cables shall be fastened securely to transverse members of the cable trays.
(B) Supports. Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.
Cable trays shall be supported at intervals in accordance with the installation instructions.
392.46 Bushed Conduit and Tubing. A box shall not be required where cables or conductors are installed in bushed conduit and tubing used for support or for protection against physical damage.
392.56 Cable Splices.
Cable splices made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible. Splices shall be permitted to project above the side rails where not subject to physical damage.
392.60 Grounding and Bonding.
(A) Metallic Cable Trays. Metallic cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with provisions of this section. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96 and Part IV of Article 250.
(B) Steel or Aluminum Cable Tray Systems. Steel or aluminum cable tray systems shall be permitted to be used as equipment grounding conductors, provided all the following requirements are met:
(1) The cable tray sections and fittings are identified as an equipment grounding conductor.
(2) The minimum cross-sectional area of cable trays conform to the requirements in Table 392.60(A).
(3) All cable tray sections and fittings are legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction and the total cross-sectional area of both side rails for ladder or trough cable tray.
(4) Cable tray sections, fittings, and connected raceways are bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

Table 392.60(A) Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal[a] Steel Cable Trays		Aluminum Cable Trays	
	mm²	in.²	mm²	in.²
60	129	0.20	129	0.20
100	258	0.40	129	0.20
200	451.5	0.70	129	0.20
400	645	1.00	258	0.40
600	967.5	1.50[b]	258	0.40
1000	---	---	387	0.60
1200	---	---	645	1.00
1600	---	---	967.5	1.50
2000	---	---	1290	2.00[b]

[a]Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.
[b]Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.

III. Construction Specifications
392.100 Construction.
(A) Strength and Rigidity. Cable trays shall have suitable strength and rigidity to provide adequate support for all contained wiring.
(B) Smooth Edges. Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.
(C) Corrosion Protection. Cable tray systems shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.
(D) Side Rails. Cable trays shall have side rails or equivalent structural members.
(E) Fittings. Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.

(F) Nonmetallic Cable Tray. Nonmetallic cable trays shall be made of flame-retardant material.

Substantiation: The rewrite includes changes in headings and numbering scheme to comply with the NEC Style Manual and for consistency with other Chapter 3 articles.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

BLOM, J.: The following revisions affirm the intent of CMP-8's CP804 action. These revisions further improve usability of the Article by providing needed additional subdivision, moving some text within the Article in order to more closely correspond to the titles and editing a few sentences for improved clarity.

The outline of the Article was revised as follows:

I. General
II. Installation
392.10 Uses Permitted
392.12 Uses Not Permitted
392.18 Cable Tray Installation
392.19 Cable Installation
392.22 Number of Conductors or Cables
392.30 Securing and Supporting of Cables
392.46 Bushed Conduit and Tubing
392.56 Cable Splices
392.60 Grounding and Bonding
392.80 Ampacity of Conductors
III. Construction Specifications
392.100 Construction

Note that Subdivisions 392.18 and 392.19 are changes to clarify for the reader the distinguishing requirements of cable tray installation vs. requirements for installing cables in the cable tray. The numbering of these subdivisions was selected to correspond to the numbering system in Article 300's sections 300.18 & 300.19.

Ampacity of Conductors was re-numbered to 392.80 so that the numbering would mimic that found in the Cable Articles 320, 328, 330, 332, 334, 336, and 340.

Another change was to reinstate the subdivision titles. These title additions are consistent with the Style Manual and very helpful for readers to find desired information.

The sentence clarifications or relocations are as follows:

1. Modification to NEC 2008 392.6(A) sentence beginning "where cable trays support individual conductors and where conductors pass from one cable tray to another.......". The modified sentence is : "Where cables or conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft)."

The substantiation for this clarification is: If you take this existing language literally, you can have a single conductor tray cable extend up to 6 ft. from one tray to another (or to a piece of equipment) but you *could not have a multi-conductor cable* do so without a raceway or other supporting means. This is not likely to have been CMP-8's intent. In fact, if you look at the picture in the NEC 2008 Handbook, Exhibit 392.2, you'll see "examples of multi-conductor cables in cable trays....." not single conductors as mentioned in 392.6(A).

2. Relocated NEC 2008 392.6 Complete System subdivision (A) sentence beginning "A bonding jumper sized…" to 392.60 Grounding and Bonding. This relocation places the text with the corresponding subdivision title.

3. Relocated NEC 2008 392.6 Complete System subdivision (A) sentence beginning "The conductors shall be secured…" to 392.30(C), Securing and Supporting of Cables. This relocation places the text with the corresponding subdivision title. Additionally, clarifying text was provided to indicate that the requirement for securing cables applied to transitions.

4. Finally, the second sentence of NEC 2008 392.6 (J) which begins "For raceways terminating at the tray,…" is changed to "Raceways terminating at the tray shall be securely fastened to the cable tray system." This revised sentence appears in this comment's revised Article text as 392.18 (H). The phrase "a listed cable tray clamp or adapter" is removed. The listing requirement for conduit to cable tray clamps is relocated to 392.60 to recognize that the listing applies for grounding and bonding, not support.

ARTICLE 392

Cable Trays

I. General

392.1 Scope. This article covers cable tray systems, including ladder, ventilated trough, ventilated channel, solid bottom, and other similar structures.

FPN: For further information on cable trays, see ANSI/NEMA–VE 1-1998, *Metal Cable Tray Systems*; NEMA–VE 2-1996, *Metal Cable Tray Installation Guidelines*; and NEMA–FG-1998, *Nonmetallic Cable Tray Systems.*

392.2 Definition.

Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.

II. Installation

392.10 Uses Permitted. Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits. Cable tray installations shall not be limited to industrial establishments. Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant. Cable trays and their associated fittings shall be identified for the intended use.

(A) Wiring Methods. The wiring methods in Table 392.10(A) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

Table 392.10(A) Wiring Methods

Wiring Method	Article
Armored cable	320
CATV cables	820
CATV raceways	820
Class 2 and Class 3 cables	725
Communications cables	800
Communications raceways	800
Electrical metallic tubing	358
Electrical nonmetallic tubing	362
Fire alarm cables	760
Flexible metal conduit	348
Flexible metallic tubing	360
Instrumentation tray cable	727
Intermediate metal conduit	342
Liquidtight flexible metal conduit	350
Liquidtight flexible nonmetallic conduit	356
Metal-clad cable	330
Mineral-insulated, metal-sheathed cable	332
Multiconductor service-entrance cable	338
Multiconductor underground feeder and branch-circuit cable	340
Network-powered broadband communications cables	830
Nonmetallic-sheathed cable	334
Non-power-limited fire alarm cable	760
Optical fiber cables	770
Optical fiber raceways	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays	
Polyvinyl chloride PVC conduit	352
Power and control tray cable	336
Power-limited fire alarm cable	760
Power-limited tray cable	725
Rigid metal conduit	344
Rigid nonmetallic conduit	352
RTRC	355
Signaling raceway	725

(B) In Industrial Establishments. The wiring methods in Table 392.10(A) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system, any of the cables in 392.10(B)(1) and (B)(2) shall be permitted to be installed in ladder, ventilated trough, solid bottom, or ventilated channel cable trays.

(1) Single-conductor cables shall be permitted to be installed in accordance with (B)(1)(a) through (B)(1)(c).

(a) Single-conductor cable shall be 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays. Where 1/0 AWG through 4/0 AWG single-conductor cables are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).

(b) Welding cables shall comply with the provisions of Article 630, Part IV.

(c) Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and they shall be 4 AWG or larger.

(2) Single and multiconductor medium voltage cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.10(B)(1).

(C) Hazardous (Classified) Locations. Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.

(D) Nonmetallic Cable Tray. In addition to the uses permitted elsewhere in 392.10, nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.

(E) Complete System. Cable trays shall be installed as a complete system. Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained. Cable tray systems shall be permitted to have mechanically discontinuous segments between cable tray runs or between cable tray runs and equipment. The system shall provide for the support of the cables in accordance with their corresponding articles.

Where cable trays support individual conductors and where the conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft). The conductors shall be secured to the cable tray(s) at the transition, and they shall be protected, by guarding or by location, from physical damage.

A bonding jumper sized in accordance with 250.102 shall connect the two sections of cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.

(F) Completed Before Installation. Each run of cable tray shall be completed before the installation of cables.

(G) Covers. In portions of runs where additional protection is required, covers or enclosures providing the required protection shall be of a material that is compatible with the cable tray.

(H) Through Partitions and Walls. Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.

(I) Exposed and Accessible. Cable trays shall be exposed and accessible except as permitted by 392.10(H).

(J) Adequate Access. Sufficient space shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables.

(K) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems. In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1. For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.

For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.

For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.

(L) Cable Installation.

(1) Multiconductor cables rated 600 volts or less shall be permitted to be installed in the same cable tray.

(2) Cables rated over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:

(a) The cables rated over 600 volts are Type MC.

(b) The cables rated over 600 volts are separated from the cables rated 600 volts or less by a solid fixed barrier of a material compatible with the cable tray

(M) Connected in Parallel. Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.

Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies.

(N) Single Conductors. Where any of the single conductors installed in ladder or ventilated trough cable trays are 1/0 through 4/0 AWG, all single conductors shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

392.12 Uses Not Permitted.

Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

392.17 Ampacity of Conductors

(A) Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays.

(1) The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.22(A) shall be as given in Table 310.16 and Table 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).

(a) The derating factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.

(b) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not over 95 percent of the allowable ampacities of Table 310.16 and Table 310.18 shall be permitted for multiconductor cables.

(c) Where multiconductor cables are installed in a single layer in uncovered trays, with a maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ambient temperature-corrected ampacities of multiconductor cables, with not more than three insulated conductors rated 0 through 2000 volts in free air, in accordance with 310.15(C).

FPN: See Table B.310.3.

(2) The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:

(a) Where installed according to the requirements of 392.22(B), the ampacities for 600 kcmil and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 600 kcmil and larger cables shall not exceed 70 percent of the allowable ampacities in Table 310.17 and Table 310.19.

(b) Where installed according to the requirements of 392.22(B), the ampacities for 1/0 AWG through 500 kcmil single-conductor cables in uncovered cable trays shall not exceed 65 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG through 500 kcmil cables shall not exceed 60 percent of the allowable ampacities in Table 310.17 and Table 310.19.

(c) Where single conductors are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.17 and Table 310.19.

Exception to (2)(c): For solid bottom cable trays the ampacity of single conductor cables shall be determined by 310.15(C).

(d) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free airspace of not less than 2.15 times one conductor diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities of two or three single insulated conductors rated 0 through 2000 volts supported on a messenger in accordance with 310.15(B).

FPN: See Table 310.20.

(3) Where a cable tray contains a combination of multiconductor and single-conductor cables, the allowable ampacities shall be as given in 392.17(A)(1) for multiconductor cables and 392.17(A)(2) for single-conductor cables, provided that the following conditions apply:

(a) The sum of the multiconductor cable fill area as a percentage of the allowable fill area for the tray calculated per 392.22(A), and the single-conductor cable fill area as a percentage of the allowable fill area for the tray calculated per 392.22(B), totals not more than 100 percent.

(b) Multiconductor cables are installed according to 392.22(A) and single-conductor cables are installed according to 392.22(B) and 392.10(M) and (N).

(B) Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.

The ampacity of cables, rated 2001 volts, nominal, or over, installed according to 392.22(C) shall not exceed the requirements of this section.

(1) The allowable ampacity of multiconductor cables shall be as given in Table 310.75 and Table 310.76, subject to the following provisions:

(a) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not more than 95 percent of the allowable ampacities of Table 310.75 and Table 310.76 shall be permitted for multiconductor cables.

(b) Where multiconductor cables are installed in a single layer in uncovered cable trays, with maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ampacities of Table 310.71 and Table 310.72.

(2) The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), shall comply with the following:

(a) The ampacities for 1/0 AWG and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.69 and Table 310.70. Where the cable trays are covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG and larger single-conductor cables shall not exceed 70 percent of the allowable ampacities in Table 310.69 and Table 310.70.

(b) Where single-conductor cables are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.69 and Table 310.70.

(c) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free air space of not less than 2.15 times the diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.67 and Table 310.68.

392.22 Number of Conductors or Cables

(A) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays.

The number of multiconductor cables, rated 2000 volts or less, permitted in a single cable tray shall not exceed the requirements of this section. The conductor sizes herein apply to both aluminum and copper conductors.

(1) Where ladder or ventilated trough cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed the cable tray width, and the cables shall be installed in a single layer. Where the cable ampacity is determined according to 392.17(A)(1)(c), the cable tray width shall not be less than the sum of the diameters of the cables and the sum of the required spacing widths between the cables.

(b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22(A) for the appropriate cable tray width.

(c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the calculation in Column 2 of Table 392.22(A) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

(2) Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray. A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(3) Where solid bottom cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed 90 percent of the cable tray width, and the cables shall be installed in a single layer.

(b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 3 of Table 392.22(A) for the appropriate cable tray width.

(c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the computation in Column 4 of Table 392.22(A) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

Table 392.22(A)(5) Allowable Cable Fill Area for Multiconductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables: Column 1 One Cable		Column 2 MoreThan One Cable	
mm	in.	mm^2	in.^{2}	mm^2	in.^{2}
75	3	1500	2.3	850	1.3
100	4	2900	4.5	1600	2.5
150	6	4500	7.0	2450	3.8

(6) Where solid channel cable trays contain multiconductor cables of any type, the following shall apply:

(a) Where only one multiconductor cable is installed, the cross-sectional area of the cable shall not exceed the value specified in Column 1 of Table 392.22(A)(6).

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cable shall not exceed the value specified in Column 2 of Table 392.22(A)(6).

Table 392.22(A)(6) Allowable Cable Fill Area for Multiconductor Cables in Solid Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Column 1 One Cable		Column 2 More than One Cable	
mm	in.	mm^2	in.^{2}	mm^2	in.^{2}
50	2	850	1.3	500	0.8
75	3	1300	2.0	700	1.1
100	4	2400	3.7	1400	2.1
150	6	3600	5.5	2100	3.2

(B) Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays.
The number of single-conductor cables, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes herein apply to both aluminum and copper conductors.

Table 392.22(A) Allowable Cable Fill Area for Multiconductor Cables in Ladder, Ventilated Trough, or Solid Bottom Cable Trays for Cables Rated 2000 Volts or Less

		Maximum Allowable Fill Area for Multiconductor Cables: Ladder or Ventilated Trough Cable Trays, 392.22(A)(1)				Solid Bottom Cable Trays, 392.22(A)(3)			
Inside Width of Cable Tray		Column 1 Applicable for 392.22(A)(1)(b) Only		Column 2[a] Applicable for 392.22(A)(1)(c) Only		Column 3 Applicable for 392.22(A)(3)(b) Only		Column 4[a] Applicable for 392.22(A)(3)(c) Only	
mm	in.	mm^2	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}	mm^2	in.^{2}
150	6.0	4,500	7.0	4,500 – (30 Sd)[b]	7– (1.2 Sd)[b]	3,500	5.5	3,500–(25 Sd[b])	5.5–Sd[b]
225	9.0	6,800	10.5	6,800 – (30 Sd)	10.5– (1.2 Sd)	5,100	8.0	5,100–(25 Sd)	8.0–Sd
300	12.0	9,000	14.0	9,000 – (30 Sd)	14– (1.2 Sd)	7,100	11.0	7,100–(25 Sd)	11.0–Sd
450	18.0	13,500	21.0	13,500 – (30 Sd)	21– (1.2 Sd)	10,600	16.5	10,600–(25 Sd)	16.5–Sd
600	24.0	18,000	28.0	18,000 – (30 Sd)	28– (1.2 Sd)	14,200	22.0	14,200–(25 Sd)	22.0–Sd
750	30.0	22,500	35.0	22,500 – (30 Sd)	35– (1.2 Sd)	17,700	27.5	17,700–(25 Sd)	27.5–Sd
900	36.0	27,000	42.0	27,000 – (30 Sd)	42– (1.2 Sd)	21,300	33.0	21,300–(25 Sd)	33.0–Sd

[a]The maximum allowable fill areas in Columns 2 and 4 shall be calculated. For example, the maximum allowable fill in mm^2 for a 150-mm wide cable tray in Column 2 shall be 4500 minus (30 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 7 minus (1.2 multiplied by Sd)].

[b]The term Sd in Columns 2 and 4 is equal to the sum of the diameters, in mm, of all cables 107.2 mm (in inches, of all 4/0 AWG) and larger multiconductor cables in the same cable tray with smaller cables.

(4) Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray. A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(5) Where ventilated channel cable trays contain multiconductor cables of any type, the following shall apply:

(a) Where only one multiconductor cable is installed, the cross-sectional area shall not exceed the value specified in Column 1 of Table 392.22(A)(5).

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cables shall not exceed the value specified in Column 2 of Table 392.22(A)(5).

(1) Where ladder or ventilated trough cable trays contain single-conductor cables, the maximum number of single conductors shall conform to the following:

(a) Where all of the cables are 1000 kcmil or larger, the sum of the diameters of all single-conductor cables shall not exceed cable tray width, and the cables shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

(b) Where all of the cables are from 250 kcmil through 900 kcmil, the sum of the cross-sectional areas of all single-conductor cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22(B)(1) for the appropriate cable tray width.

(c) Where 1000 kcmil or larger single-conductor cables are installed in the same cable tray with single-conductor cables smaller than 1000 kcmil, the sum of the cross-sectional areas of all cables smaller than 1000 kcmil shall

not exceed the maximum allowable fill area resulting from the computation in Column 2 of Table 392.22(B)(1) for the appropriate cable tray width.
(d) Where any of the single conductor cables are 1/0 through 4/0 AWG, the sum of the diameters of all single conductor cables shall not exceed the cable tray width.

Table 392.22(B)(1) Allowable Cable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays for Cables Rated 2000 Volts or Less

Maximum Allowable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays

Inside Width of Cable Tray		Column 1 Applicable for 392.22(B)(1)(b) Only		Column 2[a] Applicable for 392.22(B)(1)(c) Only	
mm	in.	mm^2	$in.^2$	mm^2	$in.^2$
150	6	4,200	6.5	4,200 – (28 Sd)[b]	6.5 – (1.1 Sd)[b]
225	9	6,100	9.5	6,100 – (28 Sd)	9.5 – (1.1 Sd)
300	12	8,400	13.0	8,400 – (28 Sd)	13.0 – (1.1 Sd)
450	18	12,600	19.5	12,600 – (28 Sd)	19.5 – (1.1 Sd)
600	24	16,800	26.0	16,800 – (28 Sd)	26.0 – (1.1 Sd)
750	30	21,000	32.5	21,000 – (28 Sd)	32.5 – (1.1 Sd)
900	36	25,200	39.0	25,200 – (28 Sd)	39.0 – (1.1 Sd)

[a]The maximum allowable fill areas in Column 2 shall be calculated. For example, the maximum allowable fill, in mm^2, for a 150 mm wide cable tray in Column 2 shall be 4200 minus (28 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 6.5 minus (1.1 multiplied by Sd)].
[b]The term Sd in Column 2 is equal to the sum of the diameters, in mm, of all cables 507 mm^2 (in inches, of all 1000 kcmil) and larger single-conductor cables in the same ladder or ventilated trough cable tray with small cables.
(2) Where 50 mm (2 in.), 75 mm (3 in.), 100 mm (4 in.), or 150 mm (6 in.) wide ventilated channel cable trays contain single-conductor cables, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.
(C) Number of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.
The number of cables rated 2001 volts or over permitted in a single cable tray shall not exceed the requirements of this section.
The sum of the diameters of single-conductor and multiconductor cables shall not exceed the cable tray width, and the cables shall be installed in a single layer. Where single conductor cables are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.
392.30 Securing and Supporting
(A) Securely Fastened. In other than horizontal runs, the cables shall be fastened securely to transverse members of the cable trays.
(B) Supports. Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.
Cable trays shall be supported at intervals in accordance with the installation instructions.
392.46 Bushed Conduit and Tubing. A box shall not be required where cables or conductors are installed in bushed conduit and tubing used for support or for protection against physical damage.
392.56 Cable Splices.
Cable splices made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible. Splices shall be permitted to project above the side rails where not subject to physical damage.
392.60 Grounding and Bonding.
(A) Metallic Cable Trays. Metallic cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with provisions of this section. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96 and Part IV of Article 250.
(B) Steel or Aluminum Cable Tray Systems. Steel or aluminum cable tray systems shall be permitted to be used as equipment grounding conductors, provided all the following requirements are met:
(1) The cable tray sections and fittings are identified as an equipment grounding conductor.
(2) The minimum cross-sectional area of cable trays conform to the requirements in Table 392.60(A).
(3) All cable tray sections and fittings are legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction and the total cross-sectional area of both side rails for ladder or trough cable tray.
(4) Cable tray sections, fittings, and connected raceways are bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

Table 392.60(A) Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal[a] Steel Cable Trays		Aluminum Cable Trays	
	mm^2	$in.^2$	mm^2	$in.^2$
60	129	0.20	129	0.20
100	258	0.40	129	0.20
200	451.5	0.70	129	0.20
400	645	1.00	258	0.40
600	967.5	1.50[b]	258	0.40
1000	---	---	387	0.60
1200	---	---	645	1.00
1600	---	---	967.5	1.50
2000	---	---	1290	2.00[b]

[a]Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.
[b]Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.
III. Construction Specifications
392.100 Construction.
(A) Strength and Rigidity. Cable trays shall have suitable strength and rigidity to provide adequate support for all contained wiring.
(B) Smooth Edges. Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.
(C) Corrosion Protection. Cable tray systems shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.
(D) Side Rails. Cable trays shall have side rails or equivalent structural members.
(E) Fittings. Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.
(F) Nonmetallic Cable Tray. Nonmetallic cable trays shall be made of flame-retardant material.

8-236 Log #10 NEC-P08 **Final Action: Accept in Principle**
(392)

NOTE: This proposal appeared as Comment 8-77 on Proposal 8-180 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-180 was:
Move:
392.3 to 392.10
392.4 to 392.12
Relocate and renumber existing 392.10 and 392.12.
Submitter: Richard E. Loyd, Sun Lakes, AZ, James Imlah
Recommendation: Revise Article 392 as follows:

ARTICLE 392 Cable Tray~~s~~ Systems

I. General

392.1 Scope. This article covers cable tray systems, including ladder, ventilated trough, ventilated channel, solid bottom, and other similar structures.

FPN: For further information on cable trays, see ANSI/NEMA–VE 1-1998,Metal Cable Tray Systems; NEMA–VE 2-1996, Metal Cable Tray Installation Guidelines; and NEMA–FG-1998, Nonmetallic Cable Tray Systems.

392.2 Definition.
Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.
FPN. Cable trays are not raceways they are mechanical support systems. See definition of raceway in Article 100.

ll. Installation

392.~~3~~ 10 Uses Permitted.
Complete System. Cable trays shall be installed as a complete system. ~~Cable trays and their associated fittings shall be identified for the intended use.~~
(A) Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits.

(B) Cable tray installations shall not be limited to industrial establishments.

(C) Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant.

(D) Cable tray systems shall be permitted to have mechanically discontinuous segments between cable tray runs or between cable tray runs and equipment. The system shall provide for the support of the cables in accordance with their corresponding articles.

(E Where cable trays support individual conductors and where the conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft). The conductors shall be secured to the cable tray(s) at the transition, and they shall be protected, by guarding or by location, from physical damage.

(F) In all ~~L~~ locations ~~(A) Wiring Methods. T~~the wiring methods in Table 392.~~3~~10~~(A)~~ (F) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

Table 392.~~3~~10~~(A)(6)~~ (F) Wiring Methods

Wiring Method	Article	Section
Armored cable	320	
Communication raceways	800	
Electrical metallic tubing	358	
Electrical nonmetallic tubing	362	
Fire alarm cables	760	
Flexible metal conduit	348	
Flexible metallic tubing	360	
Instrumentation tray cable	727	
Intermediate metal conduit	342	
Liquidtight flexible metal conduit	350	
Liquidtight flexible nonmetallic conduit	356	
Metal-clad cable	330	
Mineral-insulated, metal-sheathed cable	332	
Multiconductor service-entrance cable	338	
Multiconductor underground feeder and branch-circuit cable	340	
Multipurpose and communications cables	800	
Nonmetallic-sheathed cable	334	
Power and control tray cable	336	
Power-limited tray cable		725.61(C) and 725.82(E)
Optical fiber cables	770	
Optical fiber raceways	770	
Rigid metal conduit	344	
Rigid nonmetallic conduit	352	
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays.		

~~B)~~ (G) In Industrial Establishments Only. The wiring methods in Table 392.~~3(A)~~ 10 (F) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system any of ~~the~~ cables in 392.~~3~~ 10(G) (1) ~~(B)(1)~~ and (G) (4) ~~(B)(2)~~ shall be permitted to be installed in ladder, ventilated trough, solid bottom, or ventilated channel cable trays.
~~(1) Single Conductors. Single-conductor cables shall be permitted to be installed in accordance with (B)(1)(a) through (B)(1)(c).~~
~~(a)~~ (1) Single-conductor cable shall be 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays. Where 1/0 AWG through 4/0 AWG single-conductor cables are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).

~~(b)~~ (2) Welding cables shall comply with the provisions of Article 630, Part IV.

~~(c)~~ (3) Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and they shall be 4 AWG or larger.

~~(2)~~ ~~(d)~~ (4) Medium Voltage. Single- and multiconductor medium voltage cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.~~3(B)(1)~~10~~(5)(a).~~(G)(1)

~~(C)~~ (H) Equipment Grounding Conductors. Metallic cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with provisions of 392.~~7~~ 60.

~~(D)~~ (I) Hazardous (Classified) Locations. Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.

~~(E)~~ (J) Nonmetallic Cable Tray. In addition to the uses permitted elsewhere in 392.~~3~~ (10), nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.

~~392.6 (E)~~ (K) Multiconductor Cables Rated 600 Volts or Less. Multiconductor cables rated 600 volts or less shall be permitted to be installed in the same cable tray.
~~392.6(F)~~ (L)Cables Rated Over 600 Volts. Cables rated over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:
(1) The cables rated over 600 volts are Type MC.
(2) The cables rated over 600 volts are separated from the cables rated 600 volts or less by a solid fixed barrier of a material compatible with the cable tray.

~~392.6(G)~~ (M)Through Partitions and Walls. Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.

~~392.6(H)~~ (N) Exposed and Accessible. Cable trays shall be exposed and accessible except as permitted by 392.~~6(G)~~ 10(~~13)~~ (M).

~~392.6(I)~~ (O) Adequate Access. Sufficient space shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables.

392.~~4~~12 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

~~392.6(B)~~ 392.22 Conductors and Multiconductor Cables Completed Before Installation. Each run of cable tray shall be completed before the installation of cables.

~~392.8(D)~~ (A) Connected in Parallel.
(1) Where single conductor cables comprising each phase, neutral; or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.
(2) Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies.

~~392.8(E)~~ (B) Single Conductors. Where any of the single conductors installed in ladder or ventilated trough cable trays are 1/0 through 4/0 AWG, all single conductors shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

~~392.9~~ (C) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays.
The number of multiconductor cables, rated 2000 volts or less, permitted in a single cable tray shall not exceed the requirements of this section. The conductor sizes herein apply to both aluminum and copper conductors.
(~~A~~) (1) Any Mixture of Cables. Where ladder or ventilated trough cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:
~~(1)~~ (a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.
~~(2)~~ (b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.~~9~~ 22 (C) for the appropriate cable tray width.
~~(3)~~ (c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the calculation in Column 2 of Table 392.~~9~~ 22 (C) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

INSERT TABLE 392.22 HERE (LANDSCAPE) (Not submitted)

(~~B~~) (2) Multiconductor Control and/or Signal Cables Only.
(a) Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray.
(b) A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).
(~~C~~) (3) Solid Bottom Cable Trays Containing Any Mixture. Where solid bottom cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:
~~(1)~~ (a) where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed 90 percent of the cable tray width, and the cables shall be installed in a single layer.
~~(2)~~ (b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 3 of Table 392.~~9~~ 22 (C)for the appropriate cable tray width.
~~(3)~~ (c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the computation in Column 4 of Table 392.~~9~~ 22 (C) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.
(~~D~~) (4) Solid Bottom Cable Tray — Multiconductor Control and/or Signal Cables Only.
(a) Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray.
(b) A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).
(~~E~~) (5) Ventilated Channel Cable Trays. Where ventilated channel cable trays contain multiconductor cables of any type, the following shall apply:
~~(1)~~ (a) Where only one multiconductor cable is installed, the cross-sectional area shall not exceed the value specified in Column 1 of Table 392.~~9(E).~~22 (C) (5)
~~(2)~~ (b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cables shall not exceed the value specified in Column 2 of Table 392.~~9(E).~~22 (C) (5)

Table ~~392.9(E)~~ 392.22(C)(5) Allowable Cable Fill Area for Multiconductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables			
		Column 1 One Cable		Column 2 More Than One Cable	
mm	in.	mm2	in.2	mm2	in.2
75	3	1500	2.3	850	1.3
100	4	2900	4.5	1600	2.5
150	6	4500	7.0	2450	3.8

(~~F~~) (6) Solid Channel Cable Trays. Where solid channel cable trays contain multiconductor cables of any type, the following shall apply:
~~(1)~~ (a) Where only one multiconductor cable is installed, the cross-sectional area of the cable shall not exceed the value specified in Column 1 of Table 392.~~9(F)~~ 22 (C) (6).
~~(2)~~ (b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cable shall not exceed the value specified in Column 2 of Table 392.~~9(F)~~ 22 (C) (6).

Table ~~392.9(F)~~392.22(C)(6) Allowable Cable Fill Area for Multiconductor Cables in Solid Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Column 1 One Cable		Column 2 More Than One Cable	
mm	in.	mm2	in.2	mm2	in.2
50	2	850	1.3	500	0.8
75	3	1300	2.0	700	1.1
100	4	2400	3.7	1400	2.1
150	6	3600	5.5	2100	3.2

~~392.10~~ 392.22 (D) Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays.
The number of single-conductor cables, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes herein apply to both aluminum and copper conductors.
~~(A)~~ (1) Ladder or Ventilated Trough Cable Trays. Where ladder or ventilated trough cable trays contain single-conductor cables, the maximum number of single conductors shall conform to the following:
~~(1)~~ (a) Where all of the cables are 1000 kcmil or larger, the sum of the diameters of all single conductor cables shall not exceed cable tray width, and the cables shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.
~~(2)~~ (b) Where all of the cables are from 250 kcmil up to 1000 kcmil, the sum of the cross-sectional areas of all single-conductor cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.~~10(A)~~ 22(D) for the appropriate cable tray width.
~~(3)~~ (c) Where 1000 kcmil or larger single-conductor cables are installed in the same cable tray with single-conductor cables smaller than 1000 kcmil, the sum of the cross-sectional areas of all cables smaller than 1000 kcmil shall not exceed the maximum allowable fill area resulting from the computation in Column 2 of Table ~~392.10(A~~) 392.22(D) for the appropriate cable tray width.
~~(4)~~ d Where any of the single conductor cables are 1/0 through 4/0 AWG, the sum of the diameters of all single conductor cables shall not exceed the cable tray width.
~~(B)~~ (2) Ventilated Channel Cable Trays. Where 50 mm (2 in.), 75 mm (3 in.), 100 mm (4 in.), or 150 mm (6 in.) wide ventilated channel cable trays contain single-conductor cables, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.

Table ~~392.10(A)~~ 392.22 (D) Allowable Cable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays			
		Column 1 Applicable for 392.~~10(A)(2)~~ 22 (D) (1) (b) Only		Column 2a Applicable for 392.~~10(A)(3)~~ 392.22 (D) (1) (c) Only	
mm	in.	mm2	in.2	mm2	in.2
150	6	4,200	6.5	4,200 – (28 Sd)[b]	6.5 – (1.1 Sd)[b]
225	9	6,100	9.5	6,100 – (28 Sd)	9.5 – (1.1 Sd)
300	12	8,400	13.0	8,400 – (28 Sd)	13.0 – (1.1 Sd)
450	18	12,600	19.5	12,600 – (28 Sd)	19.5 – (1.1 Sd)
600	24	16,800	26.0	16,800 – (28 Sd)	26.0 – (1.1 Sd)
750	30	21,000	32.5	21,000 – (28 Sd)	32.5 – (1.1 Sd)
900	36	25,200	39.0	25,200 – (28 Sd)	39.0 – (1.1 Sd)

[a]The maximum allowable fill areas in Column 2 shall be calculated. For example, the maximum allowable fill, in mm2, for a 150 mm wide cable tray in Column 2 shall be 4200 minus (28 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 6.5 minus (1.1 multiplied by Sd)].

[b]The term Sd in Column 2 is equal to the sum of the diameters, in mm, of all cables 507 mm2 (in inches, of all 1000 kcmil) and larger single-conductor cables in the same ladder or ventilated trough cable tray with small cables.

~~392.12~~ (E) Number of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.

The number of cables rated 2001 volts or over permitted in a single cable tray shall not exceed the requirements of this section.

(1) The sum of the diameters of single-conductor and multiconductor cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

(2) Where single conductor cables are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.

~~392.6(A)~~ 392.24 Field Bends or Modifications ~~How Made.~~ Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained.

~~392.5(B)~~ 392.28 Smooth Edges. Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.

~~392.6(C)~~ 392.30 Supports.

A. Cable Supports

(1)Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.

~~392.8 (B)~~(2) (B) ~~Fastened Securely.~~ In other than horizontal runs, the cables shall be fastened securely to transverse members of the cable trays.

~~(A)~~ (B) Cable trays shall be supported at intervals in accordance with the installation instructions.

~~(B)~~ (C) ~~392.6(J)~~ Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.

(1) In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1.

~~(a)~~ (2) For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.

~~(b)~~ (3) For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.

~~(c)~~ (4) For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.

~~392.5 (E) & 392.3~~ 392.40 ~~(D) Boxes and~~ Fittings and Covers.

~~392.5(E)~~ 392.40(A) Fittings.

(1) Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.

~~392.3~~ (2) Cable trays and associated fittings shall be identified for the intended use.

~~392.6(D)~~(B) Covers. In portions of runs where additional protection is required, covers or enclosures providing the required protection shall be of a material that is compatible with the cable tray.

~~392.8(C)~~ 392.46 Bushed Conduit and Tubing. A box shall not be required where cables or conductors are installed in bushed conduit and tubing used for support or for protection against physical damage.

~~392.8(A)~~ 392.56 Cable Splices. Cable splices made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible and do not project above the side rails.

392.60 Grounding and Bonding.

~~392.7~~ 392.60 (A) Grounding

(A) Metallic Cable Trays. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96.

(~~B~~ 1) Steel or Aluminum Cable Tray Systems. Steel or aluminum cable tray systems shall be permitted to be used as equipment grounding conductors, provided that all the following requirements are met:

~~(1)~~ a The cable tray sections and fittings shall be identified for grounding purposes.

~~(2)~~ b The minimum cross-sectional area of cable trays shall conform to the requirements in Table 392.~~7(B).~~60 (A)

~~(3)~~ c All cable tray sections and fittings shall be legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction, and the total cross-sectional area of both side rails for ladder or trough cable trays.

~~(4)~~ d Cable tray sections, fittings, and connected raceways shall be bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

~~Table 392.7(B)~~ Table 392.60(A) Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Minimum Cross-Sectional Area of Metal[a]

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	**Minimum Cross-Sectional Area of Metal[a]**			
	Steel Cable Trays		**Aluminum Cable Trays**	
	mm2	**in.2**	**mm2**	**in.2**
60	129	0.20	129	0.20
100	258	0.40	129	0.20
200	451.5	0.70	129	0.20
400	645	1.00	258	0.40
600	967.5	1.50[b]	258	0.40
1000	—	—	387	0.60
1200	—	—	645	1.00
1600	—	—	967.5	1.50
2000	—	—	1290	2.00[b]

[a]Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.

[b]Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.

~~292.6(A)~~ 392.60(B) Bonding. A bonding jumper sized in accordance with 250.102 shall connect the two sections of cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.

~~392.11~~ 392. 80 Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays.
(A) Multiconductor Cables. The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.9 shall be as given in Table 310.16 and Table 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).
(1) The derating factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.
(2) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not over 95 percent of the allowable ampacities of Table 310.16 and Table 310.18 shall be permitted for multiconductor cables.
(3) Where multiconductor cables are installed in a single layer in uncovered trays, with a maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ambient temperature-corrected ampacities of multiconductor cables, with not more than three insulated conductors rated 0 through 2000 volts in free air, in accordance with 310.15(C).
FPN: See Table B.310.3.
(B) Single-Conductor Cables. The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:
(1) Where installed according to the requirements of 392.10, the ampacities for 600 kcmil and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 600 kcmil and larger cables shall not exceed 70 percent of the allowable ampacities in Table 310.17 and Table 310.19.
(2) Where installed according to the requirements of 392.10, the ampacities for 1/0 AWG through 500 kcmil single-conductor cables in uncovered cable trays shall not exceed 65 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG through 500 kcmil cables shall not exceed 60 percent of the allowable ampacities in Table 310.17 and Table 310.19.
(3) Where single conductors are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.17 and Table 310.19.

Exception to (B)(3): For solid bottom cable trays the ampacity of single conductor cables shall be determined by 310.15(C).
(4) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free airspace of not less than 2.15 times one conductor diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities of two or three single insulated conductors rated 0 through 2000 volts supported on a messenger in accordance with 310.15(B).
FPN: See Table 310.20.

~~392.13~~ ~~392.64~~(C) Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.
The ampacity of cables rated 2001 volts, nominal, or over, installed according to ~~392.12~~ 392.22(E) shall not exceed the requirements of this section.
(A) Multiconductor Cables (2001 Volts or Over). The allowable ampacity of multiconductor cables shall be as given in Table 310.75 and Table 310.76, subject to the following provisions:
(1) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not more than 95 percent of the allowable ampacities of Table 310.75 and Table 310.76 shall be permitted for multiconductor cables.
(2) Where multiconductor cables are installed in a single layer in uncovered cable trays, with maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ampacities of Table 310.71 and Table 310.72.

(B) Single-Conductor Cables (2001 Volts or Over). The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), shall comply with the following:
(1) The ampacities for 1/0 AWG and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.69 and Table 310.70. Where the cable trays are covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG and larger single-conductor cables shall not exceed 70 percent of the allowable ampacities in Table 310.69 and Table 310.70.
(2) Where single-conductor cables are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.69 and Table 310.70.

(3) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free air space of not less than 2.15 times the diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in

III Construction Specifications

~~392.5 Construction Specifications~~.

~~392.5~~ 392.100 Construction

(A) Strength and Rigidity. Cable trays shall have suitable strength and rigidity to provide adequate support for all contained wiring.

~~392.5 (D)~~ (B) Side Rails. Cable trays shall have side rails or equivalent structural members.

~~392.5(C)~~ 392.110 Corrosion Protection. Cable tray systems shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.

~~392.5(F)~~ 392.116 Nonmetallic Cable Tray. Nonmetallic cable trays shall be made of flame-retardant material.

Revised Article 392 would show as follows:

ARTICLE 392 Cable Tray Systems

I. General

392.1 Scope. This article covers cable tray systems, including ladder, ventilated trough, ventilated channel, solid bottom, and other similar structures.

FPN: For further information on cable trays, see ANSI/NEMA–VE 1-1998,Metal Cable Tray Systems; NEMA–VE 2-1996, Metal Cable Tray Installation Guidelines; and NEMA–FG-1998, Nonmetallic Cable Tray Systems.

392.2 Definition.

Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.

FPN. Cable trays are not raceways they are mechanical support systems. See definition of raceway in Article 100.

ll. Installation

392.10 Uses Permitted.

Complete System. Cable trays shall be installed as a complete system.

(A) Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits.

(B) Cable tray installations shall not be limited to industrial establishments.

(C) Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant.

(D) Cable tray systems shall be permitted to have mechanically discontinuous segments between cable tray runs or between cable tray runs and equipment. The system shall provide for the support of the cables in accordance with their corresponding articles.

(E) Where cable trays support individual conductors and where the conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft). The conductors shall be secured to the cable tray(s) at the transition, and they shall be protected, by guarding or by location, from physical damage.

(F) In all locations the wiring methods in Table 392.10 (F) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections

Table 392.10-(F) Wiring Methods

Wiring Method	ArticleSection
Armored cable	320
Communication raceways	800
Electrical metallic tubing	358
Electrical nonmetallic tubing	362
Fire alarm cables	760
Flexible metal conduit	348
Flexible metallic tubing	360
Instrumentation tray cable	727
Intermediate metal conduit	342
Liquidtight flexible metal conduit	350
Liquidtight flexible nonmetallic conduit	356
Metal-clad cable	330
Mineral-insulated, metal-sheathed cable	332
Multiconductor service-entrance cable	338
Multiconductor underground feeder and branch-circuit cable	340
Multipurpose and communications cables	800
Nonmetallic-sheathed cable	334
Power and control tray cable	336
Power-limited tray cable	725.61(C) and 725.82(E)
Optical fiber cables	770
Optical fiber raceways	770
Rigid metal conduit	344
Rigid nonmetallic conduit	352

Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays.

(G) In Industrial Establishments Only. The wiring methods in Table 392.10 (F) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system any of the cables in 392.10(G) (1) and (G) (4) shall be permitted to be installed in ladder, ventilated trough, solid bottom, or ventilated channel cable trays.

(1) Single-conductor cable shall be 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays. Where 1/0 AWG through 4/0 AWG single-conductor cables are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).

(2) Welding cables shall comply with the provisions of Article 630, Part IV.

(3)Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and they shall be 4 AWG or larger.

(4) Medium Voltage. Single- and multiconductor medium voltage cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.10(G) (1)

(H) Equipment Grounding Conductors. Metallic cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with provisions of 392.60.

(I) Hazardous (Classified) Locations. Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.

(J) Nonmetallic Cable Tray. In addition to the uses permitted elsewhere in 392.10, nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.

(K) Multiconductor Cables Rated 600 Volts or Less. Multiconductor cables rated 600 volts or less shall be permitted to be installed in the same cable tray.

(L)Cables Rated Over 600 Volts. Cables rated over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:

(1) The cables rated over 600 volts are Type MC.

(2) The cables rated over 600 volts are separated from the cables rated 600 volts or less by a solid fixed barrier of a material compatible with the cable tray.

(M)Through Partitions and Walls. Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.

(N) Exposed and Accessible. Cable trays shall be exposed and accessible except as permitted by 392.10 (M).

(O) Adequate Access. Sufficient space shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables.

392.12 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

392.22 Conductors and Multiconductor Cables Completed Before Installation. Each run of cable tray shall be completed before the installation of cables.

(A) Connected in Parallel.

(1) Where single conductor cables comprising each phase, neutral; or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.

(2) Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies.

(B) Single Conductors. Where any of the single conductors installed in ladder or ventilated trough cable trays are 1/0 through 4/0 AWG, all single conductors shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

(C) Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays.
The number of multiconductor cables, rated 2000 volts or less, permitted in a single cable tray shall not exceed the requirements of this section. The conductor sizes herein apply to both aluminum and copper conductors.

(1) Any Mixture of Cables. Where ladder or ventilated trough cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

(b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22 (C) for the appropriate cable tray width.

(c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the calculation in Column 2 of Table 392.22 (C) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

INSERT TABLE 392.22(c) HERE (LANDSCAPE) (Not submitted)

(2) Multiconductor Control and/or Signal Cables Only.

(a) Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray.

(b) A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(3) Solid Bottom Cable Trays Containing Any Mixture. Where solid bottom cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

(a) where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed 90 percent of the cable tray width, and the cables shall be installed in a single layer.

(b) Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 3 of Table 392.22 (C)for the appropriate cable tray width.

(c) Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the computation in Column 4 of Table 392.22 (C) for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

(4) Solid Bottom Cable Tray — Multiconductor Control and/or Signal Cables Only.

(a) Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray.

(b) A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(5) Ventilated Channel Cable Trays. Where ventilated channel cable trays contain multiconductor cables of any type, the following shall apply:

(a) Where only one multiconductor cable is installed, the cross-sectional area shall not exceed the value specified in Column 1 of Table 392.22 (C) (5)

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cables shall not exceed the value specified in Column 2 of Table 392.22 (C) (5)

Table 392.22(C)(5) Allowable Cable Fill Area for Multiconductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Multiconductor Cables			
		Column 1 One Cable		Column 2 More Than One Cable	
mm	**in.**	**mm2**	**in.2**	**mm2**	**in.2**
75	3	1500	2.3	850	1.3
100	4	2900	4.5	1600	2.5
150	6	4500	7.0	2450	3.8

(6) Solid Channel Cable Trays. Where solid channel cable trays contain multiconductor cables of any type, the following shall apply:

(a) Where only one multiconductor cable is installed, the cross-sectional area of the cable shall not exceed the value specified in Column 1 of Table 392.22 (C) (6).

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cable shall not exceed the value specified in Column 2 of Table 392.22 (C) (6).

Table 392.22(C) (6) Allowable Cable Fill Area for Multiconductor Cables in Solid Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Column 1 One Cable		Column 2 More Than One Cable	
mm	**in.**	**mm2**	**in.2**	**mm2**	**in.2**
50	2	850	1.3	500	0.8
75	3	1300	2.0	700	1.1
100	4	2400	3.7	1400	2.1
150	6	3600	5.5	2100	3.2

(D) Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays.

The number of single-conductor cables, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes herein apply to both aluminum and copper conductors.

(1) Ladder or Ventilated Trough Cable Trays. Where ladder or ventilated trough cable trays contain single-conductor cables, the maximum number of single conductors shall conform to the following:

(a) Where all of the cables are 1000 kcmil or larger, the sum of the diameters of all single conductor cables shall not exceed cable tray width, and the cables shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

(b) Where all of the cables are from 250 kcmil up to 1000 kcmil, the sum of the cross-sectional areas of all single-conductor cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22(D) for the appropriate cable tray width.

(c) Where 1000 kcmil or larger single-conductor cables are installed in the same cable tray with single-conductor cables smaller than 1000 kcmil, the sum of the cross-sectional areas of all cables smaller than 1000 kcmil shall not exceed the maximum allowable fill area resulting from the computation in Column 2 of Table 392.22(D) for the appropriate cable tray width.

(d) Where any of the single conductor cables are 1/0 through 4/0 AWG, the sum of the diameters of all single conductor cables shall not exceed the cable tray width.

(2) Ventilated Channel Cable Trays. Where 50 mm (2 in.), 75 mm (3 in.), 100 mm (4 in.), or 150 mm (6 in.) wide ventilated channel cable trays contain single-conductor cables, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.

Table 392.22 (D) Allowable Cable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Maximum Allowable Fill Area for Single-Conductor Cables in Ladder or Ventilated Trough Cable Trays			
		Column 1 Applicable for 392.22 (D) (1) (b) Only		Column 1 Applicable for 392.22 (D) (1) (b) Only	Column 2a Applicable for 392.22 (D) (1) (c) Only
mm	in.	mm2	in.2	mm2	in.2
150	6	4,200	6.5	4,200 – (28 Sd)[b]	6.5 – (1.1 Sd)[b]
225	9	6,100	9.5	6,100 – (28 Sd)	9.5 – (1.1 Sd)
300	12	8,400	13.0	8,400 – (28 Sd)	13.0 – (1.1 Sd)
450	18	12,600	19.5	12,600 – (28 Sd)	19.5 – (1.1 Sd)
600	24	16,800	26.0	16,800 – (28 Sd)	26.0 – (1.1 Sd)
750	30	21,000	32.5	21,000 – (28 Sd)	32.5 – (1.1 Sd)
900	36	25,200	39.0	25,200 – (28 Sd)	39.0 – (1.1 Sd)

[a]The maximum allowable fill areas in Column 2 shall be calculated. For example, the maximum allowable fill, in mm2, for a 150 mm wide cable tray in Column 2 shall be 4200 minus (28 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 6.5 minus (1.1 multiplied by Sd)].

[b]The term Sd in Column 2 is equal to the sum of the diameters, in mm, of all cables 507 mm2 (in inches, of all 1000 kcmil) and larger single-conductor cables in the same ladder or ventilated trough cable tray with small cables.

(E) Number of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays.

The number of cables rated 2001 volts or over permitted in a single cable tray shall not exceed the requirements of this section.

(1) The sum of the diameters of single-conductor and multiconductor cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

(2) Where single conductor cables are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.

392.24 Field Bends or Modifications. Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained.

392.28 Smooth Edges. Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.

392.30 Supports.
A. Cable Supports

(1)Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.

(2) In other than horizontal runs, the cables shall be fastened securely to transverse members of the cable trays.

(B) Cable trays shall be supported at intervals in accordance with the installation instructions.

(C) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.

(1) In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1.

(2) For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.

(3) For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.

(4) For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.

392.40 Fittings and Covers.

(A) Fittings.

(1) Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.

(2) Cable trays and associated fittings shall be identified for the intended use.

(B) Covers. In portions of runs where additional protection is required, covers or enclosures providing the required protection shall be of a material that is compatible with the cable tray.

392.46 Bushed Conduit and Tubing. A box shall not be required where cables or conductors are installed in bushed conduit and tubing used for support or for protection against physical damage.

392.56 Cable Splices. Cable splices made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible and do not project above the side rails.

392.60 Grounding and Bonding.

(A) Grounding

(1) Metallic Cable Trays. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96.

(2) Steel or Aluminum Cable Tray Systems. Steel or aluminum cable tray systems shall be permitted to be used as equipment grounding conductors, provided that all the following requirements are met:

(a) The cable tray sections and fittings shall be identified for grounding purposes.

(b) The minimum cross-sectional area of cable trays shall conform to the requirements in Table 392.60 (A)

(c) All cable tray sections and fittings shall be legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction, and the total cross-sectional area of both side rails for ladder or trough cable trays.

(d)Cable tray sections, fittings, and connected raceways shall be bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

Table 392.60(A) Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal[a]			
	Steel Cable Trays		Aluminum Cable Trays	
	mm2	in.2	mm2	in.2
60	129	0.20	129	0.20
100	258	0.40	129	0.20
200	451.5	0.70	129	0.20
400	645	1.00	258	0.40
600	967.5	1.50[b]	258	0.40
1000	—	—	387	0.60
1200	—	—	645	1.00
1600	—	—	967.5	1.50
2000	—	—	1290	2.00[b]

[a]Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.

[b]Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.

(B) Bonding. A bonding jumper sized in accordance with 250.102 shall connect the two sections of cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.

392.80 Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays.

(A) Multiconductor Cables. The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.9 shall be as given in Table 310.16 and Table 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).

(1) The derating factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.

(2) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not over 95 percent of the allowable ampacities of Table 310.16 and Table 310.18 shall be permitted for multiconductor cables.

(3) Where multiconductor cables are installed in a single layer in uncovered trays, with a maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ambient temperature-corrected ampacities of multiconductor cables, with not more than three insulated conductors rated 0 through 2000 volts in free air, in accordance with 310.15(C).

FPN: See Table B.310.3.

(B) Single-Conductor Cables. The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:

(1) Where installed according to the requirements of 392.10, the ampacities for 600 kcmil and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 600 kcmil and larger cables shall not exceed 70 percent of the allowable ampacities in Table 310.17 and Table 310.19.

(2) Where installed according to the requirements of 392.10, the ampacities for 1/0 AWG through 500 kcmil single-conductor cables in uncovered cable trays shall not exceed 65 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG through 500 kcmil cables shall not exceed 60 percent of the allowable ampacities in Table 310.17 and Table 310.19.

(3) Where single conductors are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.17 and Table 310.19.

Exception to (B)(3): For solid bottom cable trays the ampacity of single conductor cables shall be determined by 310.15(C).

(4) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free airspace of not less than 2.15 times one conductor diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities of two or three single insulated conductors rated 0 through 2000 volts supported on a messenger in accordance with 310.15(B).

FPN: See Table 310.20.

(C) Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays. The ampacity of cables rated 2001 volts, nominal, or over, installed according to 392.22(E) shall not exceed the requirements of this section.

(1) Multiconductor Cables (2001 Volts or Over). The allowable ampacity of multiconductor cables shall be as given in Table 310.75 and Table 310.76, subject to the following provisions:

(a) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not more than 95 percent of the allowable ampacities of Table 310.75 and Table 310.76 shall be permitted for multiconductor cables.

(b) Where multiconductor cables are installed in a single layer inuncovered cable trays, with maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ampacities of Table 310.71 and Table 310.72.

(2) Single-Conductor Cables (2001 Volts or Over). The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), shall comply with the following:

(a) The ampacities for 1/0 AWG and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.69 and Table 310.70. Where the cable trays are covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG and larger single-conductor cables shall not exceed 70 percent of the allowable ampacities in Table 310.69 and Table 310.70.

(b) Where single-conductor cables are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Table 310.69 and Table 310.70.

(c) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free air space of not less than 2.15 times the diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in

III Construction Specifications

392.100 Construction

(A) Strength and Rigidity. Cable trays shall have suitable strength and rigidity to provide adequate support for all contained wiring.

(B) Side Rails. Cable trays shall have side rails or equivalent structural members.

392.110 Corrosion Protection. Cable tray systems shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.

392.116 Nonmetallic Cable Tray. Nonmetallic cable trays shall be made of flame-retardant material.

Substantiation: As per the TCC to clarify the panel action, Article 392 was reorganized to more closely follow the suggested numbering system established in the NFPA style manual.

Substantiations for Changes to Article 392

This rewrite was completed to format it as closely as possible to the common numbering system.

- Title: add "systems" to clarify this article cover cable tray systems.
- Add Part l General
- 392.2 Definition added new FPN added for clarity definition.
- Add Part ll Installation
- 392.6 "Installation" was no longer needed so it was deleted.
- 392.3 renumbered to "392.10 and revised to style manual. The first sentence from 392.6(A) was added. "Complete System. Cable trays shall be installed as a complete system."
- Old "392.3 renumbered to 392.10 Uses Permitted" will change the numbering system from the normal 1, 2, 3… to A, B, C… to match the style manual. Additionally, the list style shown in the style manual does not provide for sub-lists within a section and the following changes:
- Old 392.3 (A) renumbered to 392.10 (A)
- Old 392.3 (A) renumbered to 392.10 (B)
- Old 392.3 (A) renumbered to 392.10 (C).
- Old 392.6 (A) renumbered to 392.10 (D)
- Old 392.6 (A) renumbered to 392.10 (E)
- Old 392.3 (A) renumbered to 392.10 (F) and changed table reference to Table 392.3(6) (A) to read Table 392.10 (F). The was an editorial change for adding "In all locations the" and removing "(A) Wiring Methods"
- Old Table 392.3 (A) (6) renumbered to Table 392.10 (F)
- Old 392.3 (B) renumbered to 392.10 (G) "In Industrial Establishments Only"
- Old 392.3 (B), first sentence table reference renumbered to 392.10 (F).
- Old 392.3 (B) second sentence to read "any of the cables in 392.10 (G) (1) to (G) (4)"
- Old 392.3 (B) (1) removed the sentence "(1) Single Conductors. Single-conductor cables shall be permitted to be installed in accordance with (B) (1) (a) through (B) (1) (c) as not needed sub heading.
- Old 392.3 (B) (1) (A renumbered to 392.10 (G) (1)
- Old 392.3 (B) (1) (B) renumbered to 392.10 (G) (2)
- Old 392.3 (B) (1) (C) renumbered to 392.10 (G) (3)
- Old 392.3 (B) (2) (d) renumbered to 392.10 (G) (4) and changed reference in article of 392.3 (B) (1) to 392.10 (G) (1)
- Old 392.3 (C) renumbered to 392.10 (H) and the grounding reference is changed from 392.7 to 392.60
- Old 392.3 (D) renumbered to 392.10 (I)
- Old 392.3 (E) renumbered to 392.10 (J)
- Old 392.6 (E) renumbered to 392.10 (K).
- Old 392.6 (F) renumbered to 392.10 (L)
- Old 392.6 (G) renumbered to 392.10 (M)
- Old 392.6 (H) renumbered to 392.10 (N) and change the reference within (N) identified as 392.6(G) renumbered to 392.10 (M)
- Old 392.6 (I) renumbered to 392.10 (O)
- Old 392.4 renumbered to 392.12.
- Old 392.6 "Installation" renumbered to 392.22 with a title of "Conductors and Cables" by adding the word "Multiconductor" that is referenced in the section due to the rewrite and numbering sequence. Change title to read "392.22 Conductors and <u>Multiconductor</u> Cables."
- Old 392.8 (D) renumbered to 392.22 (A) and the contents within this article subdivided as two separate conditions to read:

"Where single conductor cables comprising each phase, neutral; or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance."

"Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies.

- Old 392.8 (E) renumbered to 392.22 (B).
- Old 392.9(A) (1) renumbered to 392.22 (C) (1) (a)
- Old 392.9 that was renumbered to 392.22 (C) with subsection (1) (b) to change the existing reference of Column 1 of Table 392.9 changed to Column 1 of Table 392.22 (C).
- Old 392.9 that was renumbered to 392.22 (C) with subsection (1) (c) to change the existing reference of Column 2 of Table 392.9 changed to Column 2 of Table 392.22 (C).
- Old Table 392.9 that was renumbered to Table 392.22 (C) to change the following table references with the table to read as follows:

Ladder or Ventilated Trough Cable Trays 392.9 (A) renumbered to 392.22 (C) (1)

Solid Bottom Cable Trays 392.9 (A) renumbered to 392.22 (C) (3)

Column 1 Application for 392.9 (A) (2) renumbered to 392.22 (C) (1) (b) Only

Column 2 Application for 392.9 (A) (3) renumbered to 392.22 (C) (1) (c) Only

Column 3 Application for 392.9 (C) (2) renumbered to 392.22 (C) (2) (b) Only

Column 4 Application for 392.9 (C) (3) renumbered to 392.22 (C) (2) (c) Only

- Old 392.9 (B) changed the section content now numbered 392.22 (C) (2) into parts (a) and (b) to follow previous article format and will read as follows:

Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray.

A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

- Old 392.9 (C) renumbered to 392.22 (C) (3)
- Old 392.9 (C) (1) renumbered to 392.22 (C) (3) (a)
- Old 392.9 (C) (2) renumbered to 392.22 (C) (3) (b) to update reference Table to new title of Table 392.22 (C).
- Old 392.9 (C) (3) renumbered to 392.22 (C) (3) (c) to update reference Table to new title of Table 392.22 (C).
- Old 392.9 (D) renumbered to 392.22 (C) (4)
- Old 392.9 (D) changed the section content now numbered 392.22 (C) (4) into parts (a) and (b) to follow previous article format and will read as follows:

Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray.

A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

- Old 392.9 (E) (1) renumbered to 392.22 (C) (5) (a) table reference changed to read "Column 1 of Table 392.22 (C) (5)."
- Old 392.9 (E) (2) renumbered to 392.22 (C) (5) (b) table reference changed to read "Column 2 of Table 392.22 (C) (5)."
- Old Table 392.9 (E) renumbered to Table 392.22 (C) (5)
- Old 392.9 (F) renumbered to 392.22 (C) (6)
- Old 392.9 (F) (1) renumbered to 392.22 (C) (6) (a) and table reference changed to read "Column 1 of Table 392.22 (C) (6)."
- Old 392.9 (F) (2) changed to 392.22 (C) (6) (b) and table reference changed to read "Column 2 of Table 392.22 (C) (6)."
- Old Table 392.9 (F) is renumbered to Table 392.22 (C) (6)
- Old 392.10 renumbered to 392.22 (D)
- Old 392.10 (A) renumbered to 392.22 (D) (1)
- Old 392.10 (A) (1) renumbered to 392.22 (D) (1) (a)
- Old 392.10 (A) (2) renumbered to 392.22 (D) (1) (b) for table reference to now read Column 1 of Table 392.22 (D)
- Old 392.10 (A) (3) renumbered to 392.22 (D) (1) (c) for table reference to now read Column 2 of Table 392.22 (D)
- Old 392.10 (A) (4) renumbered to 392.22 (D) (1) (d)
- Old 392.10 (B) renumbered to 392.22 (D) (2)
- Old Table 392.10 (A) renumbered to Table 392.22 (D)
- Old Table 392.10 (A) column heading reference renumbered to "Column 1 Applicable for 392.22 (D) (1) (b) Only"
- Old Table 392.10 (A) column heading reference to "Column 2a Applicable for 392.22 (D) (1) (c) Only"
- Old 392.12 renumbered to 392.22 (E)
- Old 392.12 renumbered to 392.22 (E) changed the section content into parts (1) and (2) to follow previous article format style and will read as follows:

The sum of the diameters of single-conductor and multiconductor cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

Where single conductor cables are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.

- The old 392.6 (A) has relocated this sentence to this newly number section as follows:

392.24 Field Bends or Modifications. Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained. Words "Field" and "or Modifications" were editorial changes to provide clarity for job specific installation requirements.

- The old 392.5 (B) has relocated this sentence to the newly numbered section as follows:

392.28 Smooth Edges. Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.

- The old 392.6 (C) has been renumbered to "392.30" "Supports."
- The old 392.6 has been renumbered to 392.30 "(A) Cable Supports" for multiple support requirements that will be identified as separate requirements.
- The old 392.6 (C) renumbered as 392.39 (A) (1) as one of the requirements for cable supports as follows:

Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.

● The old 392.8 (A) second sentence has been relocated to 392.30 (A) (2) to read:
In other than horizontal runs, the cables shall be fastened securely to transverse members of the cable trays. This relocation better fulfills the requirements for cable supports. The old title "Securely Fastened" has been removed from the 392.8 (B) when this was relocated.
● Old 392.6 (A) second sentence is renumbered as 392.30 (B).
● Old 392.6 (J) is renumbered as 392.30 (C) with a title "(C) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.
● Old 392.6 (J) now identified as 392.30 (C) was changed to a number format numbered 1 to 4 as separate requirements by the following numbering sequence:
In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1
For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.
For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.
For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.
● From the old 392.5 (E) and 392.3 (D) renumbered to a new heading and number to read as follows:"392.40 Fitting and Covers."
● Old 392.5 (E) renumbered and an identification sub (A) 392.40 (A) "Fittings."
From the old 392.5 (E) and a new designation:
Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.
● From the old 392.3 to have a new (2) for the statement relocated as follows: Cable trays and associated fittings shall be identified for the intended use.
This change was to correlate with the fitting and covers title line.
● Old 392.6 (D) renumbered to 392.40 and new designation sub (B) titled "Covers."
● Old 392.8 (C) renumbered as 392.46 "Bushed Conduit and Tubing"
● Old 392.8(A) renumbered as 392.56 "Cable Splices."
● From the old 392.7 Grounding has been renumbered to 392.60 to more closely follow the NEC numbering sequence. Additionally, the title has been changed to "Grounding and Bonding" for the title to more accurately describe the content of the article
A new sub-heading "392.60 (A) Grounding" to separate the requirements from bonding.
● Old 392.7 (A) is renumbered 392.60 (A) (1) "Metallic Cable Trays"
● Old 392.7 (B) is renumbered 392.60 (A) (2) "Steel or Aluminum Cable Tray Systems."
● Old 392.7 (B) (1) is renumbered 392.60 (A) (2) (a)
● Old 392.7 (B) (2) is renumbered 392.60 (A) (2) (b) the table reference to Table 392.7 (B) renumbered to Table 392.60 (A)
● Old 392.7 (B) (3) is renumbered 392.60 (A) (2) (c)
● Old 392.7 (B) (4) is renumbered 392.60 (A) (2) (d)
● Old Table 392.7 (B) is renumbered 392.60 (A)
● From the old 392.6 (A) has been re-identified as a sub designation "392.60 (B) Bonding" for the title to more accurately description of the article
● Old 392.11 renumbered to 392.80
● Old 392.13 renumbered to 392.80 (C) "Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays" as a sub title under ampacity
● The old 392.13 first sentence code reference should be renumbered from 392.12 to 392.22 (E)
● Old 392.13 renumbered as 392.80 (C) (1)
● Old 392.13 (A) renumbered as 392.80 (C) (1)
● Old 392.13 (A) (1) renumbered as 392.80 (C) (1) (a)
● Old 392.13 (A) (2) renumbered as 392.80 (C) (1) (b)
● Old 392.13 (B) renumbered as 392.80 (C) (2)
● Old 392.13 (B) (1) renumbered as 392.80 (C) (2) (a)
● Old 392.13 (B) (2) renumbered as 392.80 (C) (2) (b)
● Old 392.13 (B) (3) renumbered as 392.80 (C) (2) (c)
● Add Part "III Construction Specifications"
● Change the old 392.5 to 392.100 and title as "Construction" to follow the titles and location assigned to other articles.
● Old 392.5 (A) is renumbered as 392.100 (A)
● Old 392.5 (D) is renumbered as 392.100 (B)
● Old 392.5 (C) is renumbered as 392.110
● Old 392.5 (F) is renumbered as 392.116
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 8-235a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BLOM, J.: Refer to comment on Proposal 8-235a, Log No. CP804.

8-237 Log #11 NEC-P08 **Final Action: Accept in Principle**
(392)

NOTE: This proposal appeared as Comment 8-78 on Proposal 8-180 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 8-180 was:
Move:
392.3 to 392.10
392.4 to 392.12
Relocate and renumber existing 392.10 and 392.12.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation:
ARTICLE 392 Cable Trays
GENERAL

392.1 Scope
This article covers cable tray systems, including ladder, ventilated trough, ventilated channel, solid bottom, and other similar structures.
Cable trays are mechanical support systems. Cable trays are not raceways. See the definition of raceway in Article 100.
FPN: For further information on cable trays, see ANSI/NEMA–VE 1-1998, Metal Cable Tray Systems; NEMA–VE 2-1996, Metal Cable Tray Installation Guidelines; and NEMA–FG-1998, Nonmetallic Cable Tray Systems.
392.2 Definition
Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.
INSTALLATION
392.~~3~~**10** Uses Permitted
Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits.
(1) Cable tray installations shall not be limited to industrial establishments.
(2) Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant.
(3) Cable trays and their associated fittings shall be identified for the intended use.
(A) Wiring Methods The wiring methods in Table 392.~~3~~10(A) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.

Table 392.~~3~~**10**(A) Wiring Methods

Wiring Method	Article Section
Armored cable	320
Communication raceways	800
Electrical metallic tubing	358
Electrical nonmetallic tubing	362
Fire alarm cables	760
Flexible metal conduit	348
Flexible metallic tubing	360
Instrumentation tray cable	727
Intermediate metal conduit	342
Liquidtight flexible metal conduit	350
Liquidtight flexible nonmetallic conduit	356
Metal-clad cable	330
Mineral-insulated, metal-sheathed cable	332
Multiconductor service-entrance cable	338
Multiconductor underground feeder and branch-circuit cable	340
Multipurpose and communications cables	800
Nonmetallic-sheathed cable	334
Power and control tray cable	336
Power-limited tray cable	725.61(C) and 725.82(E)
Optical fiber cables	770
Optical fiber raceways	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays	
Rigid metal conduit	344
Rigid nonmetallic conduit	352

(B) In Industrial Establishments The wiring methods in Table 392.~~3~~**10**(A) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system, any of the cables in 392.~~3~~**10**(B)(1) and (B)(2) shall be permitted to be installed in ladder, ventilated trough, solid bottom, or ventilated channel cable trays.

(1) Single Conductors Single-conductor cables shall be permitted to be installed in accordance with (B)(1)(a) through (B)(1)(c).

(a) Single-conductor cable shall be 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays. Where 1/0 AWG through 4/0 AWG single-conductor cables are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).

(b) Welding cables shall comply with the provisions of Article 630, Part IV. Cable trays used to support welding cables are required to be dedicated for welding cable installation. See 630.42 for installation details.

(c) Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and they shall be 4 AWG or larger.

(2) Medium Voltage Single- and multiconductor medium voltage cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.~~3~~**10**(B)(1).

(C) Equipment Grounding Conductors Metallic cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with provisions of 392.~~7~~**60**.

(D) Hazardous (Classified) Locations Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.

(E) Nonmetallic Cable Tray In addition to the uses permitted elsewhere in 392.~~3~~**10**, nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.

392.~~4~~**12** Uses Not Permitted

(1) Cable tray systems shall not be used in hoistways or where subject to severe physical damage.

(2) Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

392.~~9~~ **22 Cable Tray Conductor Fill (A)**Number of Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays

The number of multiconductor cables, rated 2000 volts or less, permitted in a single cable tray shall not exceed the requirements of this section. The conductor sizes herein apply to both aluminum and copper conductors.

~~(A)~~ **(1)**Any Mixture of Cables Where ladder or ventilated trough cable trays contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following:

~~(1)~~**(a)** Where all of the cables are 4/0 AWG or larger, the sum of the diameters of all cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

~~(2)~~**(b)** Where all of the cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.~~9~~ **22**for the appropriate cable tray width.

~~(3)~~ **(c)** Where 4/0 AWG or larger cables are installed in the same cable tray with cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the computation in Column 4 of Table 392.~~9~~**22** for the appropriate cable tray width. The 4/0 AWG and larger cables shall be installed in a single layer, and no other cables shall be placed on them.

~~(D)~~ **(4)**Solid Bottom Cable Tray — Multiconductor Control and/or Signal Cables Only.

(a) Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray.

(b)A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

~~(E)~~ **(5)**Ventilated Channel Cable Trays Where ventilated channel cable trays contain multiconductor cables of any type, the following shall apply:

~~(1)~~ **(a)** Where only one multiconductor cable is installed, the cross-sectional area shall not exceed the value specified in Column 1 of Table 392.~~9~~ **22**(E). ~~(2)~~

(b) Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cables shall not exceed the value specified in Column 2 of Table 392.~~9~~ **22**(E).

Table 392.~~9~~ **(22)**(E) Allowable Cable Fill Area for Multiconductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less

~~(F)~~ **(6)**Solid Channel Cable Trays Where solid channel cable trays contain multiconductor cables of any type, the following shall apply:

~~(1)~~ **(a)**Where only one multiconductor cable is installed, the cross-sectional area of the cable shall not exceed the value specified in Column 1 of Table 392.~~9~~ **22**(F).

~~(2)~~ **(b)**Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cable shall not exceed the value specified in Column 2 of Table 392.~~9~~ **22**(F).

~~392.10~~ **(B)**Number of Single-Conductor Cables, Rated 2000 Volts or Less, in Cable Trays

The number of single-conductor cables, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes herein apply to both aluminum and copper conductors.

~~(A)~~ **(1)**Ladder or Ventilated Trough Cable Trays Where ladder or ventilated trough cable trays contain single-conductor cables, the maximum number of single conductors shall conform to the following:

~~(1)~~**(a)**Where all of the cables are 1000 kcmil or larger, the sum of the diameters of all single conductor cables shall not exceed cable tray width, and the cables shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

~~(2)~~**(b)**Where all of the cables are from 250 kcmil up to 1000 kcmil, the sum of the cross-sectional areas of all single-conductor cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.~~10(A)~~ **22(G)** for the appropriate cable tray width.

~~(3)~~ **(c)**Where 1000 kcmil or larger single-conductor cables are installed in the same cable tray with single-conductor cables smaller than 1000 kcmil, the sum of the cross-sectional areas of all cables smaller than 1000 kcmil shall not exceed the maximum allowable fill area resulting from the computation in Column 2 of Table 392.~~10(A)~~ **22(G)** for the appropriate cable tray width.

~~(4)~~**(d)**Where any of the single conductor cables are 1/0 through 4/0 AWG, the sum of the diameters of all single conductor cables shall not exceed the cable tray width.

~~(B)~~ (**2**)Ventilated Channel Cable Trays Where 50 mm (2 in.), 75 mm (3 in.), 100 mm (4 in.), or 150 mm (6 in.) wide ventilated channel cable trays contain single-conductor cables, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.

(C) Number of Combination of Multiconductor Cables and Single Conductor Cables in the same Cable Tray.

392.~~6~~**24**Installation

(A) Complete System Cable trays shall be installed as a complete system.

(1) Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained.

(2) Cable tray systems shall be permitted to have mechanically discontinuous segments between cable tray runs or between cable tray runs and equipment.

(3) The system shall provide for the support of the cables in accordance with their corresponding articles.

(4) Where cable trays support individual conductors and where the conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft).

(a) The conductors shall be secured to the cable tray(s) at the transition, and they shall be protected, by guarding or by location, from physical damage.

(b)A bonding jumper sized in accordance with 250.102 shall connect the two sections of cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.

(B) Completed Before Installation. Each run of cable tray shall be completed before the installation of cables.

(C) Supports. Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.

Cable trays shall be supported at intervals in accordance with the installation instructions.

(D) Covers. In portions of runs where additional protection is required, covers or enclosures providing the required protection shall be of a material that is compatible with the cable tray.

(E) Multiconductor Cables Rated 600 Volts or Less. Multiconductor cables rated 600 volts or less shall be permitted to be installed in the same cable tray.

(F) Cables Rated Over 600 Volts. Cables rated over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:

(1) The cables rated over 600 volts are Type MC.

(2) The cables rated over 600 volts are separated from the cables rated 600 volts or less by a solid fixed barrier of a material compatible with the cable tray.

(G) Through Partitions and Walls Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.

(H) Exposed and Accessible Cable trays shall be exposed and accessible except as permitted by 392.~~6~~ **(24)**(G).

I) Adequate Access. Sufficient space shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables.

(J) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.

(1) In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1.

(2) For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system.

(3) Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.

~~(B)~~ **392.30** Fastened Securely. In other than horizontal runs, the cables shall be fastened securely to transverse members of the cable trays.

392.~~8~~ **56**Cable Installation

(A) Cable Splices Cable splices made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible and do not project above the side rails.

~~(C)~~ **(B)**Bushed Conduit and Tubing A box shall not be required where cables or conductors are installed in bushed conduit and tubing used for support or for protection against physical damage.

~~(D)~~ **(C)**Connected in Parallel

(1) Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.

(2) Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies.

~~(E)~~ **(D)**Single Conductors

(1) Where any of the single conductors installed in ladder or ventilated trough cable trays are 1/0 through 4/0 AWG, all single conductors shall be installed in a single layer.

(2) Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

392.~~7~~ **60**Grounding

(A) Metallic Cable Trays.

(1) Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96.

(2) Section 392.~~7~~**(60)**(A), together with 250.96, requires all cable tray systems that support electrical conductors (whether mechanically continuous or with isolated segments) to be electrically continuous and effectively bonded and grounded. This requirement applies whether or not the cable tray is used as an equipment grounding conductor.

(B) Steel or Aluminum Cable Tray Systems Steel or aluminum cable tray systems shall be permitted to be used as equipment grounding conductors, provided that all the following requirements are met:

(1) The cable tray sections and fittings shall be identified for grounding purposes.

(2) The minimum cross-sectional area of cable trays shall conform to the requirements in Table 392.~~7~~ **60**(B).

(3) All cable tray sections and fittings shall be legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction, and the total cross-sectional area of both side rails for ladder or trough cable trays.

(4) Cable tray sections, fittings, and connected raceways shall be bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

392.~~11~~ **80**Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays

(A) Multiconductor Cables The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.~~9~~ **22(A)**shall be as given in Tables 310.16 and 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).

(1) The derating factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.

(2) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not over 95 percent of the allowable ampacities of Tables 310.16 and 310.18 shall be permitted for multiconductor cables.

(3) Where multiconductor cables are installed in a single layer in uncovered trays, with a maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ambient temperature-corrected ampacities of multiconductor cables, with not more than three insulated conductors rated 0 through 2000 volts in free air, in accordance with 310.15(C).

FPN:See Table B.310.3.

(B) Single-Conductor Cables The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:

(1) Where installed according to the requirements of 392.~~10~~**22 (B)**, the ampacities for 600 kcmil and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Tables 310.17 and 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 600 kcmil and larger cables shall not exceed 70 percent of the allowable ampacities in Tables 310.17 and 310.19.

(2) Where installed according to the requirements of 392.103, the ampacities for 1/0 AWG through 500 kcmil single-conductor cables in uncovered cable trays shall not exceed 65 percent of the allowable ampacities in Tables 310.17 and 310.19.Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG through 500 kcmil cables shall not exceed 60 percent of the allowable ampacities in Tables 310.17 and 310.19.

(3) Where single conductors are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Tables 310.17 and 310.19.

Exception to (B)(3): For solid bottom cable trays the ampacity of single conductor cables shall be determined by 310.15(C).

(4) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free airspace of not less than 2.15 times one conductor diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities of two or three single insulated conductors rated 0 through 2000 volts supported on a messenger in accordance with 310.15(B).

FPN:See Table 310.20.

392.~~12~~ **90 2001Volts or More**

(A) Number of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays

(1) The number of cables rated 2001 volts or over permitted in a single cable tray shall not exceed the requirements of this section.

(2) The sum of the diameters of single-conductor and multiconductor cables shall not exceed the cable tray width, and the cables shall be installed in a single layer.

(3) Where single conductor cables are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.

~~392.13~~ **(B)**Ampacity of Type MV and Type MC Cables (2001 Volts or Over) in Cable Trays

(1) The ampacity of cables, rated 2001 volts, nominal, or over, installed according to 392.~~12~~ **90** shall not exceed the requirements of this section.

~~(A)~~ **(a)**Multiconductor Cables (2001 Volts or Over) The allowable ampacity of multiconductor cables shall be as given in Tables 310.75 and 310.76, subject to the following provisions:

~~(1)~~**(2)**Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not more than 95 percent of the allowable ampacities of Tables 310.75 and 310.76 shall be permitted for multiconductor cables.

~~(2)~~**(3)**Where multiconductor cables are installed in a single layer in uncovered cable trays, with maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ampacities of Tables 310.71 and 310.72.

~~(B)~~ **(C)**Single-Conductor Cables (2001 Volts or Over) The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), shall comply with the following:

(1) The ampacities for 1/0 AWG and larger single-conductor cables in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Tables 310.69 and 310.70.

(2) Where the cable trays are covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG and larger single-conductor cables shall not exceed 70 percent of the allowable ampacities in Tables 310.69 and 310.70.

~~(2)~~**(3)**Where single-conductor cables are installed in a single layer in uncovered cable trays, with a maintained space of not less than one cable diameter between individual conductors, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Tables 310.69 and 310.70.

~~(3)~~**(4)**Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free air space of not less than 2.15 times the diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations or cables, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities in Tables 310.67 and 310.68.

392.~~5~~ **100** Construction Specifications.

(A) Strength and Rigidity Cable trays shall have suitable strength and rigidity to provide adequate support for all contained wiring.

(B) Smooth Edges Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.

(C) Corrosion Protection Cable tray systems shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.

(D) Side Rails Cable trays shall have side rails or equivalent structural members.

(E) Fittings Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.

(F) Nonmetallic Cable Tray Nonmetallic cable trays shall be made of flame-retardant material.

Substantiation: The Panel action was to "Accept in Principle", but the only actions stated seem to be three items. One understanding from the CMP-8 meeting was that a number of formatting changes without content changes were in fact made. The attached contains what these changes were and therefore better explains why the action taken was to "Accept in Principle" rather than to just "Accept".
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 8-235a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BLOM, J.: Refer to comment on Proposal 8-235a, Log No. CP804.

8-238 Log #4729 NEC-P08 **Final Action: Accept in Principle**
(392)

TCC Action: The Technical Correlating Committee understands that the panel statement refers to Proposal 8-235a.
Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
ARTICLE 392 Cable Tray Systems
I. General
392.1 Scope. This article covers cable tray systems, including ladder, ventilated trough, ventilated channel, solid bottom, and other similar structures.
FPN: For further information on cable trays, see ANSI/NEMA–VE 1-1998,Metal Cable Tray Systems; NEMA–VE 2-1996, Metal Cable Tray Installation Guidelines; and NEMA–FG-1998, Nonmetallic Cable Tray Systems.
392.2 Definition.
Cable Tray System. A unit or assembly of units or sections and associated fittings forming a structural system used to securely fasten or support cables and raceways.
FPN. Cable trays are not raceways they are mechanical support systems. See definition of raceway in Article 100.
ll. Cable Tray Installation
392.6 Complete System
A. Cable trays shall be installed as a complete system before the installation of jacketed multi-conductor cables or single conductors.
392. 10 Uses Permitted.
(A) Cable trays shall be permitted as follows:
(1) Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits.
(a) ~~Exposed and Accessible.~~ Cable trays shall be exposed and accessible except as permitted by 392.10 (A)(1) (c).
(b) ~~Adequate Access.~~ Sufficient space shall be provided and maintained about cable trays to permit adequate access for installing and maintaining ~~the cables~~. wiring methods permitted in Table 392.10 (B)
(c) ~~Through Partitions and Walls.~~ Cable trays shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations, complete with installed cables, are made in accordance with the requirements of 300.21.
(2) Cable tray installations shall not be limited to industrial establishments.
(3) Cable tray systems shall be permitted to have mechanically discontinuous segments between cable tray runs or between cable tray runs and equipment.
(a) The cable tray system shall provide support of the jacketed multiconductor cables or single conductors in accordance with their corresponding articles.
(4) ~~Hazardous (Classified) Locations.~~ Cable trays in hazardous (classified) locations shall contain only the cable types as permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.
(5) ~~Nonmetallic Cable Tray.~~ In addition to the uses permitted elsewhere in 392.10, nonmetallic cable tray shall be permitted in corrosive areas and in areas requiring voltage isolation.
(B) Wiring Methods within Cable Trays. The wiring methods in Table 392.10(B) shall be permitted to be installed in cable tray systems under the conditions described in their respective articles and sections.
(C) In Industrial Establishments. The wiring methods in Table 392.10 (B) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system.
392.12 Uses Not Permitted.
(A) Cable Trays in Hoistways. Cable tray systems shall not be used in hoistways or where subject to severe physical damage.
(B) Cable Trays in Air-Handling Spaces. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.
III. Jacketed Cables and Single Conductor Installation within Cable Trays
392.22 Jacketed Multi-conductor Cables and Single Conductor Installation.
(A) Sunlight Resistant. Where exposed to direct rays of the sun, insulated single conductors or jacketed multi-conductor cables shall be identified as being sunlight resistant.
(B) In Industrial Establishments. In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified persons service the installed cable tray system jacketed multiconductor cables or single conductors in 392.~~3~~22(B)(1) and (B)(2) shall be permitted to be installed in ladder, ventilated trough, solid bottom, or ventilated channel cable trays.
~~(1) Single Conductors. Single-conductor cables shall be permitted to be installed in accordance with (B)(1)(a) through (B)(1)(c).~~
(1) Jacketed multi-conductor cables or single conductors shall be permitted as follows:
(a) 1/0 AWG or larger and shall be of a type listed and marked on the surface for use in cable trays.
(b) Where 1/0 AWG through 4/0 AWG jacketed multi-conductor cables or single conductors are installed in ladder cable tray, the maximum allowable rung spacing for the ladder cable tray shall be 225 mm (9 in.).
(2) Welding single conductors ~~cables~~ shall comply with the provisions of Article 630, Part IV.
(C) ~~Where~~ Jacketed Multi-conductor Cable and Single Conductor Installation.
(1) Cable trays supporting a jacketed multi-conductor cable or ~~individual~~ single conductors ~~and where the conductors pass from one cable tray to another, or from a cable tray to raceway(s) or from a cable tray to equipment where the conductors are terminated, the distance between cable trays or between the cable tray and the raceway(s) or the equipment shall not exceed 1.8 m (6 ft)~~ shall be installed and supported to the conditions described in their respective articles and sections.
(2) Jacketed multi-conductor cables or single conductors shall be secured to the cable tray(s) at the transition and ~~they~~ shall be protected by guarding or by location from physical damage.
(3) Single conductors used as equipment grounding conductors shall be insulated, covered, or bare, and ~~they~~ shall be 4 AWG or larger.
(4) Medium voltage single conductors and jacketed multiconductor ~~medium voltage~~ cables shall be Type MV cable. Single conductors shall be installed in accordance with 392.22 (C) (1)
(5) ~~Multiconductor Cables Rated 600 Volts or Less.~~ Jacketed multiconductor cables rated 600 volts or less shall be permitted to be installed in ~~the same~~ cable tray.
(6)~~Cables Rated Over 600 Volts.~~ Jacketed cables rated over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:
(a) The jacketed multi-conductor cables rated over 600 volts are Type MC.
(b) The jacketed multi-conductor cables rated over 600 volts are separated from the jacketed multi-conductor cables rated 600 volts or less by a solid fixed barrier of a material compatible with the cable tray.
(D) Single Conductors connected in Parallel.
(1) Where single conductors ~~cables~~ comprising each phase, neutral; or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.4, the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.
(2) Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together~~, such as triplexed assemblies.~~
(E) Single Conductor Installation. Where any of the single conductors installed in ladder or ventilated trough cable trays are 1/0 through 4/0 AWG, all single conductors shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.
(F) Number of Jacketed Multiconductor Cables, Rated 2000 Volts or Less, in Cable Trays.
The number of jacketed multiconductor cables, rated 2000 volts or less, permitted in a single cable tray shall not exceed the requirements of this section. ~~The conductor sizes herein apply to both aluminum and copper conductors.~~
(1) ~~Any Mixture of Cables.~~ Where ladder or ventilated trough cable trays contain jacketed multiconductor power or lighting cables, or any mixture of jacketed multiconductor power, lighting, control, and signal cables, the maximum number of jacketed multi-conductor cables shall conform to the following:
(a) Where all of the jacketed multi-conductor cables are 4/0 AWG or larger, the sum of the diameters of all jacketed multi-conductor cables shall not exceed the cable tray width, and the jacketed multi-conductor cables shall be installed in a single layer.
(b) Where the cable ampacity is determined according to 392.64 (A) (3), the cable tray width shall not be less than the sum of the diameters of the cables and the sum of the required spacing widths between the cables.
(c) Where all of the jacketed multi-conductor cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all jacketed multi-conductor cables shall not exceed the maximum allowable cable fill area in Column 1 of Table 392.22 (F) for the appropriate cable tray width.
(d) Where 4/0 AWG or larger jacketed multi-conductor cables are installed in the same cable tray with jacketed multi-conductor cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all jacketed multi-conductor cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the calculation in Column 2 of Table 392.22 (F) for the

appropriate cable tray width. The 4/0 AWG and larger jacketed multi-conductor cables shall be installed in a single layer, and no other jacketed multi-conductor cables shall be placed on them.

Table 392.22(F) Allowable Cable Fill Area for Jacketed Multiconductor Cables in Ladder, Ventilated Trough, or Solid Bottom Cable Trays for Cables Rated 2000 Volts or Less

Maximum Allowable Fill Area for Jacketed Multiconductor Cables
Ladder or Ventilated Trough Cable Trays, 392.22 (F) (1) Solid Bottom Cable Trays, 392.22 (F) (3)

Inside Width of Cable Tray
Column 1 Applicable for 392.22 (F) (1) (c) Only
Column 2[a] Applicable for 392.22 (F) (1) (d) Only
Column 3 Applicable for 392. 22 (F) (3) (b) Only
Column 4[a] Applicable for 392.22 (F) (3) (c) Only

mm	in.	mm2	in.2	mm2	in.2	mm2	in.2	mm2	in.2	
150	6.0	4,500	7.0	4,500 – (30 Sd)[b]		7– (1.2 Sd) [b]3,500		5.5	3,500–(25 Sd [b])	
	5.5–Sd [b]									
225	9.0	6,800	10.5	6,800 – (30 Sd)		10.5– (1.2 Sd)		5,100	8.0	5,100–(25 Sd)
	8.0–Sd									
300	12.0	9,000	14.0	9,000 – (30 Sd)		14– (1.2 Sd)		7,100	11.0	7,100–(25 Sd)
	11.0–Sd									
450	18.0	13,500	21.0	13,500 – (30 Sd)		21– (1.2 Sd)		10,600	16.5	10,600–(25 Sd)
	16.5–Sd									
600	24.0	18,000	28.0	18,000 – (30 Sd)		28– (1.2 Sd)		14,200	22.0	14,200–(25 Sd)
	22.0–Sd									
750	30.0	22,500	35.0	22,500 – (30 Sd)		35– (1.2 Sd)		17,700	27.5	17,700–(25 Sd)
	27.5–Sd									
900	36.0	27,000	42.0	27,000 – (30 Sd)		42– (1.2 Sd)		21,300	33.0	21,300–(25 Sd)
	33.0–Sd									

[a] The maximum allowable fill areas in Columns 2 and 4 shall be calculated. For example, the maximum allowable fill in mm2 for a 150-mm wide cable tray in Column 2 shall be 4500 minus (30 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 7 minus (1.2 multiplied by Sd)].
[b]The term Sd in Columns 2 and 4 is equal to the sum of the diameters, in mm, of all cables 107.2 mm (in inches, of all 4/0 AWG) and larger jack-eted multiconductor cables in the same cable tray with smaller cables.

(2) Jacketed Multiconductor Control and/or Signal Cables Only.

(a) Where a ladder or ventilated trough cable tray having a usable inside depth of 150 mm (6 in.) or less contains jacketed multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all jacketed multi-conductor cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the cable tray.

(b) A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(3) ~~Solid Bottom Cable Trays Containing Any Mixture.~~ Where solid bottom cable trays contain jacketed multiconductor power or lighting cables, or any mixture of jacketed multiconductor power, lighting, control, and signal cables, the maximum number of jacketed multi-conductor cables shall conform to the following:

(a) where all of the jacketed multi-conductor cables are 4/0 AWG or larger, the sum of the diameters of all jacketed multi-conductor cables shall not exceed 90 percent of the cable tray width, and the jacketed multi-conductor cables shall be installed in a single layer.

(b) where all of the jacketed multi-conductor cables are smaller than 4/0 AWG, the sum of the cross-sectional areas of all jacketed cables shall not exceed the maximum allowable cable fill area in Column 3 of Table 392.22 (F) for the appropriate cable tray width.

(c) Where 4/0 AWG or larger jacketed multi-conductor cables are installed in the same cable tray with jacketed multi-conductor cables smaller than 4/0 AWG, the sum of the cross-sectional areas of all jacketed multi-conductor cables smaller than 4/0 AWG shall not exceed the maximum allowable fill area resulting from the computation in Column 4 of Table 392.22 (F) for the appropriate cable tray width. The 4/0 AWG and larger jacketed multi-conductor cables shall be installed in a single layer, and no other jacketed multi-conductor cables shall be placed on them.

(4) Solid Bottom Cable Tray with jacketed multiconductor control and/or signal cables only.

(a) Where a solid bottom cable tray having a usable inside depth of 150 mm (6 in.) or less contains jacketed multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all jacketed multi-conductor cables at any cross section shall not exceed 40 percent of the interior cross-sectional area of the cable tray.

(b) A depth of 150 mm (6 in.) shall be used to calculate the allowable interior cross-sectional area of any cable tray that has a usable inside depth of more than 150 mm (6 in.).

(5) Ventilated Channel Cable Trays. Where ventilated channel cable trays contain jacketed multiconductor cables of any type, the following shall apply:

(a) Where only one jacketed multiconductor cable is installed, the cross-sectional area shall not exceed the value specified in Column 1 of Table 22 (F) (5)

(b)Where more than one multiconductor cable is installed, the sum of the cross-sectional area of all cables shall not exceed the value specified in Column 2 of Table 392.22 (F) (5)

Table 392.22(F)(5) Allowable Cable Fill Area for Jacketed Multiconductor Cables in Ventilated Channel Cable Trays for Cables Rated 2000 Volts or Less

Maximum Allowable Fill Area for Jacketed Multiconductor Cables					
Inside Width of Cable Tray		**Column 1 One Cable**		**Column 2 More Than One Cable**	
mm	**in.**	**mm^2**	**in.^{2}**	**mm^2**	**in.^{2}**
75	3	1500	2.3	850	1.3
100	4	2900	4.5	1600	2.5
150	6	4500	7.0	2450	3.8

(6) Solid Channel Cable Trays. Where solid channel cable trays contain jacketed multiconductor cables of any type, the following shall apply:

(a) Where only one jacketed multiconductor cable is installed, the cross-sectional area of the cable shall not exceed the value specified in Column 1 of
Table 392.22 (F) (6).

(b) Where more than one jacketed multiconductor cable is installed, the sum of the cross-sectional area of all cable shall not exceed the value specified in Column 2 of Table 392.22 (F) (6).

See Table 392.22(F)(6) on page 480

(G) Number of Single-Conductors ~~Cables~~, Rated 2000 Volts or Less, in Cable Trays.

The number of single-conductors ~~cables~~, rated 2000 volts or less, permitted in a single cable tray section shall not exceed the requirements of this section. The single conductors, or conductor assemblies, shall be evenly distributed across the cable tray. The conductor sizes herein apply to both aluminum and copper conductors.

(1) Ladder or Ventilated Trough Cable Trays. Where ladder or ventilated trough cable trays contain single-conductors ~~cables~~, the maximum number of single conductors shall conform to the following:

(a) Where all of the ~~cables~~ single-conductors are 1000 kcmil or larger, the sum of the diameters of all single conductors ~~cables~~ shall not exceed cable tray width, and the ~~cables~~ single-conductors shall be installed in a single layer. Conductors that are bound together to comprise each circuit group shall be permitted to be installed in other than a single layer.

(b) Where all of the ~~cables~~ single-conductors are from 250 kcmil up to

Table 392.22(F)(6) Allowable Cable Fill Area for Jacketed Multiconductor Cables in Solid Channel Cable Trays for Cables Rated 2000 Volts or Less

Inside Width of Cable Tray		Column 1 One Cable		Column 2 More Than One Cable	
mm	in.	mm^2	$in.^2$	mm^2	$in.^2$
50	2	850	1.3	500	0.8
75	3	1300	2.0	700	1.0
100	4	2400	3.7	1400	2.1
150	6	3600	5.5	2100	3.2

900 kcmil, the sum of the cross-sectional areas of all single-conductors ~~cables~~ shall not exceed the maximum allowable cable fill area in Column 1 of Table 392. 22(G) for the appropriate cable tray width.

(c) Where 1000 kcmil or larger single-conductors ~~cables~~ are installed in the same cable tray with single-conductors ~~cables~~ smaller than 1000 kcmil, the sum of the cross-sectional areas of all ~~cables~~ single conductors smaller than 1000 kcmil shall not exceed the maximum allowable fill area resulting from the computation in Column 2 of Table ~~392.10(A~~) 392.22(G) for the appropriate cable tray width.

(d) Where any of the single conductors ~~cables~~ are 1/0 through 4/0 AWG, the sum of the diameters of all single conductor ~~cables~~ shall not exceed the cable tray width.

(2) Ventilated Channel Cable Trays. Where 50 mm (2 in.), 75 mm (3 in.), 100 mm (4 in.), or 150 mm (6 in.) wide ventilated channel cable trays contain single-conductors ~~cables~~, the sum of the diameters of all single conductors shall not exceed the inside width of the channel.

where the cable tray systems are designed and installed to support the load, such systems shall be permitted to support raceways and cables, and boxes and conduit bodies covered in 314.1.

(a) For raceways terminating at the tray, a listed cable tray clamp or adapter shall be used to securely fasten the raceway to the cable tray system. Additional supporting and securing of the raceway shall be in accordance with the requirements of the appropriate raceway article.

(b) For raceways or cables running parallel to and attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of the appropriate raceway or cable article.

(c) For boxes and conduit bodies attached to the bottom or side of a cable tray system, fastening and supporting shall be in accordance with the requirements of 314.23.

B. Jacketed Multi-conductor Cables and Single Conductor Support.

1. In other than horizontal runs, the jacketed multi-conductor cables shall be fastened securely to transverse members of the cable trays.

Table 392.22(G) ~~392.10(A)~~ Allowable Cable Fill Area for Single-Conductors ~~Cables~~ in Ladder or Ventilated Trough Cable Trays for Cables Rated 2000 Volts or Less

		Maximum Allowable Fill Area for Single-Conductors ~~Cables~~ in Ladder or Ventilated Trough Cable Trays			
Inside Width of Cable Tray		Column 1 Applicable for 392.~~10(A)(2)~~ 22(G)(1)(b) Only		Column 2[a] Applicable for ~~392.10(A)(3)~~ 392.22(G)(1)(c) Only	
mm	in.	mm^2	$in.^2$	mm^2	$in.^2$
150	6	4,200	6.5	4,200 – (28 Sd)[b]	6.5 – (1.1 Sd)[b]
225	9	6,100	9.5	6,100 – (28 Sd)	9.5 – (1.1 Sd)
300	12	8,400	13.0	8,400 – (28 Sd)	13.0 – (1.1 Sd)
450	18	12,600	19.5	12,600 – (28 Sd)	19.5 – (1.1 Sd)
600	24	16,800	26.0	16,800 - (28 Sd)	26.0 – (1.1 Sd)
750	30	21,000	32.5	21,000 – (28 Sd)	32.5 – (1.1 Sd)
900	36	25,200	39.0	25,200 – (28 Sd)	39.0 – (1.1 Sd)

[a]The maximum allowable fill areas in Column 2 shall be calculated. For example, the maximum allowable fill, in mm2, for a 150 mm wide cable tray in Column 2 shall be 4200 minus (28 multiplied by Sd) [the maximum allowable fill, in square inches, for a 6-in. wide cable tray in Column 2 shall be 6.5 minus (1.1 multiplied by Sd)]

[b]The term Sd in Column 2 is equal to the sum of the diameters, in mm, of all cables 507 mm2 (in inches, of all 1000 kcmil) and larger single-conductors ~~cables~~ in the same ladder or ventilated trough cable tray with smaller single-conductors ~~cables.~~

392.22(H) ~~392.12~~ Number of single-conductors Type MV and Type MC Jacketed Multi-conductor Cables (2001 Volts or Over) in Cable Trays.

(1) The number of jacketed multi-conductor cables rated 2001 volts or over permitted in a single cable tray shall not exceed the requirements of this section.

(2) The sum of the diameters of single-conductor and jacketed multiconductor cables shall not exceed the cable tray width, and the jacketed multi-conductor cables and single-conductors shall be installed in a single layer.

(a)Where single conductors ~~cables~~ are triplexed, quadruplexed, or bound together in circuit groups, the sum of the diameters of the single conductors shall not exceed the cable tray width, and these groups shall be installed in single layer arrangement.

392.24 Bends --- How Made. ~~392.6(A)~~ Field bends or modifications shall be so made that the electrical continuity of the cable tray system and support for the cables is maintained.

392.28 ~~392.5(B)~~ Smooth Edges. Cable trays shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the wiring.

392.30 ~~392.6(C)~~ Supports. Supports shall be provided to prevent stress on cables where they enter raceways or other enclosures from cable tray systems.

A. Cable tray supports.

(1) Cable trays shall be supported at intervals in accordance with the installation instructions.

(2) ~~392.6(J) Raceways, Cables, Boxes, and Conduit Bodies Supported from Cable Tray Systems.~~ In industrial facilities where conditions of maintenance and supervision ensure that only qualified persons service the installation and

392.40 ~~(D)~~ Boxes and Fittings

(A) ~~392.5(E)~~Fittings. Cable trays shall include fittings or other suitable means for changes in direction and elevation of runs.

(B) ~~392.6(D)~~Covers. In portions of runs where additional protection is required, covers or enclosures providing the required protection shall be of a material that is compatible with the cable tray.

392.46 ~~392.8(C)~~Bushed Conduit and Tubing. A box shall not be required where jacketed multi-conductor cables or single conductors are installed in bushed conduit and tubing used for support or for protection against physical damage.

392.56 ~~392.8(A)~~Cable Splices.

(A) Cable splices made and insulated by approved methods shall be permitted to be located within a cable tray, provided they are accessible and do not project above the side rails.

(1) Splices shall be permitted to project above the side rails where not subject to physical damage.

IV. Grounding and Bonding.

392.60 (A) ~~392.7~~ Grounding.

(A) Metallic Cable Trays. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96 and part IV of Article 250.

(1) (~~B~~)Steel or Aluminum Cable Tray Systems. Steel or aluminum cable

tray systems shall be permitted to be used as equipment grounding conductors, provided that all the following requirements are met:

(a) ~~(1)~~The cable tray sections and fittings are identified as an equipment grounding conductor.

(b) ~~(2)~~ The minimum cross-sectional area of cable trays shall conform to the requirements in Table 392.~~7(B)~~ 60.

(c) ~~(3)~~ All cable tray sections and fittings are legibly and durably marked to show the cross-sectional area of metal in channel cable trays, or cable trays of one-piece construction, and the total cross-sectional area of both side rails for ladder or trough cable trays.

(d) ~~(4)~~ Cable tray sections, fittings, and connected raceways are bonded in accordance with 250.96, using bolted mechanical connectors or bonding jumpers sized and installed in accordance with 250.102.

(2) Equipment Grounding Conductors. Metallic cable trays shall be permitted to be used as equipment grounding conductors where continuous maintenance and supervision ensure that qualified persons service the installed cable tray system and the cable tray complies with provisions of 392.~~7~~ 60.

Table 392.60 ~~Table 392.7(B)~~ Metal Area Requirements for Cable Trays Used as Equipment Grounding Conductor

Maximum Fuse Ampere Rating, Circuit Breaker Ampere Trip Setting, or Circuit Breaker Protective Relay Ampere Trip Setting for Ground-Fault Protection of Any Cable Circuit in the Cable Tray System	Minimum Cross-Sectional Area of Metal: Steel Cable Trays		Aluminum Cable Trays	
	mm2	in.2	mm2	in.2
60	129	0.20	129	0.20
100	258	0.40	129	0.20
200	451.5	0.70	129	0.20
400	645	1.00	258	0.40
600	967.5	1.50[b]	258	0.40
1000	—	—	387	0.60
1200	—	—	645	1.00
1600	—	—	967.5	1.50
2000	—	—	1290	2.00[b]

[a]Total cross-sectional area of both side rails for ladder or trough cable trays; or the minimum cross-sectional area of metal in channel cable trays or cable trays of one-piece construction.

[b]Steel cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 600 amperes. Aluminum cable trays shall not be used as equipment grounding conductors for circuits with ground-fault protection above 2000 amperes.

~~292.6(A) Partial~~ (B) Bonding. A bonding jumper sized in accordance with 250.102 shall connect the two sections of cable tray, or the cable tray and the raceway or equipment. Bonding shall be in accordance with 250.96.

V. Ampacity of Jacketed Cables and Single Conductors

392.64 ~~392.11~~ Ampacity of Jacketed Cables, Rated 2000 Volts or Less, in Cable Trays.

(A) Jacketed Multiconductor Cables. The allowable ampacity of jacketed multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.22 (F) shall be as given in Table 310.16 and Table 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).

(1) The derating factors of 310.15(B)(2)(a) shall apply only to jacketed multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the jacketed cable and not to the number of conductors in the cable tray.

(2) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not over 95 percent of the allowable ampacities of Table 310.16 and Table 310.18 shall be permitted for multiconductor cables.

(3) Where jacketed multiconductor cables are installed in a single layer in uncovered trays, with a maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ambient temperature-corrected ampacities of jacketed multiconductor cables, with not more than three insulated conductors rated 0 through 2000 volts in free air, in accordance with 310.15(C).

FPN: See Table B.310.3.

(B) Single-Conductor Cables. The allowable ampacity of single-conductors ~~cables~~ shall be as permitted by 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall not apply to the ampacity of ~~cables~~ single conductors in cable trays. The ampacity of single-conductors ~~cables~~, or single conductors ~~cabled~~ grouped together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:

(1) Where installed according to the requirements of 392.~~10~~ 22 (G), the ampacities for 600 kcmil and larger single-conductors ~~cables~~ in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 600 kcmil and larger ~~cables~~ single conductors shall not exceed 70 percent of the allowable ampacities in Table 310.17 and Table 310.19.

(2) Where installed according to the requirements of 392.~~10~~ 22, the ampacities for 1/0 AWG through 500 kcmil single-conductors ~~cables~~ in uncovered cable trays shall not exceed 65 percent of the allowable ampacities in Table 310.17 and Table 310.19. Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG through 500 kcmil ~~cables~~ single conductors shall not exceed 60 percent of the allowable ampacities in Table 310.17 and Table 310.19.

(3) Where single conductors are installed in a single layer in uncovered cable trays, with a maintained space of not less than one ~~cable~~ single conductor diameter between individual conductors, the ampacity of 1/0 AWG and larger ~~cables~~ single conductors shall not exceed the allowable ampacities in Table 310.17 and Table 310.19.

Exception to (B)(3): For solid bottom cable trays the ampacity of single conductors ~~cables~~ shall be determined by 310.15(C).

(4) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free airspace of not less than 2.15 times one conductor diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations ~~or cables~~, the ampacity of 1/0 AWG and larger cables shall not exceed the allowable ampacities of two or three single insulated conductors rated 0 through 2000 volts supported on a messenger in accordance with 310.15(B).

FPN: See Table 310.20.

(C) Combinations of Jacketed Multiconductor Cables and Single Conductors ~~Cables~~.

Where a cable tray contains a combination of jacketed multiconductor cables and single conductors ~~cables~~, the allowable ampacities shall be as given in 392.~~11 (A)~~ 64 (A) for jacketed multiconductor cables and 392.~~11~~ 64(B) for single-conductors ~~cables~~, provided the following conditions apply:

(1) The sum of the jacketed multiconductor cable fill area as a percentage of the allowable fill area for the tray calculated per 392.~~9~~ 22 (F), ~~and~~ totals not more than 100 percent.

(2) Jacketed multiconductor cables are installed according to 392.~~9~~ 22 (F).

(3) The single conductor ~~cables~~ fill area as a percentage of the allowable fill area for the tray calculated as per 392.~~10~~ 22 (G) , totals not more than 100 percent.

(4) Single-conductor cables are installed according to 392.~~10~~ 22 (D), 392.22 (G), and 392.56 ~~392.8 (A) (D)~~.

(D) ~~392.13~~ Ampacity of Type MV single conductors and Type MC Jacketed Multi-conductor Cables (2001 Volts or Over) in Cable Trays.

The ampacity of jacketed multi-conductor cables, rated 2001 volts, nominal, or over, installed according to ~~392.12~~ 392.22(H) shall not exceed the requirements of this section.

(1) Jacketed Multiconductor Cables (2001 Volts or Over). The allowable ampacity of jacketed multiconductor cables shall be as given in Table 310.75 and Table 310.76, subject to the following provisions:

(a) Where cable trays are continuously covered for more than 1.8 m (6 ft) with solid unventilated covers, not more than 95 percent of the allowable ampacities of Table 310.75 and Table 310.76 shall be permitted for jacketed multiconductor cables.

(b) Where jacketed multiconductor cables are installed in a single layer in uncovered cable trays, with maintained spacing of not less than one cable diameter between cables, the ampacity shall not exceed the allowable ampacities of Table 310.71 and Table 310.72.

(2) Single-Conductor Cables (2001 Volts or Over). The ampacity of single-conductors ~~cables~~, or single conductors ~~cabled~~ grouped together (triplexed, quadruplexed, etc.), shall comply with the following:

(a) The ampacities for 1/0 AWG and larger single-conductors ~~cables~~ in uncovered cable trays shall not exceed 75 percent of the allowable ampacities in Table 310.69 and Table 310.70. Where the cable trays are covered for more than 1.8 m (6 ft) with solid unventilated covers, the ampacities for 1/0 AWG and larger single-conductors ~~cables~~ shall not exceed 70 percent of the allowable ampacities in Table 310.69 and Table 310.70.

(b) Where single-conductors ~~cables~~ are installed in a single layer in uncovered cable trays, with a maintained space of not less than one ~~cable~~ conductor diameter between individual conductors, the ampacity of 1/0 AWG and larger ~~cables~~ single conductors shall not exceed the allowable ampacities in Table 310.69 and Table 310.70.

(3) Where single conductors are installed in a triangular or square configuration in uncovered cable trays, with a maintained free air space of not less than 2.15 times the diameter (2.15 × O.D.) of the largest conductor contained within the configuration and adjacent conductor configurations ~~or cables~~, the ampacity of 1/0 AWG and larger ~~cables~~ single conductors shall not

exceed the allowable ampacities in Table 310.67 and Table 310.68.

VI. Construction Specifications

~~392.5 Construction Specifications~~.

392.100 Strength and Rigidity.
(A) Cable trays shall have suitable strength and rigidity to provide adequate support for all contained wiring.
(B) Side Rails. Cable trays shall have side rails or equivalent structural members.

392.110 Corrosion Protection. Cable tray systems shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.

392.116 ~~392.5(F)~~ Nonmetallic Cable Tray. Nonmetallic cable trays shall be made of flame-retardant material.
Substantiation: This is a rewrite of Article 392 to more closely follow the suggested numbering and subject divisions by the NFPA style manual and NEC style manual. Any of the underlines items are new text submitted for review by CMP-8.
1. Added a new FPN under the definition and definition of raceway in article 100 new 392.2.
2. Added subsection parts with title for 6 separate parts and changed the numbering sequence.
3. Added the words “jacketed and multi-conductor” throughout for more consistency of verbiage. There are many references to cables as a stand alone, locations where “multi-conductor cables” is applied, and “jacketed cables.” A word search is showing that jacketed in even applied into Article 392 for uses permitted for cable trays. This is to attempt to have a consistency for the terms throughout this article that all cables are jacketed and multi-conductor types.
4. Added the words “single conductors” to differentiate between current references in this article that apply the word “single cables,” due to the confusion. Conductors are cables, but the change helps to clarify for installation within a cable tray how defined cable types (single conductor or jacketed multi-conductor cables) shall be installed and a more positive method for determining an ampacity of cables & conductors..
5. Added a new sentence 392.20 (A) (3) (a) that cables within a cable tray are to follow the requirements for the cables, conductors, or raceway systems that can be installed in a cable tray from their respective articles.
6. There are many new article titles as a result of the separation of the sections within this article. The titles are to more closely follow the content of a specific part of the article.
7. Be aware that the tables have not changed, but when copied over from the NEC handbook CD this is the format that it looks like when printed. The only changes to the tables is updated the numbering sequence or cable, conductor usage submitted for review by the committee.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 8-238.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BLOM, J.: Refer to comment on Proposal 8-235a, Log No. CP804.

8-239 Log #2054 NEC-P08 **Final Action: Accept**
(392.1, FPN)

Submitter: Robert Crain, Cablofil
Recommendation: FPN: For further information on cable trays, see ANSI/NEMA-VE 1~~-1998~~2002, Metal Cable Tray Systems; NECA/NEMA~~-VE 2~~105 ~~1996~~2007, *Standard for installing Metal Cable Tray Systems* ~~*Installation Guidelines*~~; and NEMA-FG 1-1998, *Nonmetallic Cable Tray Systems*.
Substantiation: Update references to the most recent titles and revisions.
Panel Meeting Action: Accept
Panel Statement: New section 392.1 of 8-235a will need to be updated per this proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-240 Log #558 NEC-P08 **Final Action: Reject**
(392.3)

Submitter: Joe Riley, City of Arlington
Recommendation: Add new text as follows:
392.3 Uses Permitted. Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits. Cable tray installations shall not be limited to industrial establishments. Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant and shall be installed on cable trays with ventilated covers that effectively protect the conductors and cables from direct sunlight. Cable trays, covers, and their associated fittings shall be identified for the intended use.
Substantiation: Even though the conductors and cables exposed to direct sunlight are sunlight resistant, they are still likely to be damaged over time by the extreme heat and ultra violet sun rays. Additional protection against the damaging effects of direct sunlight on cables and conductors can be achieved with the installation of ventilated cable tray covers. A General Motors automobile plant in Arlington, Texas has experienced the damaging results of direct sunlight exposure to their (MC) Metal Clad distribution cables installed on cable trays outdoors and on rooftops. The MC cable had deteriorated from the direct sunlight and environmental conditions resulting in electrical short circuits. I have included pictures of the effects of direct sunlight on sunlight resistant MC cable at the General Motors facility. At General Motors, the solution to correct the damaging effects of direct sunlight on cables and conductors was to install ventilated cable tray covers over all newly installed sunlight resistive MC cable.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: If the cables are identified as sunlight resistant, they are not required to be covered. If this is an issue, the submitter should address it with the organization responsible for the cable product listing standard.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-241 Log #1867 NEC-P08 **Final Action: Reject**
(392.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence and substitute: Cable trays shall be permitted to be used as a support system for optical fiber cables and electrical conductors including conductors in raceways and cable assemblies.
Substantiation: Proposal removes a laundry list (as in 392.1(A)), includes equipment grounding and bonding conductors and correlates with 630.42 and 770.133.
Panel Meeting Action: Reject
Panel Statement: Under uses permitted a detailed list would be expected. Panel’s experience is that this information is helpful to the user.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-242 Log #3358 NEC-P08 **Final Action: Reject**
(392.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Cable tray shall be permitted as support system for electrical conductors and optical fiber cables. ~~Service conductors, feeders, branch circuits, communication circuits, control circuits, and signaling circuits.~~
Substantiation: Edit. “Electrical conductors and optical fiber cables” supplants an itemized list and includes welding cables, grounding electrode conductors, and grounding and bonding conductors.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 8-241. Proposal is not editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-243 Log #1927 NEC-P08 **Final Action: Reject**
(392.3(1)(c))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (1)(c): Single-conductor cable other than Type MI, Type MC, and armored ground wire shall be 1/0 AWG or larger...(remainder unchanged).
In (1)(c), “or bonding” after “equipment grounding”.
Substantiation: Type MI, Type MC, and armored ground wires may be single-conductor and excluded from the 1/0 AWG requirement. Bonding conductors should be included in (c).
Panel Meeting Action: Reject
Panel Statement: 392.3(1)(c) should be 392(B)(1)(a) Product is not available, therefore the exception is not required. MI and MC are permitted in 392.3(A). All wiring methods listed in 392.3(A) are permitted to be used in 392.3(B). No substantiation was provided for the remaining changes.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-244 Log #184 NEC-P08 **Final Action: Reject**
(Table 392.3(A))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:

Table 392.3(A) Wiring Methods

Wiring Method	Article
Armored cables	320
CATV cables	820
CATV raceways	820
Class 2 and Class 3 cables	725
Communications cables	800
Communications raceways	800
Electrical metallic tubing	358
Electrical nonmetallic tubing	362
Fire alarm cables	760
Flexible metal conduits	348
Flexible metallic tubing	360
Instrumentation tray cables	727
Intermediate metal conduits	342
Liquidtight flexible metal conduits	350
Liquidtight flexible nonmetallic conduits	356
Metal-clad cables	330
Mineral-insulated, metal-sheathed cables	332
Multiconductor service-entrance cables	338
Multiconductor underground feeder and branch-circuit cables	340
Network-powered broadband communications cables	830
Nonmetallic-sheathed cables	334
Non-power-limited fire alarm cables	760
Optical fiber cables	770
Optical fiber raceways	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays	
Polyvinyl chloride PVC conduits	352
Power and control tray cables	336
Power-limited fire alarm cables	760
Power-limited tray cables	725
Rigid metal conduits	344
Rigid nonmetallic conduits	352
RTRC	355
Signaling raceways	725

Substantiation: Section 3.3.3 of the NEC Style Manual States: "**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all.*.
Panel Meeting Action: Reject
Panel Statement: The proposed change does not add clarity to the code. The singular form of these wiring methods correlates with the titles of the articles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-245 Log #3359 NEC-P08 **Final Action: Reject**
(392.3(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change the word "methods" in the heading, text, and table to "systems".
Substantiation: Edit. Some of the "methods" listed, e.g., CATV Class 1 and 3, communication, fire alarm, instrumentation tray, power and control tray, optical fiber cables, are not indicated in Chapter 3 Wiring Methods and Materials, as wiring methods.
Panel Meeting Action: Reject
Panel Statement: "Wiring method" is a type of wiring not a "system" and not limited to Chapter 3.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-246 Log #2633 NEC-P08 **Final Action: Reject**
(392.3(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Present wording limits wiring methods of Table 392.3(A) to industrial establishments. Per 392.3, cable trays are not limited to industrial establishments.
Panel Meeting Action: Reject
Panel Statement: Submitter is incorrect and present wording does not limit methods listed in 392.3(A) to industrial establishments.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-247 Log #2610 NEC-P08 **Final Action: Reject**
(392.3(B) and Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
SINGLE CONDUCTORS. Single-conductor cables shall be ~~permitted to be~~ installed in accordance with (B)(1)(a) through (B)(1)(c).
(a) No change
(b) No change
(c) No change.
Exception: Single conductors installed in raceway or as Type MC or Type MC cable.
Substantiation: "Permitted to be" does not impose a requirement, but an option or alternative per 0.5(B). Single conductors installed in a raceway or as Type MC or MI cable should be exempt. "Cable" is not specifically defined and includes Type MC and MI.
Panel Meeting Action: Reject
Panel Statement: Proposed changes do not improve clarity or content of existing text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-248 Log #2637 NEC-P08 **Final Action: Reject**
(392.3(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first paragraph: Single-conductor cables without a metallic covering shall be permitted... (remainder unchanged).
Substantiation: Present wording applies to Type MI, Type MC and Type AC cables which doesn't seem to be the intent.
Panel Meeting Action: Reject
Panel Statement: The submitter's proposal limits the section requirements with no technical substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-249 Log #1926 NEC-P08 **Final Action: Accept in Principle**
(392.3(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise text: Cable trays in hazardous (classified) locations shall contain only the cable and raceway types permitted or required in 501.10, 502.10, 503.10, 504.20, and 505.15 in such locations.
Substantiation: Edit. Raceways are permitted in cable trays and should be included. Wiring methods are already covered in the sections noted.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on proposal 8-251.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-250 Log #1955 NEC-P08 **Final Action: Accept in Principle**
(392.3(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise text: Cable trays in hazardous (classified) locations shall contain only the cable and raceway types permitted or required ~~in 501.10, 502.10, 503.10, 504.20, and 505.15~~ in such locations.
Substantiation: Edit. Raceways are permitted in cable trays and should be included. Wiring methods are already specified in the sections noted which apply without a repeat requirement in this section.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on proposal 8-251.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-251 Log #2611 NEC-P08 **Final Action: Accept in Principle**
(392.3(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Cable trays in hazardous (classified) locations shall contain only the cable types and raceways permitted or required in those locations. ~~501.10, 502.10, 503.10, 504.20, and 505.15~~.
Substantiation: Edit. Raceways are permitted in cable trays. Some cables and raceways are required.
Panel Meeting Action: Accept in Principle
Revise text in 392.10(C) as follows in 8-235a:
(C) Hazardous (Classified) Locations. Cable trays in hazardous (classified) locations shall contain only cable types and raceways as permitted by other articles of this code.
Panel Statement: The revised text meets the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-252 Log #3183 NEC-P08 **Final Action: Reject**
(392.3(D))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 392.3 delete, ~~(D) Hazardous (Classified) Locations. Cable trays in hazardous (classified) locations shall contain only the cable types permitted in 501.10, 502.10, 503.10, 504.20, and 505.15.~~
Renumber 392.3(E) as 392.3(D).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-41.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-253 Log #2279 NEC-P08 **Final Action: Accept**
(392.4)

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise Section to 392.4 to read as follows:
392.4 Uses Not Permitted
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. ~~Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.~~
Substantiation: This section was revised to remove the statement that cable trays cannot be used in plenum since metal cable trays are permitted per 300.22.
Panel Meeting Action: Accept
Revise accepted text in 392.12 as proposed in 8-235a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HUMPHREY, D.: Removal of the last sentence of section 392.4 (Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces) may cause confusion by the user. The removal of this sentence results in the user not being directed to section 300.22 for permissible wiring methods in cable tray when the cable tray is installed in ducts, plenums or other space used for environmental air. The user may likely turn to Table 392.3(A) for a wiring method selection that may not be compatible with the requirements of section 300.22. The best solution is to leave the current language in place until this issue can be addressed by revising the uses permitted section of Article 392 to reference section 300.22.

8-254 Log #2631 NEC-P08 **Final Action: Reject**
(392.5(G) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 392.XX Cable trays shall be listed.
Substantiation: Cable trays are noted in Contents under Chapter 3 wiring methods and materials. Most wiring methods are required to be listed. Listing would provide for certain standards, such as grounding and bonding, and rung spacing for single conductors for which there are no Code requirements.
Panel Meeting Action: Reject
Panel Statement: Cable tray is not a raceway or wiring method. Cable trays are not considered raceways but support systems and are not required to be listed. They are, however, classified by testing agencies such as NRTLs to verify the minimum cross-sectional area requirements are met so that cable tray can be utilized as an equipment grounding conductor.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BERMAN, R.: The Panel Statement is correct, in that metallic cable trays may be classified by a testing agency as an equipment grounding conductor. However, this classification (certification) is not required by Article 392 of the NEC. Instead, Section 392.7(B)(1) requires that metallic cable tray sections and fittings only be “identified” as an equipment grounding conductor. Certification of metallic (and nonmetallic) cable trays by a nationally recognized third party certification organization would provide further evidence that the design, manufacture, and installation has been evaluated for safety and use in accordance with NEC Article 392.

8-255 Log #470 NEC-P08 **Final Action: Reject**
(392.6(I))

Submitter: Patrick G. Heater, Netsian Technologies Group
Recommendation: Revise text to read as follows:
(I) Adequate Access. Sufficient space, a minimum of 300 mm (12 in.) access headroom shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables. Care shall be taken to ensure that other building components (e.g., air conditioning ducts) do not restrict access to trays or wireways.
Substantiation: This is to correlate with ANSI/TIA/EIA — 569 — A SECTION 4.5.6.2.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The panel continues to maintain that access is adequately covered in 392.6(1) to maintain cables and raceways within a cable tray. Also, the panel has no authority over building components and AC ducts.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-256 Log #1546 NEC-P08 **Final Action: Reject**
(392.6(1))

Submitter: Richard Hollander, City of Tucson
Recommendation: Revise text as follows:
(1) Adequate Access. Sufficient space, a minimum of 300 mm (12 in.) access headroom shall be provided and maintained about cable trays to permit adequate access for installing and maintaining the cables. Care shall be taken to ensure that other building components (e.g., air conditioning ducts) do not restrict access to trays or wireways.
Substantiation: This is to correlate with ANSI/TIA/EIA – 569 – A SECTION 4.5.6.2.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 8-255.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-257 Log #2632 NEC-P08 **Final Action: Accept in Part**
(392.6(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence of first paragraph: The system shall provide for the support of the cables and raceways in accordance with their corresponding articles. Securing to supports shall be in accordance with 392.8(B).
Substantiation: Edit. Raceways should be included since cable trays may be constructed with the intention of supporting only raceways and have rungs spaced accordingly. Support may be deemed as including attachment.
Panel Meeting Action: Accept in Part
Revise text in 392.10(E) as follows in 8-235a:
Accept only the phrase “and raceways.” Delete “Securing to supports shall be in accordance with 392.8(B).”
Panel Statement: Additional text “and raceways” improves the present language to clarify that both cables and raceways are permitted. The panel does not accept the addition of the reference to 392.8(B) as it is unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-258 Log #3355 NEC-P08 **Final Action: Reject**
(392.6(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence:
Cable trays shall be securely fastened to supports ~~supported~~ at intervals in accordance with the installation instructions.
Substantiation: Edit. Supporting is not necessarily the same as fastened.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-259 Log #3356 NEC-P08 **Final Action: Reject**
(392.6(E) and (F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
(E) ~~Multiconductor scales~~ Conductors and cables rated 600 volts or less shall be permitted to be installed in the same cable tray with conductors or cables operating at over 600 volts.
(F) Cables and conductors ~~rated~~ operating at over 600 volts and those rated 600 volts or less installed in the same cable tray shall comply with either of the following:
(1) The cables ~~rated~~ operating at over 600 volts are MC;
(2) The cables or conductors ~~rated~~ operating at over 600 volts are separated from the cables and conductors rated 600 volts or less by a solid fixed barrier of identified material compatible with the cable tray;
(3) The cables and conductors ~~rated~~ operating at over 600 volts or the cables and conductors rated at 600 volts or less are installed in a raceway or identified metal covering.
Substantiation: Edit. Present wording of (E) appears incomplete. Sometimes for one reason or another cables and conductors rated over 600 volts are used in 600 volts or less circuits; the operating voltage should be the criterion. “Cables” may be perceived as multiconductor types as it is used to designate single and multiconductor types. “Conductors” is used in 692.7(A).
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-260 Log #679 NEC-P08 **Final Action: Accept in Principle**
(392.6(F)(3))

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: Add new text to read as follows:
392.6(F)(3)
(3) A permanent, legible warning notice carrying the wording “DANGER — HIGH VOLTAGE” shall be placed in a readily visible position on all cable trays containing high-voltage conductors with the maximum spacing of warning notices not to exceed 3 m (10 ft).
Substantiation: This proposal is the work of the “High Voltage Task Group” appointed by the Technical Correlating Committee. The task group consisted of the following members: Alan Peterson, Paul Barnhart, Lanny Floyd, Alan Manche, Donny Cook, Vince Saporita, Roger McDaniel, Stan Folz, Eddie Guidry, and Jim Dollard.
Warning requirements currently exist throughout the NEC where qualified and unqualified persons encounter over 600 volt circuits and equipment. NEC 392.6 permits installation of cables and conductors rated over 600 volts in cable tray with and without cables and conductors rated 600 volts or less. Cable tray is permitted to be installed in locations accessible to both qualified and unqualified persons. Proposed text provides warning to protect persons in those locations.
Panel Meeting Action: Accept in Principle
Add a new section 392.120 to read asfollowing:
392.120 Marking. Cable trays containing conductors rated over 600 volts shall have a permanent, legible warning notice carrying the wording “DANGER-HIGH VOLTAGE” placed in a readily visible position on all cable trays with maximum spacing of warning notices not to exceed 3 m (10 ft).
Panel Statement: The panel supports the requirement to label cable tray when high voltage conductors are used. A new section to be added by this proposal pertaining to marking was added to incorporate the new language. The panel concludes that a new section should be used for this marking requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-261 Log #2290 NEC-P08 **Final Action: Reject**
(392.6(J))

Submitter: Baenson “Q” Cho, San Antonio, TX
Recommendation: Revise text to read as follows:
For Raceways terminating at the tray, unless a bonding jumper sized in accordance with 250.96 and 250.102 is installed, a listed cable tray grounding clamp or grounding adapter shall be used to securely fasten the raceway to the cable tray system.
Substantiation: All listed conduit to cable tray clamps available are UL listed for grounding and bonding and not for support. In industrial installations where grounding bushings with jumpers are required for conduits terminating at the cable tray and the jumpers are bonding the conduits with the ground cable running along the cable tray, the use of “listed” cable tray clamp is not necessary.
Often, it is the case where specifications require the need for providing multiple grounds to electrical equipment; 1) ground conductor with the power circuit; 2) equipment grounded to stingers from the ground grid; 3) Raceway grounded at the equipment, and; 4) Raceway grounded at tray by the use of ground bushing and tied to ground cable running the entire length of the tray system. The requirement for the use of listed cable tray clamp is redundant to 4.
If the conduit terminating at the cable tray is not touching the tray, the use of grounding bushing with jumpers is acceptable according to the current code. However, if the design of the tray system allows for the support of conduits, the supporting the conduit ends with the tray makes it a cleaner installation. The installation methods will need to be in accordance with raceway installation code sections as per the sentence following the proposed change.
The current wording does not allow conduits to be terminated at the cable tray unless a grounding bushing is used. Revised wording will allow supporting of conduit using cable tray without the use of grounding conduit clamp when grounding is provided using ground bushing.
Revision of the sentence would allow for supporting the conduit with cable tray without the use of conduit clamp listed for grounding. Such as bolting a section of strut and utilizing conduit straps for multiple conduits terminating at the tray in close vicinity. Grounding requirement would be met using grounding bushing & jumper to tray ground.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Section 392.6(J) covers supporting of raceway systems. The requirements for grounding are presently covered in 392.7(B)(4).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-262 Log #2640 NEC-P08 **Final Action: Reject**
(392.7(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Metallic cable trays that support electrical conductors, including conductors in raceways and cable assemblies, shall be grounded and bonded in accordance with applicable provisions of Table 250.66, 250.96, 250.122, and Part IV of Article 250 Exception No. 2 for 250.86 shall not apply.
Exception: Where the cable tray contains only the following types of conductors or cables:
(1) Secondary circuit welding cables;
(2) Optical fiber cables without current-carrying conductors;
(3) Class 2 circuit conductors;
(4) Communication circuit cables or wires.
Substantiation: Section 250.96 relates only to bonding, not grounding. Applicable provisions of Table 250.66 and 250.122 should be noted to provide for equipment grounding and bonding conductor sizing. Grounding does not appear to be a safety issue for cables and conductors in the proposed exceptions. Cable trays with a cover are enclosures and Exception No. 2 for 250.86 should not apply. Present text provides no specifics for grounding means.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the section, and the substantiation is not accurate.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-263 Log #3622 NEC-P08 **Final Action: Accept**
(392.7(A))

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
(A) Metallic Cable Trays. Metallic cable trays that support electrical conductors shall be grounded as required for conductor enclosures in accordance with 250.96 and Part IV of Article 250. Metal cable tray containing non-power conductors (communication, data, signal, etc.) shall be electrically continuous, through listed connections or the use of an insulated stranded bonding jumper not smaller than a 10 AWG.
Substantiation: The NEC presently does not require cable trays with non-power conductors to be properly bonded. The NECA/NEMA 105-2007 Standard for Installing Metal Cable Tray Systems provides bonding requirements in Section 4.7.3.2 for installations of only non-power conductors. This needs to be covered in the NEC. Most contractors do not have access to the NEIS standards.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-264 Log #362 NEC-P08 **Final Action: Reject**
(392.8(D))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
"…the conductors shall be installed in groups consisting of not more than one conductor for each ~~per~~ phase, neutral, or grounded conductor…".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The NEC style manual does not restrict the use of the word "per" in this code section. The proposed change does not add clarity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-265 Log #4883 NEC-P08 **Final Action: Reject**
(392.8(D))

Submitter: Charles Darnell, kVA Engineering and Forensics, LLC
Recommendation: Revise text as follows:
Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces unless single conductors are cabled together, such as triplexed assemblies. The restraint method employed shall protect the single conductors from damage due to the fault-current magnetic forces and be rated for the spacing between conductors and maximum available fault current.
Substantiation: Most electrical personnel (including installers and engineers) are unaware of how to achieve the single conductor performance criteria required in this code section. It is unlikely an installer or engineer could accurately quantify the conductor movement resulting from fault-current magnetic forces. Therefore, it is unreasonable to require "excessive movement" prevention unless and until electrical personnel are informed on how to meet the code requirement. There are available physics-based engineering calculations that quantify the magnitude of fault-current magnetic forces, but these would not normally be known by installers. Therefore, there is an implied code requirement for engineering force calculations whenever there are single conductors in cable tray. Also, there are several internationally recognized peer-reviewed consensus standards addressing single conductor restraint due to fault-current magnetic forces. European Standard EN 50368:2003, Cable Cleats for Electrical Installations and a forthcoming IEC standard (SC23A, PT61914, Cable Cleats for Electrical Installations) include algebraic formulas for fault-current magnetic forces and also provide manufacturer testing procedures for evaluating adequate restraint. In addition to several non-US wiring practices codes, the proposed new language for this code would be harmonized with the current revision of American Petroleum Institute RP 14F, Recommended Practice for Design, Installation, and Maintenance of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1 and Division 2 Locations (see attached excerpt) and the proposed revision to IEEE Std 45, Recommended Practice for Electrical Installations on Shipboard (same wording as API RP 14F). The proposed new language for this code section introduces specific product evaluation criteria, thus providing electrical personnel with adequate information to differentiate between single conductor restraint manufacturers and models. Additionally, this new code language would be harmonized with other existing domestic and international peer-reviewed consensus standards.
Since the fault-current magnetic forces between conductors are directly proportional to the square of the peak current magnitude and indirectly proportional to the spacing between conductors, moderate short circuit levels can generate large mechanical forces. It is possible for a 3-phase 10kARMsshort circuit to generate fault-current magnetic forces above 500 pounds per foot (see attached Cable Force Calculation #1). While forces in this order of magnitude may seem considerable, large industrial electrical systems regularly encounter fault-current magnetic forces in excess of 3 tons (see attached Cable Force Calculation #2 and corresponding Event #2 Photograph). This actual incident resulted in 400 feet of 250kcmil cable expelled from the cable tray system (cables "fire-hosing" until the upstream circuit breaker cleared the fault).
Recognizing there may be self-certified cable restraint products designed to withstand fault-current magnetic forces, there are products available that are independently tested to a peer-reviewed consensus standard to withstand fault-current magnetic forces and protect the restrained cables during actual short circuit events... the cable cleat. Cable cleats may be applied in cable tray to adequately restrain and protect single conductors.
Underperforming cable restraints can result in to hazards to persons and property. In order to provide practical safeguarding of persons and property from hazards arising from the use of electricity, this code should dictate that cable restraint systems provide protection from fault-current magnetic forces. Inclusion of the proposed requirements for single conductor protection will empower the installer to make an informed decision on which restraints to use for single conductor cable restraint.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation presents compliance and enforcement problems. No method is given that will achieve compliance with the submitter's requirements and the substantiation references general instructions provided in other documents. The requirement to secure these cables, as the submitter suggests, is at best "implied," leaving great room for subjective interpretation. The present text in 392.8(D) provides sufficient direction regarding this issue. The proposed requirements are design criteria and not appropriate for the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-266 Log #4884 NEC-P08 **Final Action: Reject**
(392.8(D))

Submitter: Charles Darnell, kVA Engineering and Forensics, LLC
Recommendation: Revise text as follows:
Single conductors shall be securely bound in circuit groups to prevent excessive movement due to fault-current magnetic forces ~~unless single conductors are cabled together, such as triplexed assemblies.~~
Substantiation: By discounting the single conductor movement criteria when single conductors are cabled together, this code section suggests multiconductor cables and triplexed assemblies inherently prevent excessive movement of their included single conductors. While these cable constructions may prove adequate in systems with low available fault duties, this author's extensive forensic experience in electrical systems subject to moderate and high available fault duties proves otherwise. Electrical personnel apply cables within their thermal damage capability by selecting appropriate protective device settings (i.e. de-energizing the circuit prior to the point of thermal insulation damage). The protective device (including fuses and circuit breakers) operating times are frequently longer than the time required for single conductors to deflect outward and break free from their cable jacket and/or restraint system (if any). Such protective device applications should protect the conductor and its insulation from exceeding their design temperatures, but does not necessarily provide for adequate mechanical restraint of multi-conductor cables or triplexed assemblies. And when the single conductors are not adequately restrained, they may be damaged and cause further damage to persons and property. This author is prepared to present high-speed slow-motion video footage of multi-conductor cables undergoing short circuit testing (at magnitudes within the cable rating) that conclusively demonstrate this point.
In order to provide practical safeguarding of persons and property from hazards arising from the use of electricity, this code should dictate equal performance criteria for all cable constructions, including single conductor, multi-conductor and triplexed assemblies.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 8-265.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
GRIFFITH, M.: It is acknowledged that movement also occurs during short-circuit conditions with bundled or triplexed conductors; but the substantiation did not establish that there was a sufficient problem associated with this movement to warrant a change.

8-267 Log #2469 NEC-P08 **Final Action: Reject**
(Table 392.9 and Table 392.10(A))

Submitter: Dallas Kellerman, Cablofil
Recommendation: This proposal is a table revising (adding additional tray widths) to be similar with NEMA VE 1, 4.3 (2 in., 8 in., 16 in., and 20 in.).
Substantiation: The 2 in., 4 in., 4 in., 8 in., 16 in., and 20 in. widths are often inquired regarding fill rates which are standard widths for wire mesh tray. Since these widths are not listed, it causes confusion, etc.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The submitter's proposal introduced new information without any substantiation. The submitter's proposal has incorrect information in the data.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
GRIFFITH, M.: Panel should have accepted the proposal in principle by correcting the Coefficients in Table 392.9. The submitter should have used "25" in lieu of "30" as the coefficient ahead of the term "Sd" in every row of the column with the heading "mm2". This correction along with the recognition of this type tray by NEMA and it's widespread use throughout industry for more than 5 years with proven success and no reported problems/failures is sufficient substantiation for accepting the proposal.

8-268 Log #2182 NEC-P08 **Final Action: Accept in Principle**
(392.11)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(A) Text to remain unchanged.
(1) The ~~derating~~ ampacity adjustment factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. ~~Derating~~ Ampacity adjustment shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in cable tray.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
(B) Single-Conductors Cables. The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The ~~derating~~ ampacity adjustment factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
(4) Text to remain unchanged.
FPN: Text to remain unchanged.
Substantiation: The term "ampacity adjustment factor" is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 8-270, which meets the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-269 Log #2999 NEC-P08 **Final Action: Accept in Principle**
(392.11)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
392.11 Ampacity of Cables, Rated 2000 Volts or Less, in Cable Trays.
(A) Text to remain unchanged.
(1) The ~~derating~~ ampacity adjustment factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. ~~Derating~~ Ampacity adjustment shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
(B) Single-Conductor Cables. The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The ~~derating~~ ampacity adjustment factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
(4) Text to remain unchanged.
FPN: Text to remain unchanged.
Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 8-270, which meets the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-270 Log #4486 NEC-P08 **Final Action: Accept**
(392.11)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
392.11 Ampacity of Conductors.
(A) Multiconductor Cables. The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 392.9 shall be as given in Table 310.16 and Table 310.18, subject to the provisions of (1), (2), (3), and 310.15(A)(2).
(1) The ~~derating~~ adjustment factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. ~~Derating~~ Adjustment factors shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the cable tray.
[remainder of 392.11(A) unchanged by this Proposal]
(B) Single-Conductor Cables. The allowable ampacity of single-conductor cables shall be as permitted by 310.15(A)(2). The ~~derating~~ adjustment factors of 310.15(B)(2)(a) shall not apply to the ampacity of cables in cable trays. The ampacity of single-conductor cables, or single conductors cabled together (triplexed, quadruplexed, etc.), nominally rated 2000 volts or less, shall comply with the following:
[remainder of 392.11(B) and 392.11(C) unchanged by this Proposal]
Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".
366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).
Panel Meeting Action: Accept
Revise section 392.17 of 8-235a as proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-271 Log #1618 NEC-P08 **Final Action: Accept**
(392.11(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In 392.11(A), change "Table 310.16 and Table 310.18" to "Table 310.15(B)(1) and Table 310.15(B)(3)".
In 392.11(A)(2), change "Table 310.16 and Table 310.18" to "Table 310.15(B)(1) and Table 310.15(B)(3)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Revise text 392.17(A). in 8-235a as proposed. TC note correlate with Panel 6 proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-272 Log #1640 NEC-P08 **Final Action: Accept**
(392.11(A)(3), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Table B.310.3" to "Table B.310.15(B)(2)(3)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables B.310.1 through B.310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and the figure designations of Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).
Panel Meeting Action: Accept
Revise 392.17(A) FPN in 8-235a as proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-273 Log #1619 NEC-P08 **Final Action: Accept**
(392.11(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In (1), change "Table 310.17" to "Table 310.15(B)(2)" and change "Table 310.19" to "Table 310.15(B)(4)" in two places.
In (2), change "Table 310.17" to "Table 310.15(B)(2)" and change "Table 310.19" to "Table 310.15(B)(4)" in two places.
In (3), change "Table 310.17" to "Table 310.15(B)(2)" and change "Table 310.19" to "Table 310.15(B)(4)".
In (4), FPN, change "Table 310.20" to "Table 310.15(B)(5)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Revise text in 392.17(A)(2) in 8-235a as proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-274 Log #363 NEC-P08 **Final Action: Accept**
(392.11(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise (1) as follows:
"The sum of the multiconductor cable fill area as a percentage of the allowable fill area for the tray calculated in accordance with ~~per~~ 392.9, and the single-conductor cable fill area as a percentage of the allowable fill area for the tray calculated in accordance with ~~per~~ 392.10, totals not more than 100 percent."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Revise section 392.17(A)(3) in 8-235a as proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-275 Log #1634 NEC-P08 **Final Action: Accept**
(392.13)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In 392.13(A), change "Table 310.75 and Table 310.76" to "Table 310.60(C)(9) and Table 310.60(C)(10)".
In 392.13(A)(1), change "Table 310.75 and Table 310.76" to "Table 310.60(C)(9) and Table 310.60(C)(10)".
In 392.13(A)(2), change "Table 310.71 and Table 310.72 to "Table 310.60(C)(5 and Table 310.60(C)(6)"
In 392.13(B)(1), change "Table 310.69 and Table 310.70" to "Table 310.60(C)(3) and Table 310.60(C)(4)" in two places.
In 392.13(B)(2), change "Table 310.69 and Table 310.70" to "Table 310.60(C)(3) and Table 310.60(C)(4)".
In 392.13(B)(3), change "Table 310.67 and Table 310.68" to "Table 310.60(C)(1) and Table 310.60(C)(2)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.67 through 310.86 as Tables 310.60(C)(1) through 310.60(C)(20) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Revise section 392.17(B) in 8-235a as proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-276 Log #3782 NEC-P08 **Final Action: Accept in Principle**
(392.80)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel..."
Substantiation: The word "an" in front of "alternating current" was misspelled without the letter "a" in front of the letter "n". This is a correction to a typographical error in the text.
Panel Meeting Action: Accept in Principle
Revise as intended in section 392.8(D).
Panel Statement: The panel recognizes that the submitter meant to reference section 392.8(D).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 393

8-277 Log #1607 NEC-P08 **Final Action: Reject**
(393 (New))

Submitter: Ray R. Keden, ERICO, Inc.
Recommendation:
ARTICLE 393 Non-Continuous Cable Supports
I. General
393.1 Scope.
This article covers the use, installation, and construction specifications for Non-Continuous Cable Supports (NC cable supports).
393.2 Definition.
NC Cable Supports. Units of support installed at intervals along a predetermined route and designed for the purpose of securely supporting and positioning cables and/or raceways.
II. Installation
393.3 Uses Permitted.
NC cable supports shall be permitted to be used as a support for multiconductor power, lighting, communications, control, and signaling circuits. NC cable support installations shall not be limited to industrial establishments. Where exposed to direct rays of the sun, insulated conductors and jacketed cables shall be identified as being sunlight resistant.
(A) Wiring Methods. The wiring methods in Table 393.3(A) shall be permitted to be installed in NC cable supports under the conditions described in their respective articles and sections.

Table 393.3(A) Wiring Methods

Wiring Method	Article
Armored cable	320
CATV cables	820
CATV raceways	820
Class 2 and Class 3 cables	725
Communications cables	800
Communications raceways	800
Electrical metallic tubing	358
Electrical nonmetallic tubing	362
Fire alarm cables	760
Flexible metal conduit	348
Flexible metallic tubing	360
Instrumentation tray cable	727
Intermediate metal conduit	342
Liquidtight flexible metal conduit	350
Liquidtight flexible nonmetallic conduit	356
Metal-clad cable	330
Mineral-insulated, metal-sheathed cable	332
Multiconductor service-entrance cable	338
Multiconductor underground feeder and branch-circuit cable	340
Network-powered broadband communications cables	830
Nonmetallic-sheathed cable	334
Non-power-limited fire alarm cable	760
Optical fiber cables	770
Optical fiber raceways	770
Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in NC cable supports	
Polyvinyl chloride PVC conduit	352
Power and control tray cable	336
Power-limited fire alarm cable	760
Power-limited tray cable	725
Rigid metal conduit	344
Rigid nonmetallic conduit	352
RTRC	355
Signaling raceway	725

(B) In Industrial Establishments. The wiring methods in Table 393.3(A) shall be permitted to be used in any industrial establishment under the conditions described in their respective articles.
(C) Nonmetallic NC Cable Supports. In addition to the uses permitted elsewhere in 393.3, nonmetallic NC cable supports shall be permitted in corrosive areas and in areas requiring voltage isolation.
393.4 Uses Not Permitted.
Cables with conductors 4/0 AWG or larger and single conductors are not permitted to be installed in NC cable supports. NC cable supports shall not be used in hoistways or where subject to severe physical damage. NC cable supports shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces. NC cable supports shall not be used in hazardous (classified) locations.
393.5 Construction Specifications.
(A) Strength and Rigidity. NC cable supports shall have suitable strength and rigidity to provide adequate support for all contained wiring.

(B) Retaining Provisions. NC cable supports shall include provisions for retaining of all contained wiring. The provisions may be integral to the supports or other suitable means.
(C) Smooth Edges. NC cable supports shall not have sharp edges, burrs, or projections that could damage the insulation or jackets of the cables.
(D) Attachment. NC cable supports shall include provisions for attachment to structures. The provisions may be associated fittings or other suitable means.
(E) Assemblies. NC cable supports may have integral provisions or associated fittings for assembly of two or more supports either in a vertical tier, back-to-back or in back-to-back tiers.
(F) Corrosion Protection. NC cable supports shall be corrosion resistant. If made of ferrous material, the system shall be protected from corrosion as required by 300.6.
(G) Listed. NC cable supports and associated fittings shall be listed.
(H) Nonmetallic NC Cable Supports. Nonmetallic NC cable supports shall be made of flame-retardant material.
393.6 Installation.
(A) Completed Before Installation. Each run of NC cable supports shall be completed before the installation of cables.
(B) Support Interval. NC cable supports shall be installed at intervals not exceeding 1.5 m (5 ft.).
(C) Exposed and Accessible. NC cable supports shall be exposed and accessible. Sufficient space shall be provided and maintained about NC cable supports to permit adequate access for installing and maintaining the cables.
393.7 Grounding.
NC cable supports are not required to be bonded to ground.
393.8 Cable Installation.
(A) Sag. The sag of the cable bundles between NC cable supports shall not exceed 300 mm (12 in.). Larger sag shall be prevented by reducing the support interval in 393.6 (B).
(B) Clearance from Surface Below. A clearance of not less than 50 mm (2 in.) shall be maintained between cables and the horizontal surface over which it passes.
(C) Clearance from Piping, Exposed Conductors, and So Forth. A clearance of not less than 50 mm (2 in.) shall be maintained between cables in NC cable support systems and other exposed conductors, piping, and so forth.
(D) Securing. Horizontal cable and raceway runs may be secured to NC cable supports. In other than horizontal runs, the cables shall be fastened securely to the NC cable supports. Securing shall be accomplished with provisions integral to the NC cable support, associated fittings or other suitable means, such as cable ties
(E) Through Partitions and Walls. Cables installed in NC cable supports shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installations are made in accordance with the requirements of 300.21.
(F) Multiconductor Cables Rated 600 Volts or Less. Multiconductor cables for power and lighting rated 600 volts or less shall be permitted to be installed in the same NC cable support.
(G) Cables Rated over 600 Volts. Cables rated over 600 volts and cables for power and lighting rated 600 volts or less shall be permitted to be installed in the same NC cable support if the cables rated over 600 volts are Type MC.
393.9 Number of Multiconductor Cables, Rated 2000 Volts or Less, in NC cable Supports.
The number of multiconductor cables, rated 2000 volts or less, permitted in a single NC cable support shall not exceed the requirements of this section. The conductor sizes herein apply to both aluminum and copper conductors.
(A) Any Mixture of Cables. Where NC cable supports contain multiconductor power or lighting cables, or any mixture of multiconductor power, lighting, control, and signal cables, the maximum number of cables shall conform to the following: The sum of the cross-sectional areas of all cables shall not exceed the maximum allowable cable fill area in Columns 3 or 4 of Table 393.9 for the appropriate NC cable support width.

Table 393.9 Allowable Cable Fill Area for Multiconductor Cables in NC Cable Supports for Cables Rated 2000 Volts or Less

Inside Width of NC Cable Support		Applicable Cross-sectional Area	
mm	in.	mm^2	$in.^2$
18	0.75	540	0.84
25	1.00	750	1.16
59	2.00	1,500	2.33
75	3.00	2,250	3.50
100	4.00	3,000	4.66

(B) Multiconductor Control and/or Signal Cables Only. Where a NC cable support having a usable inside depth of 150 mm (6 in.) or less contains multiconductor control and/or signal cables only, the sum of the cross-sectional areas of all cables at any cross section shall not exceed 50 percent of the interior cross-sectional area of the NC cable support

393.11 Ampacity of Multiconductor Cables, Rated 2000 Volts or Less, in NC Cable Supports.

The allowable ampacity of multiconductor cables, nominally rated 2000 volts or less, installed according to the requirements of 393.9 shall be as given in Table 310.16 and Table 310.18, and 310.15(A)(2). The derating factors of 310.15(B)(2)(a) shall apply only to multiconductor cables with more than three current-carrying conductors. Derating shall be limited to the number of current-carrying conductors in the cable and not to the number of conductors in the NC cable support.
Substantiation: The electrical industry has used non-continuous cable and conduit supports for many years. Standards with testing requirements exist (e.g., UL 2239). However, these parts are not codified and this proposal provides for it by formulating safety requirements. This installation method also provides for the realization of "green" aspects, a topic that supports a smarter use of our resources. Running cable in non-continuous supports saves over 80% of material compared to cable tray, yet improves the airflow and thus the heat dissipation within and around the cable bundle.
Panel Meeting Action: Reject
Panel Statement: The system consists of simply independent supports. Therefore each wiring method should be installed (supported and fastened) at intervals provided for in their own article. Realization of "green" aspects is not a consideration for requirements in the NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 394 — CONCEALED KNOB-AND-TUBE WIRING

7-152 Log #3184 NEC-P07 **Final Action: Accept in Principle**
(394.12(4))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comment expressed in the voting.
This action will be considered by the panel as a public comment.
Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 394.12, delete ~~(4) Hazardous (classified) locations~~
Renumber 394.12(5) as 394.12(4).
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(4) Hazardous (classified) locations except as specifically permitted by other articles in this *Code*.
Panel Statement: Revising (4) provides the user with the information that the use of this wiring method is not currently permitted in hazardous locations but provides the information that the user should check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
SCHUMACHER, D.: The panel should reject this as it only adds confusion to a clear article. Knob & Tube wiring is an obsolete wiring method that is only allowed by special permission in new installations. There is absolutely no need for the code users to have to go to other articles to double check this fact.

ARTICLE 396 — MESSENGER SUPPORTED WIRING

7-153 Log #2001 NEC-P07 **Final Action: Reject**
(Table 396.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Communication systems, Articles 800 and 830. Coaxial cables, Articles 820,. Optical fiber cables, Article 770.
Substantiation: This wiring method may be suitable for the proposed cables.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided evidence that such cables are manufactured or listed. The use of messenger-supported wiring for the articles proposed should appear in those respective articles rather than Article 396 since Chapter 3 applies generally unless modified by Chapters 5, 6, or 7. Chapter 8 stands alone unless it references other parts of the code.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-154 Log #3185 NEC-P07 **Final Action: Accept in Principle**
(396.10(C))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In 396.10(C), delete ~~(C) Hazardous (Classified) Locations. Messenger supported wiring shall be permitted to be used in hazardous (classified) locations where the contained cables are permitted for such use in 501.10, 502.10, 503.10, and 504.20.~~
Substantiation: Uses permitted or not for wiring methods are typically for wet locations, direct burial, etc. There are no Articles for those locations. However, it is the responsibility of CMP 14 to determine what wiring methods are permitted in hazardous locations.
Such references to parts of Chapter 5 are not in accordance with the NEC Style Manual, 2.2.1 and 4.1.2 for instance, and the Technical Correlating Committee is requested to correlate all Articles in Chapter 3 by deleting these references altogether.
Panel Meeting Action: Accept in Principle
Revise 396.10(C) as follows:
(C) Messenger-supported wiring shall be permitted to be used in hazardous (classified) locations where the contained cables and messenger supported wiring is specifically permitted by other articles in this *Code*.
Panel Statement: Revising 396.10(C) provides the user with the information that the use of messenger-supported wiring and the attached conductors or cables is permitted in hazardous locations where specifically permitted elsewhere in the code. The user must check in Chapter 5 to see if and where it is permitted. The additional added phrase preserves the responsibility for CMP-14 to authorize its use where appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-155 Log #2643 NEC-P07 **Final Action: Reject**
(396.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows: Messenger supported wiring shall not be used in hoistways or where likely to be subject to physical damage.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-156 Log #2653 NEC-P07 **Final Action: Reject**
(396.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Messenger supported wiring shall not be used in hoistways or where likely to be subject to physical damage.
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 7-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-157 Log #4885 NEC-P07 **Final Action: Reject**
(396.13 (New))

Submitter: Charles Darnell, kVA Engineering and Forensics, LLC
Recommendation: Add new text as follows:
Messenger supported wiring shall be securely bound for protection during movement caused by fault-current magnetic forces. The restraint method employed shall protect the single conductors from damage due to the fault-current magnetic forces and be rated for the spacing between conductors and maximum available fault-current.
Substantiation: Due to the propensity for damage caused by fault-current magnetic forces, messenger supported wiring restraint should be afforded the same protection required for single conductor cables in Section 392.8 (D). Conventional methods such as rings and saddles or field-installed lashing are not able to consistently provide adequate restraint for moderate to high fault levels.
Since the fault-current magnetic force between conductors is directly proportional to the square of the peak current magnitude and indirectly proportional to the spacing between conductors, moderate short circuit levels can generate large mechanical forces. It is possible for a 3-phase 10kARMS short circuit to generate fault-current magnetic forces above 500 pounds per foot (see attached Cable Force Calculation #1). While forces in this order of magnitude may seem considerable, large industrial electrical systems regularly encounter fault-current magnetic forces in excess of 3 tons (see attached Cable Force Calculation #2).
This author's extensive forensic experience in electrical systems subject to moderate and high available fault duties proves that messenger supported wiring can be damaged from fault-current magnetic forces. Electrical personnel apply cables within their thermal damage capability by selecting appropriate protective device settings (i.e. de-energizing the circuit prior to the point of thermal insulation damage). The protective device (including fuses and circuit breakers) operating times are frequently longer than the time
required for single conductors to deflect outward and break free from their cable jacket and/or restraint system (if any). Such protective device application should protect the conductor and its insulation from exceeding their design temperatures, but does not necessarily provide for adequate mechanical restraint of multi-conductor cables or triplexed assemblies. This author is prepared to present high-speed slow-motion video footage of multi-conductor cables undergoing short circuit testing (at magnitudes within the cable rating) that conclusively demonstrate this point.
In order to provide practical safeguarding of persons and property from hazards arising from the use of electricity, this code should dictate equal performance criteria for all cable constructions. Recognizing there may be self-certified cable restraint products designed to withstand fault-current magnetic forces, there are products available that are independently tested to a peer-reviewed consensus standard to withstand fault-current magnetic forces and protect the restrained cables during actual short circuit events...
the cable cleat. Cable cleats may be applied in messenger supported wiring installations to adequately restrain and protect the wiring.
Underperforming cable restraints can result in to hazards to persons and property. Inclusion of the proposed requirements will empower the installer to make an informed decision on which restraints to use for messenger supported wiring.
Panel Meeting Action: Reject
Panel Statement: The panel is aware that movement is possible under fault conditions. The magnitude varies from location to location and is considered an engineering function to determine this. The provided language is unenforceable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-158 Log #4621 NEC-P07 **Final Action: Reject**
(396.30(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following sentence: "Where messenger-supported wiring is used to supply loads wired in accordance with 250.32(B) Exception, the messenger shall be permitted to be bare and used as a neutral conductor."
Substantiation: One purpose behind proposals made in the 2008 cycle that resulted in this material entering the NEC was to correct the lack of any permission for this cable to be used for regrounded neutrals in instances (steadily decreasing) where the NEC so permitted. The final 2008 wording didn't quite get there. The 2008 wording does point to 225.4, however that reference ends up in 225.4 Exception, which allows for this practice "as specifically permitted elsewhere in this Code." This is effectively circular, because nothing in Article 396 actually permits the use. This proposal corrects the lack of correlation and makes the wording of 225.4 Exception actually point to useful information.
Panel Meeting Action: Reject
Panel Statement: The panel references the submitter to section 250.32(B) exception, which already applies and additional text is not required.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 398 — OPEN WIRING ON INSULATORS

7-159 Log #1772 NEC-P07 **Final Action: Reject**
(398.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: An exposed wiring method using cleats, knobs, nonmetallic tubes, and flexible nonmetallic tubing for the protection and support of single insulated circuit conductors and equipment grounding conductors.
Substantiation: Edit. Knobs and tubing should be specified nonmetallic. The requirement for insulated conductors should be limited to circuit conductors.
Panel Meeting Action: Reject
Panel Statement: The submitter does not provide any technical substantiation for the additional language.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-160 Log #1771 NEC-P07 **Final Action: Reject**
(398.30(B) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (B) Where not likely to be subject to physical damage ~~disturbed~~ in buildings of mill construction 8 AWG and larger...". (remainder unchanged).
(C) In industrial and agricultural establishments only...". (remainder unchanged).
Substantiation: Criteria should not be the type of building or occupancy, but the conditions of support, and maintenance and supervision. Agricultural establishments may meet those requirements.
Panel Meeting Action: Reject
Panel Statement: The general reference to industrial installations indicates conditions of maintenance by qualified individuals under direct supervision These conditions of maintenance in agricultural locations cannot be assured. In this case the use of the word "disturbed" is appropriate for this wiring method.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

7-161 Log #1874 NEC-P07 **Final Action: Reject**
(398.30(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "or agricultural" after "industrial".
Substantiation: The provision also appears appropriate for agricultural establishments where maintenance and supervision are provided.
Panel Meeting Action: Reject
Panel Statement: The general reference to industrial installations indicates conditions of maintenance by qualified individuals under direct supervision These conditions of maintenance in agricultural locations cannot be assured.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 399 — OUTDOOR, OVERHEAD CONDUCTORS, OVER 600 VOLTS

7-162 Log #680 NEC-P07 **Final Action: Accept**
(399)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
In addition, the Technical Correlating Committee assigns this material as Article 399.
The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relative to the NEC Style Manual and statements expressed in the ballots.
This action will be considered by the panel as a public comment.
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: Add new text to read as follows:
Article 399 Outdoor, Overhead Conductors, Over 600 Volts
399.1 Scope. This article covers the use, installation and construction specifications for outdoor, overhead conductors, over 600 volts.
399.2 Definition.
Outdoor Overhead Conductors, Over 600 Volts. Single conductors, insulated, covered, or bare, installed outdoors on support structures.
399.10 Uses Permitted. Outdoor overhead conductors, over 600 volts, shall be permitted only for systems rated over 600 volts nominal as follows:
(1) Outdoors
(2) For services, feeders or branch circuits
399.12 Uses Not Permitted. Overhead conductors, over 600 volts shall not be permitted to be installed indoors.
399.30 Support.
(A) Conductors. Documentation of qualified engineered spacing design between conductors shall be available upon request of the authority having jurisdiction and shall include consideration of the following:
(1) Applied voltage
(2) Conductor size
(3) Distance between support structures
(4) Type of structure
(5) Wind/Ice loading
(B) Structures. Structures of wood, metal, concrete or combinations of those materials shall be provided for support of overhead conductors, over 600 volts. Documentation of the qualified engineered design and the installation of each support structure shall be available upon request of the authority having jurisdiction and shall include consideration of the following:
(1) Soil conditions,
(2) Foundations and structure settings,
(3) Weight of all supported conductors and equipment,
(4) Weather loading (ice, wind, temperature, etc.),
(5) Angle where change of direction occurs,
(6) Spans between adjacent structures,
(7) Effect of dead end structures,
(8) Strength of guys and guy anchors,
(9) Structure size and material(s),
(10) Hardware
(C) Insulators. Insulators used to support conductors shall be rated for all of the following:
(1) The applied phase to phase voltage
(2) Mechanical strength required for each individual installation
(3) Impulse Withstand BIL in accordance with Table 490.24
Substantiation: This proposal is the work of the "High Voltage Task Group" appointed by the Technical Correlating Committee. The task group consisted of the following members: Alan Peterson, Paul Barnhart, Lanny Floyd, Alan Manche, Donny Cook, Vince Saporita, Roger McDaniel, Stan Folz, Eddie Guidry, and Jim Dollard.
Premises wiring installations, utilizing over 600 volt systems currently exist in numerous locations and have become more common as electrical usage has increased. Many of those installations utilize overhead bare conductors on insulators as feeders and branch circuits to safely distribute power to multiple building, structure and equipment locations. NEC Chapter 3 wiring methods do not currently recognize this "wiring method" nor provide prescriptive permission or limitation for these installations. Submitted text allows and requires designers to utilize existing industry standards for the specific details of the design and provides enforcement a basis for approval of the installations.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
RAY, J.: I am balloting negative on this proposal, but do recognize that there are benefits to include medium and high voltage premises wiring installation requirements in the NEC. My reasons for negative ballot on the Panel's action are on items in this proposal that need to be addressed to improve safety and clarity. These are:
1. In 399.1 Scope, the text "construction specifications" is not covered in the purpose of the NEC according to 90.1(C).
2. In 399.2, the proposed definition does not contain information that the conductors operate over 600 Volts as the term it is to define.
3. In 399.10(2), "service" is that from a serving utility and the proper terminology should be "overhead service conductors". Uses for the conductors need to be listed as conductor types and not conductor functions.
4. In 399.12, there are instances where overhead conductors over 600 Volts are installed indoors such as in vaults and supported by insulators with electrical space separation.
5. In 399.30(A) and (B), the use of the phrase "in consideration of" results in vague and unenforceable language that is not permitted according to 3.2.1 in the NEC Style Manual. This text does not provide requirements for enforcement.
6. In 399.30(C), insulator installation needs to also consider the operational environment condition, dry and wet flashover voltages, and material composition. In addition, an Advisory Note should be included to reference ANSI C29.1 through ANSI C29.7 applicable to insulators required for line insulation.
Comment on Affirmative:
NIELSEN, D.: 1. From the panel discussion it is understood that the term "qualified engineered design" is intended to mean designed by a qualified engineer.
2. It is also understood that other factors may need to be considered such as surge protection, lightning protection, etc.

ARTICLE 400 — FLEXIBLE CORDS AND CABLES

6-140 Log #495 NEC-P06 **Final Action: Accept in Part**
(Table 400.4)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: The column number references in this proposal relate to the 2008 NEC.
Revise the column headings over columns 7 - 9 as follows:

AWG Or Kcmil	Nominal Insulation Thickness[1]	
	mm	mils

Delete the fourth column entitled "AWG or kcmil".
Relocate all Notes in column 4 to column 7.
Add "See Note 14." in existing column 8 (mm) for EV, EVJ, EVE, EVJE, EVT, and EVJT.
In column 8 for EVJT, relocate (0.51) to immediately follow 0.76.
Delete "2.41" and "95" from column 8 and 9 for HPN.
For Type S, delete 18 - 12 AWG in the third column and retain 18 - 2 in the seventh column.

Relocate the numbers (10, 1.14, 45) in the row for SJT to follow the existing numbers (18 - 12, 0.76, 30) in the row for SJ and also add the same numbers to follow the existing numbers in the row for SJTO if that portion of the table extends to more than one page.

Substantiation: This proposal will eliminate duplicate text in the same table.

The seventh column in the Table repeats the same information as the third column except in more detail. The conductor size range in the fourth column is the same as the conductor size range in the seventh column.

Relocation of the Notes from column 3 to column 7 correlates with the deletion of column 3.

The column heading "Insulation Thickness" only applies to columns 8 and 9, not column 7.

Note 14 explains the dimensions in parenthesis in the current column 8 (mm).

The dimensional relocation of 0.51 for EVJT is for consistency with the previous Table listings.

The insulation thicknesses for HPN in sizes large than 12 AWG are being deleted since no conductor size is specified and existing column 4 shows the conductor size range as 18 - 12 AWG.

The size range 18 - 12 for Type S in column 3 is incorrect and the range (18 - 2) shown in column 7 is correct.

The insulation thickness for 10 AWG should be shown following the 18 - 12 AWG dimensions since the current table is confusing, but it only applies to those types that are authorized in size 10 AWG.

Panel Meeting Action: Accept in Part

The Panel rejects the recommendation to remove the fourth column of Table 400.4. In addition, reject the recommendation to move the notes from column 4 to column 7. Accept all other recommendations.

Panel Statement: The fourth column is a quick reference to size and types. The column also contains various notes to products that may be useful to retain.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-141 Log #2394 NEC-P06 **Final Action: Reject**

(Table 400.4)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Delete the 4th column in Table 400.4 entitled "AWG or kcmil".

Substantiation: Column 4 and Column 7 essentially repeat the same information – conductor size.

Column 7 will provide all the necessary information regarding conductor size in more detail.

Panel Meeting Action: Reject

Panel Statement: The fourth column is a quick reference to size and types. The column also contains various notes to products that may be useful to retain. See panel action on Proposal 6-140.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-142 Log #1558 NEC-P06 **Final Action: Reject**

(Table 400.4, 400.5(A) and 400.6)

Submitter: Susan L. Stene, Underwriters Laboratories Inc.

Recommendation: Revise Tables 400.4 and 400.5(A) and Section 400.6 as follows:

Insert new row between type S and type SC in Table 400.4

See Table 400.4 on page 493

400.6 Markings.

(A) Standard Markings. Flexible cords and cables shall be marked by means of a printed tag attached to the coil reel or carton. The tag shall contain the information required in 310.11(A). Types S, SBST, SC, SCE, SCT, SE, SEO, SEOO, SJ, SJE, SJEO, SJEOO, SJO, SJT, SJTO, SJTOO, SO, SOO, ST, STO, STOO, SEW, SEOW, SEOOW, SJEW, SJEOW, SJEOOW, SJOW, SJTW, SJTOW, SJTOOW, SOW, SOOW, STW, STOW, and STOOW flexible cords and G, G-GC, PPE, and W flexible cables shall be durably marked on the surface at intervals not exceeding 610 mm (24 in.) with the type designation, size, and number of conductors.

Table 400.5(A) Allowable Ampacity for Flexible Cords and Cables [Based on Ambient Temperature of 30°C (86°F). See 400.13 and Table 400.4] *Only header shown*

		Thermoset Types C, E, EO, PD, S, SJ, SJO, SJOW, SJOO, SJOOW, SO, SOW, SOO, SOOW, SP-1, SP-2, SP-3, SRD, SV, SVO, SVOO	
Size (AWG)	Thermoplastic Types TPT, TST	Thermoplastic Types ET, ETLB, ETP, ETT, SBST, SE, SEW, SEO, SEOW, SEOOW, SJE, SJEW, SJEO, SJEOW, SJEOOW, SJT, SJTW, SJTO, SJTOW, SJTOO, SJTOOW, SPE-1, SPE-2, SPE-3, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, ST, SRDE, SRDT, STO, STOW, STOO, STOOW, SVE, SVEO, SVT, SVTO, SVTOO	Types HPD, HPN, HSJ, HSJO, HSJOO

Substantiation: UL 62, clauses 4.1.2.2 and 4.1.6.3 indicate that new materials may be used if the electrical, mechanical and physical characteristics of the construction show that the new material is comparable in performance to materials intended for the application.

UL evaluated a cord similar in construction to an SVT using a new halogen free material. The mechanical characteristics of the new material were determined and were compared to those obtained on a PVC cord. Tests used were crush, abrasion and flexing. As a result of these tests, end-of-life values were determined for an SVT cord. The data provided shows the comparison between a typical SVT cord and a cord using the new material.

As a result of this evaluation, a new cord type is being proposed. This cord type uses a halogen free material (a blend of styrenic block copolymer and polypropylene, abbreviated SPP). It is proposed to call this new cord Type SBST.

Due to the thicknesses of the construction submitted, the proposed SBST cord does not meet the construction of either SVT or SJT. Therefore, the SBST cord will have its own thickness requirements. The overall diameter of the cable falls at the high end of the range for SVT. It is therefore proposed that the overall diameter of the SBST cord shall have its own requirements.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The proposed cord size is between vacuum and junior hard service cord, and the acceptance of this proposal will require new sizes of strain relief, plug bodies etc. Therefore, the acceptance will create a substitution problems between existing cord types and connectors, and limits the material used to a halogen free material designated SPP (styrene block copolymer and polypropylene) and proposed as SBST.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Hard service cord	S See Note 6.	600	18–12	2 or more	Thermoset	18–16 14–10 8–2	0.76 1.14 1.52	30 45 60	None	Thermoset	Pendant or portable	Damp locations	Extra hard usage
Service cord	SBST	300	18–16	2 or 3	Blend of Styrene block Copolymer with polypropylene	18–16	0.51	20	None	Blend of Styrene block Copolymer With polypropylene	Pendant or portable	Dry locations	Not hard usage
Flexible stage and lighting power cable	SC	600	8–250	1 or more		8–2 1–4/0 250	1.52 2.03 2.41	60 80 95		Thermoset	Portable, extra hard usage		

Table 400.4 Flexible Cords & Cables

6-142 (Log #1558)

6-143 Log #4477 NEC-P06 **Final Action: Reject**
(Table 400.4 and Table 400.5)

Submitter: Anick Simon, The Dow Chemical Company
Recommendation: Insert type letter **NISPENH-1** and **NISPENH-2** in table 400.4 under trade name Non-integral parallel cords. Insert type letter **SJENH** in table 400.4 under trade name Junior hard service cord. Insert type letter **SPENH-1, SPENH-2, SPENH-3** in table 400.4 under trade name All elastomer (thermoplastic) parallel cord. Insert type letter **SVENH** in table 400.4 under trade name Vacuum cleaner cord. Insert type letter **TPENH** in table 400.4 under trade name Parallel tinsel cord. Insert type letter **TSENH** in table 400.4 under trade name Jacketed tinsel cord. See table below for location:

Insert type **SPENH-1, SPENH-2, SPENH-3, TPENH, NISPENH-1, NISPENH-2** into note 3. See location below.
Insert type **TPENH, TSENH** into note 4. See location below
Insert type **SPENH-1, SPENH-2, SPENH-3, NISPENH-1, NISPENH-2,** into note 8. See location below
Insert type **TPENH,** and **TSENH** in table 400.5 into column number 2 row 1. Insert type **SPENH-1, SPENH-2, SPENH-3, SVENH,** and **SJENH** in table 400.5 into column number 3 row 2 See table 400.5 below for location.

See Table 400.4 on pages 495 -496 and Table 400.5 on page 495
Substantiation: There is growing appliance manufacturer and consumer interest to utilize non-halogen materials for flexible wiring and cord use, including communication and low voltage power cable applications. These would provide for improved fire safety in terms of easier visibility for egress (low smoke) and better electrical safety (less potential for corrosive atmospheres that may impact sensitive equipment or circuits). It is proposed that the NEC® be revised to facilitate the anticipated use of these materials.
In particular the development of non-halogen thermoplastic elastomer materials with a good balance of performance characteristics such as flexibility and toughness and having the needed product safety performance such as meeting cable burn testing requirements, improved combustion corrosivity and good long term electrical characteristics is underway. These non-halogen materials would need to be qualified against applicable NRTL standards appropriate to the product category and intended use.
These materials would be available as alternatives to resins that are currently used. This proposal will bridge the performance interval between currently-available material classes. For example, it is anticipated that these materials will meet the 121C hot deformation and heat aging requirement for insulation and jacketing applications, matching the incumbent materials, which have proven to be fully satisfactory in this regard. Performance data demonstrating that the material can meet the proposed target will be forth coming in the future stages of the process
Panel Meeting Action: Reject
Panel Statement: There is no data provided by the submitter to support the claim of increased fire safety. There is also no evidence that the halogen free meets the safety requirements in the applicable product safety standard. 400.6(B) allows for additional markings and this allowance could be used for HF or NF cable.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-144 Log #4780 NEC-P06 **Final Action: Accept in Part**
(Table 400.4, Note 15)

Submitter: Samuel B. Friedman, General Cable Corporation
Recommendation: Add following to end of second sentence:
"and are considered sunlight resistant".
Substantiation: Although note 15 does a good job in advising that "w" suffix on cord designation indicates that the product is water resistant, it falls short of properly advising that the product is also sunlight resistant. Due to this, questions are often asked by inspectors, with less experience with cord products, as to whether a cord is sunlight resistant. The addition of the above words to note 15 should help in this regard.
Panel Meeting Action: Accept in Part
Panel rejects 'considered' from the proposed text to revise text as follows:
"...and are sunlight resistant".
Panel Statement: The rejected text, "considered" is subjective, subject to interpretation, and not in compliance with 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-145 Log #3455 NEC-P06 **Final Action: Accept**
(400.5)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal related to the action taken on Proposal 6-150.
This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In 400.5(A), change "Table 400.5(A)" to "Table 400.5(A)(1)", "Table 400.5(B)" to "Table 400.5(A)(2)" in two places and "Table 400.5" to "Table 400.5(A)(3)".
Renumber Table 400.5(A) as Table 400.5(A)(1)
Renumber Table 400.5(B) as Table 400.5(A)(2)
Renumber Table 400.5 as Table 400.5(A)(3) and relocate the FPN to follow the Table
Relocate the first paragraph of 400.5(B) to the end of the section. The remaining paragraphs currently under (B) will now be under (A).
Delete the exception under (B) and add the following paragraph:
"(C) Engineering Supervision. Under engineering supervision, conductor ampacities shall be permitted to be calculated in accordance with 310.15(C).
Substantiation: Renumbering the Tables complies with 2.3.1 of the NEC Style Manual.
Except for the first paragraph under (B), all of the other paragraphs relate to the adjustment factors.
The FPN should follow the Table as it does in 310.15(B)(2)(a).
The Exception is not correct. 310.15(C) provides an equation to calculate the ampacity, not the adjustment factor.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-146 Log #1149 NEC-P06 **Final Action: Accept**
(400.5(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise the third sentence as follows: "Where cords are used in ambient temperatures ~~exceeding~~ other than 30° C (86°F), the temperature correction factors from Table 310.16 that correspond to the temperature rating of the cord shall be applied to the ampacity from Table 400.5(B)."
Substantiation: Currently, there is no provision in Article 400 to apply correction factors to the ampacities of flexible cables when used in ambient temperatures below 30°C.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-147 Log #1620 NEC-P06 **Final Action: Accept in Principle**
(400.5(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Table 310.16" to "Table 310.15(B)(1)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept in Principle
Change "Table 310.16" to "Table 310.15(B)(16)".
Panel Statement: See panel action on Proposal 6-52.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-148 Log #1150 NEC-P06 **Final Action: Accept**
(Table 400.5(A) and Table 400.5(B))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Insert "copper" to size column.
Substantiation: This will clarify that the present ampacities are for copper conductors only.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

Table 400.4

Trade Name	Type Letter	Voltage	AWG or kcmil	Number of Conductors	Insulation	Nominal Insulation Thickness AWG or kcmil	mm	mils	Braid on Each Conductor	Outer Covering	Use		
Non-integral parallel cord	NISP-1	300	20-18	2 or 3	Thermoset	20-18	0.38	15	None	Thermoset	Pendant or portable	Damp locations	Not hard usage
	NISP-2	300	18-16			18-16	0.76	30					
	NISPE-1 See Note 8	300	20-18		Thermoplastic elastomer	20-18	0.38	15		Thermoplastic elastomer			
	NISPE-2 See Note 8	300	18-16			18-16	0.76	30					
	NISPENH-1	**300**	**20-18**		**Non -halogen thermoplastic elastomer**	**20-18**	**0.38**	**15**		**Non -halogen thermoplastic elastomer**			
	NISPENH-2	**300**	**18-16**			**18-16**	**0.76**	**30**					
	NISPT-1 See Note 8	300	20-18		Thermoplastic	20-18	0.38	15		Thermoplastic			
	NISPT-2 See Note 8	300	18-16			18-16	0.76	30					
Junior hard service cord	SJ	300	18-10	2-6	Thermoset	18-12	0.76	30	None	Thermoset	Pendant or portable	Damp locations	Hard usage
	SJENH	**300**			**Non -halogen thermoplastic elastomer**					**Non -halogen thermoplastic elastomer**			
	SJE	300			Thermoplastic elatsomer					Thermoplastic elatsomer			
	SJEW See Note 15	300										Damp and wet locations	
	SJEO	300								Oil-resistant thermoplastic elastomer		Damp locations	
	SJEOW See note 15	300										Damp &wet locations	
	SJEOO	300			Oil-resistant thermoplastic elastomer							Damp locations	
	SJEOOW See Note 15	300										Damp & wet locations	

6-143 (Log #1558)

Table 400.5(A) Allowable Ampacity for Flexible Cords and Cables [Based on Ambient Temperature of 30°C (86°F). See 400.13 and Table 400.4]

	Thermoplastic Types TPT, TST, **TPENH, TSENH**	Thermoset Types C, E, EO, PD, S, SJ, SJO, SJOW, SJOO, SJOOW, SO, SOW, SOO, SOOW, SP-1, SP-2, SP-3, SRD, SV, SVO, SVOO Thermoplastic Types ET, ETLB, ETP, ETT, SE, SEW, SEO, SEOW, SEOOW, SJE, **SJENH,** SJEW, SJEO, SJEOW, SJEOOW, SPE-1, SPE-2, SPE-3, **SPENH-1, SPENH-2 SPENH-3** SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, ST, SRDE, SRDT, STO, STOW, STOO, STOOW, SVE, **SVENH**, SVEO, SVT, SVTO, SVTOO		Types HPD, HPN, HSJ, HSJO, HSJOO
		Column A+	Column B+	
27*	0.5	—	—	—
20	—	5**	***	—
18	—	7	10	10
17	—	9	12	13
16	—	10	13	15
15	—	12	16	17
14	—	15	18	20
12	—	20	25	30
10	—	25	30	35
8	—	35	40	—
6	—	45	55	—
4	—	60	70	—
2	—	80	95	—

*Tinsel cord.
**Elevator cables only.
***7 amperes for elevator cables only; 2 amperes for other types.
+The allowable currents under Column A apply to 3-conductor cords and other multiconductor cords connected to utilization equipment so that only 3 conductors are current-carrying. The allowable currents under Column B apply to 2-conductor cords and other multiconductor cords connected to utilization equipment so that only 2 conductors are current-carrying.

6-143 (Log #3455)

Table 400.4 (Cont)

Trade Name	Type Letter	Voltage	AWG or kcmil	Number of Conductors	Insulation	Nominal Insulation Thickness			Braid on Each Conductor	Outer Covering	Use		
						AWG or kcmil	mm	mils					
Junior hard service cord	SJO	300	18-10	2-6	Thermoset	18-12	0.76	30	None	Oil resistant thermoset	pendant or portable	Damp locations	Hard usage
	SJOW See Note 15.	300										Damp and wet locations	
	SJOO	300			Oil resistant thermoset							Damp locations	
	SJOOW See Note 15	300										Damp and wet locations	
	SJT	300			Thermoplastic					Thermoplastic		Damp locations	
	SJTW See Note 15	300				10	1.14	45				Damp and wet locations	
	SJTO	300			Thermoplastic					Oil-resistant thermoplastic		Damp locations	
	SJTOW See Note 15.	300										Damp and wet locations	
	SJTOO	300			Oil-resistant thermoplastic	18-12	0.76	30				Damp locations	
	SJTOOW	300										Damp and wet locations	

6-143 (Log #4477)

Table 400.4 (Cont)

Trade Name	Type Letter	Voltage	AWG or kcmil	Number of Conductors	Insulation	Nominal Insulation Thickness			Braid on Each Conductor	Outer Covering	Use		
						AWG or kcmil	mm	mils					
All elastomer (thermoplastic) parallel cord	SPE-1 See note 8	300	20-18	2 or 3	thermoplastic elastomer	20-18	0.76	30	None	None	Pendant or portable	Damp locations	Not hard usage
	SPE-2 See Note 8	300	18-16			18-16	1.14	45					
	SPE-3 See Note 8	300	18-10			18-16 14 12 10	1.52 2.03 2.41 2.80	60 80 95 110			Refrigerators, room air conditioners, and as permitted in 422.16(B)		
	SPENH-1 see note 8	**300**	**20-18**		**Non -halogen thermoplastic elastomer**	**20-18**	**0.76**	**30**			**Pendant or portable**		
	SPENH-2 see note 8	**300**	**18-16**			**18-16**	**1.14**	**45**					
	SPENH-3 see note 8	**300**	**18-10**			**18-16** **14** **12** **10**	**1.52** **2.03** **2.41** **2.80**	**60** **80** **95** **110**			**Refrigerators, room air conditioners, and as permitted in 422.16(B)**		
Vacuum cleaner cord	SV	300	18-16	2 or 3	Thermoset	18-16	0.38	15	None	Thermoset	Pendant or portable	Damp locations	Not hard usage
	SVENH	**300**			**Non -halogen thermoplastic elastomer**					**Non-halogen thermoplastic elastomer**			
	SVE	300			Themoplatic elastomer					Themoplatic elastomer			
	SVEO	300								Oil-resistant thermoplastic elastomer			
	SVEOO	300			Oil-resistant thermoplastic elastomer								
	SVO	300			Thermoset					Oil-resistant thermoset			
	SVOO	300			Oil-resistant thermoset					Oil-resistant thermoset			
	SVT	300			Thermoplastic					Thermoplastic			
	SVTO	300			Thermoplastic					Oil-resistant thermoplastic			
	SVTOO	300			Oil-resistant thermoplastic								
Parallel tinsel cord	TPT see Note 4	300	27	2	Thermoplastic	27	0.76	30	None	Thermoplastic	Attached to an Appliance	Damp locations	Not hard usage
	TPENH see Note 4	**300**			**Non -halogen thermoplastic elastomer**					**Non -halogen thermoplastic elastomer**			
Jacketed tinsel cord	TST see Note 4	300	27	2	Thermoplastic	27	0.38	15	None	Thermoplastic	Attached to an Appliance	Damp locations	Not hard usage
	TSENH see note 4	**300**			**Non -halogen thermoplastic elastomer**					**Non -halogen thermoplastic elastomer**			

[3]All types listed in Table 400.4 shall have individual conductors twisted together except for types HPN, SP-1, SP-2, SP-3, SPE-1, SPE-2, SPE-3, **SPENH-1, SPENH-2, SPENH-3,** SPT-1, SPT-2, SPT-3, TPT, **TPENH,** NISP-1, NISP-2, NISPT-1, NISPT-2, NISPE-1, NISPE-2, **NISPENH-1, NISPENH-2** and three conductor parallel versions of SRD, SRDE, and SRDT.

[4]Types TPT, **TPENH, TSENH,** and TST should be permitted in lengths not exceeding 2.5 m (8ft) where attached directly, or by means of a special type of plug, to a portable appliance rated at 50 watts or less and of such nature that extreme flexibility of the cord is essential

[8]The third conductor in type HPN shall be used as an equivalent grounding conductor only. The insulation of the equipment grounding conductor for types SPE-1, SPE-2, SPE-3, **SPENH-1, SPENH-2, SPENH-3,** SPT-1, SPT-2, SPT-3, NISPT-1, NISPT-2, NISPE-1, **NISPENH-1, NISPENH-2** and NISPE-2 should be permitted to be thermoset polymer

6-143 (Log #4477)

6-149 Log #1642 NEC-P06 **Final Action: Accept**
(400.5(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Table B.310.11” to “Table B.310.15(B)(2)(11)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables B.310.1 through B.310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and the figure designations of Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-150 Log #1644 NEC-P06 **Final Action: Accept**
(400.5(B) Exception)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 400.5(B) Exception as shown: *”Exception: For other loading conditions, adjustment factors shall be permitted to be calculated* <u>*in accordance with*</u> ~~*under*~~ *310.15(C).”*
Substantiation: Consistent standard writing style.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-151 Log #3544 NEC-P06 **Final Action: Reject**
(400.7)

Submitter: Randall K. Wright, RKW Consulting
Recommendation: Revise text to read as follows:
400.7 Uses Permitted.
(A) Uses. Flexible cords and cables shall be used only for the following:
(1) Pendants
(2) Wiring of luminaires<u> and electric signs, </u>
(3) Connection of portable luminaires, portable and mobile signs, or appliances
(4) Elevator cables
(5) Wiring of cranes and hoists
(6) Connection of utilization equipment to facilitate frequent interchange<u>, interconnection of electronic sign modules used in electronic message centers.</u>
(7) Prevention of the transmission of noise or vibration
(8) Appliances where the fastening means and mechanical connections are specifically designed to permit ready removal for maintenance and repair, and the appliance is intended or identified for flexible cord connection
(9) Connection of moving parts
(10) Where specifically permitted elsewhere in this *Code.*
Substantiation: (2) To allow the use of electric signs. Flexible cords are being used as wiring in signs for a number of reasons, the least of which is that ballasts, LED power supplies, and LED modules are not able to be repaired in the field. Therefore, maintenance personnel find it necessary to quickly change out components when they no longer function. The use of flexible cords makes it possible to provide connectors that lessens the likelihood service personnel will expose themselves and the sign to an electrical fault. Cord connected signs are allowed in the code and we are adding the use of the cord. (6) Electronic message centers have removable parts and chassis and new cord and plug for maintenance. The use of cord has been prohibited in outdoor signs since the NEC does not include the same reference to signs as is made to luminaires.
Panel Meeting Action: Reject
Panel Statement: Article 600 describes methods of supplying electrical power to signs. Exception No. 2 under 600.6 refers to cord-connected signs, and in the article it is implied that only portable signs shall be permitted to be cord-connected. Lock Out Tag Out (LOTO) means is currently required for all signs.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-152 Log #4107 NEC-P06 **Final Action: Reject**
(400.7(A)(2) and (8))

Submitter: David Servine, Channelume/Let-R-Edge Co.
Recommendation: Revise text to read as follows:
(2) Wiring of luminaries <u>and signs</u>
(8) Appliances <u>and electronic sign modules</u> where the fastening means and mechanical connections are specifically designed to permit ready removal for maintenance and repair, and the appliance <u>and electronic sign module</u> is intended or identified for flexible cord connection.
Substantiation: In many applications, the only difference between a luminaire and a sign is that the lens in front of the diffuser conveys a message. This result in two similar electrical products being constructed differently in as much as their has been a need to restrict the use of flexible cord to the supply connection of portable products, there are a number of electronic sign products that are design to be readily remove for service. Amending the text will advance a solution to the current problem associated with the restricted use of flexible cord for power and interconnection of electronic modules used in electronic signs.
Panel Meeting Action: Reject
Panel Statement: Article 600 describes methods of supplying electrical power to signs. Exception No. 2 under 600.6 refers to cord-connected signs, and in the article it is implied that only portable signs shall be permitted to be cord-connected. Lock Out Tag Out (LOTO) means is currently required for all signs. Portable signs may be cord-connected according to Article 600.6.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-153 Log #1981 NEC-P06 **Final Action: Reject**
(400.7(A)(11) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows: (11) Wiring of traffic signals where supported by a messenger and the flexible cord is identified for the use.
Substantiation: Flexible cord is commonly used for wiring of traffic signals supported by a messenger cable and installed by contractors and municipal employees covered by 90.2(A)(1), and does not appear to be covered by 400.7(A)(1).
Panel Meeting Action: Reject
Panel Statement: A certification category (XNTL) already exists for Traffic Signal Cable Classified in Accordance with IMSA Specifications.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-154 Log #2641 NEC-P06 **Final Action: Accept in Principle**
(400.7(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: “cord connector” after “receptacle outlet”.
Substantiation: Edit. Such attachment plugs may also be energized from a cord connector body.
Panel Meeting Action: Accept in Principle
Add: “<u>or cord connector body</u>” after “receptacle outlet”.
Panel Statement: The Panel accepts the proposal in principle but has modified the submitter’s proposed text to clarify the language.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-155 Log #2333 NEC-P06 **Final Action: Reject**
(400.8)

Submitter: David Nemchik, Medina County Building Department [Ohio]
Recommendation: Revise text as follows:
(2) Where run through holes in walls, structural ceilings, suspended ceilings, or floors
<u>Exception to (2): As permitted in accordance with the provisions of 410.62(C)(1)</u>
(3) Where run through doorways, windows, or similar openings
(4) Where attached to building surfaces
Exception to (4): ~~Flexible cord and cable shall be~~ <u>As</u> permitted ~~to be attached to building surfaces~~ in accordance with the provisions of 368.56(B)
(5) Where concealed by walls, floors, or ceilings or located above suspended or dropped ceilings
<u>Exception to (5): As permitted in accordance with the provisions of 410.62(C)(1).</u>
Substantiation: In their current form, 400.8 and 410.62(C)(1) are in conflict.. This proposal eliminates that conflict without expanding the verbage that could cause the section to become needlessly drawn-out and bloated.
Panel Meeting Action: Reject
Panel Statement: There is not a conflict between 400.8(2) and (5), and 410.62(C)(1). You may not run a cord through a hole in a ceiling to power a luminaire, even if the luminaire is located directly below the outlet or busway.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-156 Log #4500 NEC-P06 **Final Action: Reject**
(400.8(4))

Submitter: Mike Flegel, Reliance Controls Corp.
Recommendation: Revise new Exception No 2 to (4) as follows:
Exception No 2: Flexible cord or cable used to supply generator power to a building or structure when connected to a device mounted on a building or structure surface that contains suitable strain relief.
Substantiation: UL has prevented the listing of the device as described in the added exception due to the wording as it exists now. I believe such an application to be safe especially since the cord is an inlet for power and not an outlet. That is to say, the cord is not live until it is plugged into a generator and the generator is running.
Panel Meeting Action: Reject
Panel Statement: No substantiation was provided to support this proposal. Properly located inlets will prevent this installation. Permanently installed flexible cord on a structure is not safe.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-157 Log #2243 NEC-P06 **Final Action: Reject**
(400.8(5))

Submitter: Richard E. Loyd, Sun Lakes, AZ
Recommendation: Revise as follows:
(5) Where concealed by walls, floors, ~~or~~ and structural ceilings, or located above suspended or dropped ceilings except as permitted by 400.7(3).
Substantiation: I attend many inspector meetings throughout the U.S. annually. This issue continues to come up and inspectors are permitting items such as wireless routers in hotel ceilings and small cord & plug connected water heaters over office bathrooms and other similar items that are supplied with a factory cord and plug. Although I agree it is presently a violation, I have polled inspectors and have not found any problems associated with this practice. Note: This change is only intended to apply to areas above dropped and suspended ceilings.
Panel Meeting Action: Reject
Panel Statement: The proposal, as submitted, is incorrect. Its application would bypass all 400.8 uses not permitted for the 400.7 items that are listed in the proposal.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-158 Log #652 NEC-P06 **Final Action: Reject**
(400.8(5) Exception (New))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Add new Exception to read as follows:
Exception to (5). Flexible cord as part of an assembly not exceeding 6 ft in length shall be permitted above suspended or dropped ceilings, provided the space above the ceiling is not in conflict with 300.22.
Substantiation: Security cameras, fire detection and other equipment that is shipped with molded cord assemblies cannot be installed under current code rules. I think short pieces of cord, part of a listed assembly should be allowed. I think a greater problem exists when the contractor tries to hand wire the equipment.
Panel Meeting Action: Reject
Panel Statement: The substantiation states that some equipment cannot be installed under current code rules. There are currently provisions in the code that address this issue and allow installation of cords above suspended ceilings. The authority having jurisdiction could ultimately allow permission for these types of installations based on 400.7(A)(3).
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-159 Log #1751 NEC-P06 **Final Action: Reject**
(400.8(7))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where likely to be subject to physical damage.
Substantiation: Edit. “Likely” is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The use of the term “likely” is unenforceable and vague and does not comply with 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-160 Log #1862 NEC-P06 **Final Action: Reject**
(400.8(8))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: (8) Where likely to be subject to direct sunlight unless identified as sunlight resistant.
Substantiation: Edit. Proposal correlates with other provisions that require sunlight resistance.
Panel Meeting Action: Reject
Panel Statement: The use of the term “likely” is unenforceable and vague and does not comply with 3.2.1 of the NEC Style Manual. Section 110.3(B) already states that equipment must be used within its listing/rating and labeling. Sunlight resistant cord is designated as such with a “w” on the jacket. See also Note 15 to Table 400.4 as revised by the panel in Proposal 6-144.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-161 Log #2754 NEC-P06 **Final Action: Accept**
(400.12)

Submitter: Travis Lindsey, Travis Lindsey Consulting Services
Recommendation: Delete 400.12 in its entirety.
Substantiation: A companion proposal is being submitted to relocate this material to a revised 400.21 since these requirements more appropriately belong under Part I1 Construction Specifications.
Panel Meeting Action: Accept
Panel Statement: See panel actions on Proposals 6-162 and 6-169.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-162 Log #4781 NEC-P06 **Final Action: Accept**
(400.12)

Submitter: Samuel B. Friedman, General Cable Corporation
Recommendation: Remove Exception to 400.12
Substantiation: The exception to 400.12 does not apply since G-GC cables are permitted to be supplied with conductor sizes less than #10 AWG. This exception was placed in the code when the smallest conductor size permitted for G-GC cables was #8 AWG. However, this was changed in the 2004 code when the smallest size was changed to #12 AWG. The exception should have been removed at that time. Since the exception is no longer correct (#12 AWG is permitted to be used as ground-check) and not needed to clarify Section 400.12, the exception should be removed.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-163 Log #1752 NEC-P06 **Final Action: Accept in Principle in Part**
(400.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Flexible cords and cables, and tinsel cords shall be protected in accordance with 240.5.
Substantiation: Edit. Overcurrent devices are not described in 240.5, only circuit ampacity ratings. The requirement should include “cables” and sizes smaller than 18 AWG.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
400.13 Overcurrent Protection. Flexible cords not smaller than 18 AWG, and tinsel cords or cords having equivalent characteristics of smaller size approved for
use with specific appliances, shall be considered as protected against overcurrent ~~by the overcurrent devices described~~ in accordance with 240.5.
Panel Statement: The panel agrees with the submitter that overcurrent devices are not described in 240.5, but does not agree that cables smaller than 18 AWG should be included in the section. No technical data was supplied to indicate smaller size conductors should be included. The panel agrees that the current wording is sufficient with the proposed text changes.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-164 Log #2259 NEC-P06 **Final Action: Reject**
(400.14)

Submitter: Gus Bryan, Deputy ELectrical Inspector State of TN
Recommendation: ...In industrial (and commercial) establishments...
Substantiation: This method of installing cord drops has proven to work well. The benefits of the type installed should be extended to commercial applications.
Panel Meeting Action: Reject
Panel Statement: Industrial establishments have limited personnel access while commercial establishments would normally have much broader personnel access. The panel was not provided evidence that the conditions of qualified personnel exist in commercial establishments.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-165 Log #3513 NEC-P06 **Final Action: Accept**
(400.14)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the last line of the second paragraph, change “Table 400.5” to “Table 400.5(A)(3)”.
Substantiation: This is a companion proposal to the revision of 400.5 and the renumbering of the tables to comply with the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-166 Log #799 NEC-P06 **Final Action: Reject**
(400.19 (New))

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new Section 400.19.
400.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment.
Substantiation: 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While the equipment historically has not been listed, a basis for approval of this equipment is needed.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 and 110.3 already state that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in 400.19 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permit field equipment evaluation, so this text is unnecessary.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-167 Log #800 NEC-P06 **Final Action: Reject**
(400.19 (New))

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 400.19.
400.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation.
Substantiation: 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While the equipment historically has not been listed, a basis for approval of this equipment is needed.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 and 110.3 already state that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in 400.19 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permits field equipment evaluation, so this text is unnecessary. See panel action on Proposal 6-166.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-168 Log #801 NEC-P06 **Final Action: Reject**
(400.19 (New))

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 400.19.
400.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment.
Substantiation: 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While the equipment historically has not been listed, a basis for approval of this equipment is needed.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 and 110.3 already state that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in 400.19 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permit field equipment evaluation, so this text is unnecessary. See panel action on Proposals 6-166 and 6-167.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-169 Log #2753 NEC-P06 **Final Action: Accept in Principle in Part**
(400.21)

Submitter: Travis Lindsey, Travis Lindsey Consulting Services
Recommendation: Revise 400.21 to read as follows:
400.21 Construction.
(A) Conductors. The individual conductors of a flexible cord or cable shall be copper, have flexible stranding and shall not be smaller than the sizes in Table 400.4.
Exception: The ~~size of the~~ insulated ground-check conductor of Type G-GC cables shall ~~be~~ not be smaller than 10 A WG.
(B) Nominal Insulation Thickness. The nominal thickness of insulation for conductors of flexible cords and cables shall not be ~~less~~ smaller than specified in Table 400.4.
Exception: The nominal insulation thickness for the ground-check conductors of Type G-GC cables shall not be less than 1.14 mm (45 mils) for 8 AWG and not less than 0.76 mm (30 mils) for 10 AWG.
Substantiation: A companion proposal has been submitted to delete 400.12.
This revision will consolidate the construction requirements of flexible cords and cables into 400.21.
The addition of "copper" and "flexible stranding" provides consistency with the requirements in 400.31. The ampacity Table 400.5(A) specifies ampacities for copper conductors only and would have to be revised if other conductor materials were used. Flexible stranding is essential in flexible cords and cables, as specified in the title of Article 400.
The revisions to (A) Exception eliminates redundancy and is a grammatical correction that is consistent with the grammar used in the (B) Exception.
The rules proposed for the revised 400.21 were adopted from the existing 400.12 and 400.21. The revisions to 400.12 and 400.21 that were made to consolidate and merge them into the revised 400.21 are shown below for information.
400.12 Minimum Size.
The individual conductors of a flexible cord or cable shall be copper, have flexible stranding, and shall comply with the sizes specified ~~not be smaller than the sizes~~ in Table 400.4.
Exception: The ~~size of the~~ insulated ground-check conductor of Type G-GC cables shall ~~be~~ not be smaller than I0 AWG.
400.21 Nominal Insulation Thickness.
The nominal thickness of insulation for conductors of flexible cords and cables shall comply with ~~not be less than specified~~ in Table 400.4.
Exception: The nominal insulation thickness for the ground-check conductors of Type G-GC cables shall not be less than 1.14 mm (45 mils) for 8 AWG and not less than 0.76 mm (30 mils) for 10 AWG.
Panel Meeting Action: Accept in Principle in Part
1. Accept the proposed revision to the title of 400.21,
2. Accept the proposed addition of 400.21(A) and the relocation under the new subtitle (B) of the nominal insulation thickness.
3. Reject the change from "less" to "smaller" and the addition of the phrase "be copper".
4. Delete the exeption to 400.21(B).
Revise text as follows:
400.21 Construction.
(A) Conductors. The individual conductors of a flexible cord or cable shall have flexible stranding and shall not be smaller than the sizes specified in Table 400.4.
(B) Nominal Insulation Thickness. The nominal thickness of insulation for conductors of flexible cords and cables shall not be less than specified in Table 400.4.
~~Exception: The nominal insulation thickness for the ground-check conductors of Type G-GC cables shall not be less than 1.14 mm (45 mils) for 8 AWG and not less than 0.76 mm (30 mils) for 10 AWG.~~
Panel Statement: The term "less" is more appropriate since it refers to an insulation thickness. See panel action on proposal 6-162, which deletes the exception to part A of this section.

The exception to 400.21(B) does not apply since G-GC cables are permitted to be supplied with conductor sizes less than 10 AWG. This exception was placed in the code when the smallest conductor size permitted for G-GC cables was 8 AWG. However, this was changed in the 2004 code when the smallest size was changed to 12 AWG. The exception should have been removed at that time. Since the exception is no longer correct (12 AWG is permitted to be used as ground-check) and not needed to clarify Section 400.21(B), the exception should be removed.

Currently, there is no section in the code that specifies copper conductors, and the added text is not needed. The submitter's substantiation has not provided any data to justify the addition of the term "copper".

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-170 Log #2594 NEC-P06 **Final Action: Reject**
(400.23)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

An insulated or covered ~~A~~ conductor intended to be used... (remainder unchanged).

Substantiation: Edit. The requirement should be limited to insulated or covered conductors.
Panel Meeting Action: Reject
Panel Statement: The existing wording for conductor is sufficient as a conductor can either be insulated or covered. The submitter's proposal does not add any additional clarification to the requirement. No technical substantiation was provided to add the proposed wording.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-171 Log #1151 NEC-P06 **Final Action: Accept**
(400.31(B))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Delete in its entirety: "~~(B) Shields. Cables operated at over 2000 volts shall be shielded. Shielding shall be for the purpose of confining the voltage stresses to the insulation.~~"
Substantiation: There are no cords or cables in Article 400 that are rated for use above 2000 volts.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 402 — FIXTURE WIRES

6-172 Log #4867 NEC-P06 **Final Action: Reject**
(402)

Submitter: F. Patrick Mahoney, RCDD, Cannon Design
Recommendation: The title of Article 402 "Fixture Wires" and associated text should be changed to Luminaire Cable.
Substantiation: There is a conflict in terminology in the code as Article 410 has removed all mention of "fixtures" and code now defines what used to be a fixture as a luminaire. Use of the term fixture is confusing. In addition to avoid inconsistency cable better defines the conductor than wire.
Panel Meeting Action: Reject
Panel Statement: Fixture wires are used in more applications than just luminaires.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-173 Log #1621 NEC-P06 **Final Action: Accept**
(Table 402.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Relocate the column heading "Thickness of Insulation" that is currently over columns 4 – 6 to only be the heading for columns 5 and 6. The heading should appear as follows:

	Thickness of Insulation	
AWG	mm	mils

Insert a vertical line in the entire table between the "AWG" column and the "mm" column".
Substantiation: The conductor size should not be under the Thickness of Insulation heading. The vertical line will provide consistency with the other columns in the Table.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-174 Log #751 NEC-P06 **Final Action: Reject**
(402.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 402.19.

402.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved.

The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:

(1) Equipment listing or labeling

(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation.

Substantiation: 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While the equipment historically has not been listed, a basis for approval of this equipment is needed.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 and 110.3 already state that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in 402.19 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permit field equipment evaluation, so this text is unnecessary.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-175 Log #752 NEC-P06 **Final Action: Reject**
(402.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 402.19.
402.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:

(1) Equipment listing or labeling

(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation

(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment.

Substantiation: 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While the equipment historically has not been listed, a basis for approval of this equipment is needed.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 and 110.3 already state that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in 402.19 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permit field equipment evaluation, so this text is unnecessary. See panel action on Proposal 6-174.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-176 Log #753 NEC-P06 **Final Action: Reject**
(402.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 402.19.
402.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment.
Substantiation: 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While the equipment historically has not been listed, a basis for approval of this equipment is needed.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 and 110.3 already state that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in 402.19 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permit field equipment evaluation, so this text is unnecessary. See panel action on Proposals 6-174 and 6-175.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 404 — SWITCHES

9-95 Log #1160 NEC-P09 **Final Action: Accept in Principle**
(404.2(C) (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add a new subparagraph 404.2(C) and exception to read as follows:
404.2 Switch Connections.
(C) Switches Controlling Lighting Loads. Where switches control lighting loads supplied by a grounded general purpose branch circuit, a grounded circuit conductor shall be provided at the switch location.
Exception: Grounded conductors shall not be required where conductors for switches controlling lighting loads enter the device box through a raceway.
Substantiation: There are electronic lighting control devices that require a standby current to maintain the ready state and detection capability of the device. This allows immediate switching of the load to the "on" condition. These devices require standby current when they are in the "off" state, i.e., when no current is flowing to the the load. The typical design of these devices may utilize the grounding conductor for the standby current flow.

In many, if not most commercial installations, a grounded conductor is not provided in the switch box for switches controlling lighting loads. This forces the design of these control devices to utilize the grounding conductor to conduct the standby current. Occupancy sensors are permitted by UL 773A to have a current of up to 0.5 mA on the grounding conductor. In fact, a number of UL Standards permit up to a 0.5 mA ground leakage current as acknowledgment of an operational necessity.

This is allowed because the function of an occupancy sensor requires a low level standby current. The standard permits this current on the grounding conductor because in a typical installation there may be no grounded circuit conductor in the switch box which can be used as the return conductor for the standby current. The leakage current is additive and multiple devices on the same circuit could possibly create a risk. The lack of a grounded conductor in the switch box forces the use of the grounded conductor for the operation of the device. Product designers have no reasonable option but to accommodate the lack of a grounded conductor by relying on the grounding conductor. This not only promotes the risk outlined above, but limits the functionality of the device due to low current level allowed. Products can and are designed to utilize a grounded conductor. However, installers will continue to use the grounding conductor in lieu of the grounded conductor when there is no grounded conductor available in the lighting control switch box, again, promoting the same possible risk.

Sensor manufacturers could distribute the necessary supervisory current through the load for some devices, but this solution has several drawbacks. Current cannot pass through ballasts and transformers, so this method limits control to incandescent lamps, which are seldom used in commercial buildings due to requirements of the same energy codes that dictate sensor use. Leaking to load also requires sizing the device to the load, and specifying minimum loads to prevent glowing filaments. Finally, having current flowing at the load when the device is presumed to be off could create a similar risk.

Many lighting control devices are installed as a means of realizing significant energy savings associated with the control of lighting circuits. Due to escalating energy costs and the increased recognition and adoption of energy saving codes, it is expected that there will be a substantial increase in the installation of these products. It is becoming less of a design decision or personal preference and more of a legislative requirement. In order to ensure the safe use of these products, the NEC should recognize an installation practice that requires the appropriate circuit conductor to be available for the standby-operation of the control device. An occupancy sensor can be installed in any switch location. It is impractical to expect the customer or installer to anticipate all instances where an occupancy sensor will be installed.

Since revisions to the NEC often results in advances in technology with respect to electrical installations, mandating a neutral in switch boxes will encourage device manufacturers to develop products that need a power supply in order to deliver advances in the control of electricity and reduce improper wiring methods where a grounding conductor is improperly used.

Although the current design of many lighting control devices relies on the grounding conductor for conducting current, adopting this proposed requirement will ensure that future designs will take advantage of the presence of the grounded conductor in the switch box and no longer compel the design of the product or installation practice to use the grounding conductor to conduct the standby current. The availability of a grounded conductor will also promote the design of many new and improved lighting control products.

The proposal allows an exception for installations utilizing some form of raceway instead of cable. The raceway would accommodate the installation of a grounded conductor at a latter time if needed.
Panel Meeting Action: Accept in Principle
Accept the proposal as modified by revising the proposed exception to read as follows:
The grounded circuit conductor shall be permitted to be omitted from the switch enclosure where either of the conditions in (1) or (2) apply:
(1) Conductors for switches controlling lighting loads enter the device box through a raceway.
(2) Cable assemblies for switches controlling lighting enter the box through a framing cavity that is open at the top or bottom on the same floor level, or through a wall, floor, or ceiling that is unfinished on one side.
Panel Statement: This exception should only be applied in cases where compliance with the normal requirements is so difficult that covert attempts to evade the rules would be likely.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
YOUNG, R.: The Proposal should have been rejected. The proposal does not consider the fact that the vast majority of residential wiring utilizes standard light switches or electronic light dimmers. Requiring a grounded conductor at all switch boxes will significantly increase the cost of residential wiring, as all home runs (between the panel and the utilization equipment) will be required to pass through all light switches before going to the fixture box, or else switch legs would require an additional neutral conductor. Either approach would make the total length of the copper wiring required significantly longer, at zero safety benefit for most applications. Concerns about grounding conductors potentially being used as circuit conductors should be addressed in the product standards for devices that are allowed to retrofit for standard switches.
Comment on Affirmative:
HARTWELL, F.: The panel action, which may well be the best solution, still suffers from the drawback that conventional snap switches do not now and never will require a connection to a grounded circuit conductor. This may be excessive in the case of one- and two-family housing, where even if every such switch were changed to an electronic type, the cumulative load on the equipment grounding system would not be problematic. CMP 9 could avoid the "what-if" aspect of this proposal by waiving the rules in cases where the total number of switches in any current return path (branch circuit or feeder) on the load side of a main or system bonding jumper did not exceed some specified value. On the other hand, the exception presented in the panel action will be very easy to apply. Comments on this point would be appreciated.
LEMAY, T.: There are many safety and convenience benefits to the electrical system of an occupancy having a grounded circuit conductor available at all outlet control points when the control point is wired with a cabled wiring method.
There are many control devices currently on the market, and more likely to come that require the use of a grounded circuit conductor for their operation.
There are instances where the branch circuit wiring could be extended from the switch box containing a grounded circuit conductor to provide additional outlets or power to other loads near the control point at a later time.
There are also instances where the installation of a multi-level controlled luminary or appliance assembly are not contemplated at rough in and installed after the fact by the end user, requiring an additional insulated control or switch loop conductor. This provision will provide for a means to accomplish this.
Additionally, I believe that the raceway exception should be the only exception to this rule as wall finishes could be provided at any time, rendering the switch box inaccessible.

9-96 Log #318 NEC-P09 **Final Action: Reject**
(404.4)

Submitter: Thomas A. Rorro, Parsippany Bldg. Dept.
Recommendation: 404.4 Prohibits switches in "tub or shower spaces".
410.10(D) Defines "zone" 3 ft horizontally and 8 ft vertically from tub or shower rim.
I recommend that 404.4 be revised so switches are restricted in "zone".
Substantiation: The code is not clear. The code may permits a switch which can be operated while standing in a tub full of water with wet hands. Moving switches out of 3 ft "zone" will prevent this problem!
Panel Meeting Action: Reject
Panel Statement: The submitter misunderstands the objective of this rule. It is not to prevent someone in a tub or shower from touching a switch. It is to prevent the location of switches where streams of water over the cover would be routine, eventually compromising gaskets and impairing grounding continuity. A properly installed and grounded switch immediately outside the normal shower curtain location is not intended to be considered in violation of this rule.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-97 Log #450 NEC-P09 **Final Action: Reject**
(404.4)

Submitter: Vincent P. Caballero, Contra Costa County Building Inspection
Recommendation: Add new text to read as follows:
Switches shall not be installed within 900 mm (3 ft) of wet locations in tub or shower spaces...
Substantiation: I have inspected switches that have the ungrounded and grounded conductor reversed causing the metal screws on the cover plate to be energized (no doubt by an amateur). Note in the photo I have provided that if the switch was a half inch to the right, it would be illegal, as it would be "within" the shower space. This "legal" installation is not safe.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-96.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-98 Log #1733 NEC-P09 **Final Action: Accept in Principle**
(404.4)

Submitter: Darryl Hill, Wichita Electrical JATC / Rep. IBEW LU 271
Recommendation: Revise text to read as follows:
404.4 Damp or Wet Locations. ~~A surface mounted switch or circuit breaker in a damp or wet location...".~~
(A) Surface-mounted Switch or Circuit Breaker. Shall be enclosed in a weatherproof enclosure or cabinet that shall comply with 312.2. ~~A flush mounted switch or circuit breaker in a damp or wet location.~~
(B) Flush-mounted Switch or Circuit Breaker. Shall be equipped with a weatherproof cover. ~~Switches shall not be installed within wet location in tub or shower spaces unless installed as part of a listed tub or shower assembly.~~
(C) Tub or Shower Space Switch. Switches shall not be installed within this location unless installed as part of a listed tub or shower assembly.
Substantiation: In the original text, there is some redundant language like "damp or wet location" that is repeated a couple of times. For clarity and usability, this section already tells us in the title that we are in a "Damp or Wet location". By adding "surface-mounted" and "flush-mounted" in the 2008 NEC, this paragraph is essentially about 3 different locations or switch/breaker installations and would be much clearer if this is separated into 3 first level subdivisions as shown above.
Panel Meeting Action: Accept in Principle
Revise text as follows:
404.4 Damp or Wet Locations.
(A) Surface-Mounted Switch or Circuit Breaker. A surface-mounted switch or circuit breaker ~~in a damp or wet location~~ shall be enclosed in a weatherproof enclosure or cabinet that shall comply with 312.2.
(B) Flush-Mounted Switch or Circuit Breaker. A flush-mounted switch or circuit breaker ~~in a damp or wet location~~ shall be equipped with a weatherproof cover.
(C) Switches in Tub or Shower Spaces. Switches shall not be installed within these ~~wet~~ locations ~~in tub or shower spaces~~ unless installed as part of a listed tub or shower assembly.
Panel Statement: The panel action revises the proposed text for compliance with the NEC Style Manual and meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-99 Log #1873 NEC-P09 **Final Action: Reject**
(404.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "where mounted in an enclosure as described in 404.3".
Substantiation: Where switches and circuit breakers are not mounted in enclosures, as permitted by Exception No. 2 for 404.3(A), the on and off position should be indicated.
Panel Meeting Action: Reject
Panel Statement: The open switches described in 110.27, as cited in the submitter's substantiation, need not be indicating if their position is obvious upon inspection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-100 Log #1896 NEC-P09 **Final Action: Reject**
(404.8(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "used as switches" in the first sentence.
Substantiation: Article 100 defines a circuit breaker as a device to open and close a circuit by nonautomatic (manual) means. Present wording infers there are instances where a circuit breaker is not a switch. Even if deemed not a switch, ready access to manually operated circuit breakers should be required.
Panel Meeting Action: Reject
Panel Statement: There are instances where circuit breakers are not being used as a switching means. Additionally, requirements for the accessibility of overcurrent devices are included in 240.24.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-101 Log #1158 NEC-P09 **Final Action: Accept in Principle**
(404.8(A) Exception No. 4 (New))

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action with the following revision:
"404.1 Scope. The provisions of this article apply to all switches, switching devices, and circuit breakers used as switches, operating at 600 volts, nominal, or less, unless specifically referenced elsewhere in the Code for higher voltages."
Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add the following:
Exception No. 4: For equipment operating above 600V, location of switches shall be in accordance with 490.41.
Substantiation: 490.41(B) allows handles for infrequently operated devices over 600V to be located above the 2.0 m maximum elevation as long as they are safely operable and serviceable from a portable platform. There is some confusion among the AHJs as to whether the requirements of 490.41 supersede those of 404.8(A) for switches over 600V. Adding Exception No. 4 to 404.8(A) provides clarification.
Note: See companion proposal to 490.41(B).
Panel Meeting Action: Accept in Principle
Revise 404.1 to read as follows:
"The provisions of this article apply to all switches, switching devices, and circuit breakers used as switches, operating at 600 volts and below, unless specifically referenced elsewhere in the *Code* for higher voltages."
Panel Statement: CMP-9 agrees with the submitter that the switch height requirement for medium voltage systems should be covered in Article 490. When medium voltage applications were covered in Chapter 7, the provisions of 90.3 automatically resolved the sort of problem that arose in this case. Now that these rules have been moved to Chapter 4, inadvertent conflicts such as this may continue to crop up, and the suggested change in scope should restore the independence of Article 490 in these cases. CMP-9 recognizes that article scope statements are the province of the TCC and recommends this change. As part of this action, CMP-9 is reviewing the content of Article 404 and making correlating changes accordingly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HARTWELL, F.: A preliminary review of provisions in Article 490 during the panel meeting did not raise any specific areas where additional correlating actions would be necessary. Comment is invited on this point.

9-102 Log #3242 NEC-P09 **Final Action: Reject**
(404.8(A) Exception No. 4 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:
Exception No. 4: Switching devices identified for only automatic operation by temperature. Pressure, flow, movement, proximity, magnetism, light, and the like, shall not be required to be readily accessible.
Substantiation: Since 404.1 includes switching devices but no section except 404.15(B) specifically addresses them the requirement for switches must be assumed to apply.
Panel Meeting Action: Reject
Panel Statement: Although the devices cited in the substantiation have a switching function, they are not switches of the type defined in Article 100, and therefore not covered by the provisions of this article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-103 Log #1905 NEC-P09 **Final Action: Reject**
(404.8(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A snap switch, dimmer, receptacle, pilot light, or other device, with exposed terminals, shall not be grouped or ganged in enclosures with other ~~snap switches, receptacles, or similar such~~ devices unless they are arranged so that the voltage between adjacent devices does not exceed 300 volts, or unless the voltage between ~~adjacent devices~~ a device and the one next to it does not exceed 300 volts, or unless they are installed in enclosures equipped with identified securely installed barriers between such devices.
Substantiation: Edit. The provision should apply to devices other than snap switches with exposed terminals, which present the same hazard. “Adjacent” is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: There are devices that are equipped with wire leads without exposed terminals that are intended to be covered by this rule and that would be exempt under the terms of this proposal. In addition, the word “adjacent” is not vague and means exactly the same thing as the one next to it, so this does not improve the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-104 Log #2582 NEC-P09 **Final Action: Reject**
(404.8(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
A snap switch, receptacle, pilot light, push button and other such devices shall not be grouped.... (remainder unchanged.)
Substantiation: Edit. This provision should apply to other devices which may present a hazard.
Panel Meeting Action: Reject
Panel Statement: This proposal is not within the scope of Article 404. The section as worded is correct, because it states the requirement in terms of snap switches (which Article 404 does control) being located adjacent to other equipment. Note that 406.4(G) now contains the reciprocal requirements for receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-105 Log #3764 NEC-P09 **Final Action: Reject**
(404.8(B))

Submitter: Richard Shackelford, Clinton, OH
Recommendation: Revise text to read as follows:
404.8(B) Voltage Between Adjacent Devices. A snap switch shall not be grouped or ganged in enclosures with other snap switches, receptacles, or similar devices, unless they are arranged so that the voltage between adjacent devices does not exceed 300 volts ~~or~~ unless they are installed in enclosures equipped with identified, securely installed barriers between adjacent devices or by other listed means.
Substantiation: The current language in 404.8(B) limits the method of providing a barrier to dividers designed for use in boxes to provide separation between devices. These dividers are normally field installed by being inserted in a slot or other means to form a separate compartment for a device. This proposal will recognize other listed methods that provide the equivalent level of protection. Additionally, if field conditions warrant the installation of a barrier and a box is not designed to have barriers installed, recognizing a listed means as an alternative, could be achieved with this proposal.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: CMP-9 is not convinced that the product described in the illustrations that accompany this proposal is a satisfactory equivalent to a conventional barrier. The current code language does not limit the barrier to a divider inserted into a box. It does require that the barrier be “secure”, which means it must remain in place throughout its useful life.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-106 Log #3650 NEC-P09 **Final Action: Accept in Principle**
(404.8(C), FPN (New))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Add new text to read as follows:
FPN: See 210.7(B) for disconnect requirements when more than one circuit supplies a switch.
Substantiation: Listed or not, if you supply the switch with more than one circuit a means to simultaneously disconnect the ungrounded conductors must be provided on the line side of the switch per 210.7(B). Without this FPN many code users will miss this critical safety requirement.
Panel Meeting Action: Accept in Principle
Accept the proposal as written, but change “when” to “where”.
Panel Statement: The qualifying language is a condition of place and not time. CMP-9 agrees that the note is appropriate in this context.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-107 Log #4538 NEC-P09 **Final Action: Reject**
(404.9(B))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
(**B) Provision for Grounding.** Snap switches, including dimmer and similar control switches, shall ~~be connected to an equipment grounding conductor and shall~~ provide a means to connect metal faceplates to the equipment grounding conductor, whether or not a metal faceplate is installed. ~~Snap switches shall be considered to be part of an effective ground-fault current path if either of the following conditions is met:~~
~~(1) The switch is mounted with metal screws to a metal box or metal cover that is connected to an equipment grounding conductor or to a nonmetallic box with integral means for connecting to an equipment grounding conductor.~~
~~(2) An equipment grounding conductor or equipment bonding jumper is connected to an equipment grounding termination of the snap switch.~~
~~Exception to (B): Where no means exists within the snap-switch enclosure for connecting to the equipment grounding conductor or where the wiring method does not include or provide an equipment grounding conductor, a snap switch without a connection to an equipment grounding conductor shall be permitted for replacement purposes only. A snap switch wired under the provisions of this exception and located within reach of earth, grade, conducting floors, or other conducting surfaces shall be provided with a faceplate of nonconducting, noncombustible material or shall be protected by a ground-fault circuit interrupter.~~
Substantiation: This proposal intends to move the installation requirements for grounding switches to Article 250 under the jurisdiction of CMP-5. The construction requirements are appropriate to remain in Article 410.
Panel Meeting Action: Reject
Panel Statement: The grounding provisions for snap switches should remain in Article 404. These devices are self-contained and, unlike receptacles, they do not provide a portal for a quasi branch-circuit extension beyond the device in the form of a cord. These requirements have been in this location for many code cycles, and users are accustomed to finding them in their current location. Note also the discussion and panel actions in this cycle regarding Proposals 9-110 and 9-111 for examples of where grounding rules become complicated by the design of some current styles of snap switches with novel internal constructions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-108 Log #2581 NEC-P09 **Final Action: Accept in Principle**
(404.9(B) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
A snap switch wired under this provisions of this exception and located within ~~reach~~ 2.5 m (8 ft) vertically or 1.5 m (5 ft) horizontally of ground or exposed grounded metal shall be provided with a faceplate of nonconducting noncombustible material with nonmetallic attachment screws unless the switch mounting strap or yoke is nonmetallic or ~~shall be~~ the circuit is protected by a ground-fault circuit interrupter.
Substantiation: “Within reach” is subjective. Nonmetallic attachment screws (nylon for example) for the faceplate should be required for metallic switch straps.
Panel Meeting Action: Accept in Principle
Accept the proposal as written but add the word “objects” after the words “or exposed grounded metal”.
Panel Statement: CMP-9 wishes to keep the construction of this provision parallel to the wording in 250.110(1).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-109 Log #499 NEC-P09 **Final Action: Reject**
(404.9(B) Exception to (B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "circuit" and "interrupter" in the second sentence.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The lack of a hyphen is consistent with Article 100 and the NEC Style Manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-110 Log #245 NEC-P09 **Final Action: Accept in Principle**
(404.9(B) Exception No. 2 (New))

Submitter: Douglas R. Burrell, Cheetah USA Corp.
Recommendation: Add new text to read as follows:
<u>Exception No. 2: Where a listed snap switch comprised of a non-metallic, non-conductive plastic yoke exists, with no means of fastening a metal faceplate and provisions of 250.148 are met, the equipment grounding conductor shall not be required to be terminated at the snap switch.</u>
Substantiation: It is clear that the entire intent and assumptions of 404.9 are in relation to a metal yoke and the potential assembly of a metal faceplate that could become energized and introduce a safety hazard to consumers. Every inspector and electrician we have talked with acknowledges this interpretation and rationale for grounding the snap switch (due to metal yokes). Metal yokes have been the norm for 40+ years.
With the introduction of a plastic yoke, with its inherit safety features (plastic cannot become energized), we request a provisional consideration that would allow properly listed (UL 20 Standards Approved through a Recognized NRTL) snap switches that have a plastic yoke and that do not provide any means of fastening a standard screw-based wall plate (thus not allowing a metal wall plate to be fastened) be considered safe for installation without use of the grounding connector. This provision does not recommend and/or suggest that the grounding means required in 250.148 be eliminated, but that the termination of such grounding means not be required for this unique plastic yoke snap switch. The grounding means should always be available and accessible in the outlet box and properly grounded for replacement purposes or installation of metal yoke devices. Our request is only in consideration of a specifically listed and marked device where the assumptions set forth for metal yoked snap switches do not apply.
We would present the following evidences for your consideration:
1. The plastic yoke snap switches have no holes/means to attach a standard screw wall plate.
2. The plastic yoke is clearly marked, "for use with Cheetah non-metallic faceplates only" as per the NRTL laboratory (ETL) specification (UL20) documentation. (See Listing Report).
3. The provided Dielectric Test Report conducted by Intertek (ETL) Laboratory where 5000 Volts were applied directly to the plastic yoke snap switch with no dielectric breakdown.
4. The plastic yoke snap switch has been approved and installed in over 35 states with full local jurisdiction and state-wide approval. Most jurisdictions approve immediately when presented samples and documentation - due to the self-evident aspects of the plastic yoke with the statement, "how do you ground plastic?".
5. Every electrical board that has allowed us to properly present our products with substantive evidences of our safety features have approved the installation of the non-grounded snap switches. See samples of some of the electrical board approval documents.
6. The plastic yoke snap switches have been installed across the nation for over 4 years without any incident of safety or hazard concerns to consumer.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
The present exception becomes "Exception No. 1 to (B)." Reword the exception as follows: "Exception No. 2 to (B): Listed snap switches equipped with nonmetallic yokes and faceplates, where the plate cannot be installed on any other type of snap switch, shall not be required to be connected to an equipment grounding conductor."
Panel Statement: This wording is more economical. Section 250.148 applies whether or not this exception is used. The limitation on other types of faceplates is taken from the recommendation that is part of Proposal 9-111.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
HARTWELL, F.: This exception may require further tightening at the December meetings. The submitting manufacturer offers an accessory that "Converts Cheetah Box to Standard Screw Box." Subtle changes in wording, or even wholesale reconsideration, may be required to assure that a metal faceplate will not be used at a future time to replace the nonmetallic faceplate that was in place at the time of inspection. No jurisdiction known to this panel member requires permits and inspections in connection with changing a faceplate, which is the reason for the present rule. This product was turned down for listing by a major testing laboratory for this reason, however, the manufacturer then went to another testing laboratory and got a different result, leading, apparently, to this proposal that has the effect of legitimizing the end result. Comment on the part of those who actually install this product and the accessories thereto is invited.
OSBORNE, R.: While continuing to "accept in principle", the panel should consider modifications to the panel action to address the following concerns: (1) The proposal is specific to snap switches, consideration should be given to whether the exception should apply to all devices identified in the parent rule (including dimmers and similar control switches), (2) Require the device and cover plate to be listed as a kit or assembly - this mirrors the requirement in 406.4(D) for receptacle/faceplate combinations and is consistent with the panels intent that the yoke be designed to interface with a unique faceplate, (3) Include additional verbiage to ensure the yoke does not have mounting means to mount faceplates not provided as part of the listed assembly (i.e. the yoke should not be provided with threads to accept 6-32 screws for the mounting of traditional faceplates), (4) Limit the exception to those devices with all parts accessible after installation to be manufactured of nonmetallic materials (i.e., the switch operator should not be metallic), and (5) Revision to 404.12 to address the renumbering of the existing exception. These changes are incorporated in the following alternative text:
<u>"404.9(B) - Exception No. 2: Listed kits or listed assemblies shall not be required to be connected to an equipment grounding conductor if all of the following conditions are met:</u>
<u>(1) The device is provided with a nonmetallic faceplate that cannot be installed on any other type of device,</u>
<u>(2) The device does not have mounting means to accept other configurations of faceplates,</u>
<u>(3) The device is equipped with a nonmetallic yoke, and</u>
<u>(4) All parts of the device that are accessible after installation of the faceplate are manufactured of nonmetallic materials."</u>
404.12, last sentence, should read as follows: "Except as covered in 404.9(B), Exception <u>No. 1</u>, nonmetallic boxes for switches shall be installed with a wiring method that provides or includes an equipment grounding conductor."

9-111 Log #725 NEC-P09 **Final Action: Accept in Principle**
(404.9(B) Exception No. 2 and 3 (New))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise numbering of existing Exception to (B) and add new text to read as follows:
404.9 Provisions for General-Use Snap Switches.
(A) Faceplates. *[unchanged by this Proposal]*
(B) Grounding. Snap switches, including dimmer and similar control switches, shall be connected to an equipment grounding conductor and shall provide a means to connect metal faceplates to the equipment grounding conductor, whether or not a metal faceplate is installed. Snap switches shall be considered to be part of an effective ground-fault current path if either of the following conditions is met:
(1) The switch is mounted with metal screws to a metal box or metal cover that is connected to an equipment grounding conductor or to a nonmetallic box with integral means for connecting to an equipment grounding conductor.
(2) An equipment grounding conductor or equipment bonding jumper is connected to an equipment grounding termination of the snap switch.
Exception <u>No. 1</u> to (B): Where no means exists within the snap-switch enclosure for connecting to the equipment grounding conductor or where the wiring method does not include or provide an equipment grounding conductor, a snap switch without a connection to an equipment grounding conductor shall be permitted for replacement purposes only. A snap switch wired under the provisions of this exception and located within reach of earth, grade, conducting floors, or other conducting surfaces shall be provided with a faceplate of nonconducting, noncombustible material or shall be protected by a ground-fault circuit interrupter.
<u>Exception No. 2 to (B): A snap switch with integral enclosure complying with 300.15(E) shall be permitted.</u>
<u>Exception No. 3 to (B): Listed kits or assemblies encompassing a snap switch without a connection to an equipment grounding conductor and nonmetallic faceplates that cover the snap switch, where the plate cannot be installed on any other snap switch, shall be permitted.</u>
Substantiation: Proposed *Exception No. 2* is necessary to reconcile correlation issues. In accordance with 300.15(E), 334.30(C), 545.10, 550.15(I) *Exception*, 551.47(E) *Exception No. 1*, and 552.48(E) *Exception No. 1*, receptacles AND SWITCHES of the boxless type are Listed and can be used in installations. These switches incorporate integral nonconductive (nonmetallic) faceplates and inherently cannot interchange faceplates, metal or otherwise. Contrary to this requirement, there is absolutely no point in providing a means to connect a metal faceplate to the equipment grounding conductor, or even to connect the switch itself where there is no feed-through to switched equipment having no need to be grounded.
Similarly, there are Listed switches that are restricted by design to accepting proprietary faceplates of a mounting configuration available only in nonconductive, nonmetallic materials, and, vice versa, these faceplates are only

capable of being mounted to this switch. The wording for *Exception No. 3* parallels that of *NEC*® 406.4(D) *Exception* for receptacles, adapted for snap switches.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Accept the first proposed exception worded as follows: "Exception No. 3 to (B): A snap switch with integral nonmetallic enclosure complying with 300.15(E) shall be permitted without a connection to an equipment grounding conductor." Take no action on the second proposed exception.

Panel Statement: The substance of the second proposed exception has been incorporated in principle, relying on the wording developed in the panel action in Proposal 9-110 as a new Exception No. 2. The first proposed exception (which becomes Exception No. 3) has been reworded to clarify exactly what is being permitted.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

OSBORNE, R.: See comment on Proposal 9-110.

9-112 Log #3604 NEC-P09 **Final Action: Accept**

(404.9(C))

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Revise text to read as follows:

404.9 Provisions for General-Use Snap Switches.

[404.9(A) and 404.9(B) unchanged by this Proposal]

(C) Construction. Metal faceplates shall be of ferrous metal not less than 0.76 mm (0.030 in.) in thickness or of nonferrous metal not less than 1.02 mm (0.040 in.) in thickness. Faceplates of insulating material shall be noncombustible and not less than 2.54 mm (~~0.010~~ 0.100 in.) in thickness, but they shall be permitted to be less than 2.54 mm (~~0.010~~ 0.100 in.) in thickness if formed or reinforced to provide adequate mechanical strength.

Substantiation: Errata (multi-Edition).

These values were last balanced during the Clinton administration [1999 *NEC*®, 380-9(c)]. These US units of measure have been running a deficit, however, throughout the Bush administration [2002, 2005, 2008 *NEC*®, 404.9(C)].

0.10 in. = 2.54 mm, as indicated in 1999 *NEC*®.

380-9(c) in 1999 *NEC*® = 404.9(C) in 2002, 2005, 2008 *NEC*®

However, 2.54 mm ≠0.010 in., as indicated in 2002, 2005, 2008 *NEC*®. A 90% shortfall!!

Restoring the balance of values is the Change We Need!

CAN/CSA C22.2 No 42.1 • ANSI/UL514D, Cover Plates for Flush-Mounted Wiring Devices, 4.3.2.2 Exception No 2, 4.3.2.3 Exception No 2, 4.3.2.6 Exception, 4.3.2.7 Exception, 4.3.2.8.1 Exception, and 4.3.2.9.1 Exception already reflect the corrected value.

Panel Meeting Action: Accept

Panel Statement: Although the panel action is to accept the proposal to correct a typographical error, it does not necessarily agree with all of the submitter's substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-113 Log #4470 NEC-P09 **Final Action: Accept in Principle**

(404.9(N))

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Revise text to read as follows:

[404.9] **(B) Grounding. "**Where constructed with exposed conductive surfaces, s~~S~~nap switches, including dimmer and similar control switches, shall be connected to an equipment grounding conductor and shall provide a means to connect metal faceplates to an equipment grounding conductor, whether or not a metal faceplate is installed...".

Substantiation: Switches are currently available that are manufactured using plastic mounting straps, and there is no practical reason to connect these devices to the equipment grounding conductor as there is no exposed conductive surface that is likely to become energized in an insulation or equipment failure event. This has confused some AHJs regarding the enforcement of this section of the code. By accepting this proposed change, clarity of code intent and enforceability will both be enhanced.

Panel Meeting Action: Accept in Principle

See the panel actions on Proposals 9-110 and 9-111.

Panel Statement: See the panel statements on Proposals 9-110 and 9-111.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

OSBORNE, R.: See comment on Proposal 9-110.

9-114 Log #3890 NEC-P09 **Final Action: Reject**

(404.10(C))

Submitter: Ted "Smitty" Smith, Electrical Experts Consulting

Recommendation: Add new text as follows:

404.10(C) Exposed Terminals. Switches shall be enclosed so that energized wiring terminals are not exposed to contact.

Substantiation: This was proposal 9-97 Log #2778 for the 2008 NEC and the panel rejected the proposal and in their comments made wording suggestions which may be more acceptable and accomplish the intent of the proposal. I have made those wording changes. I believe this change will help keep electricians and other safer from electrical shock, especially in those circumstances where covers are removed for painting or other things and the circuits have not be de-energerized.

Panel Meeting Action: Reject

Panel Statement: CMP-9 rejected this in the 2008 cycle with the following statement: "All exposed terminals are required to be in an enclosure with covers and plates installed. This is a design option that can be addressed in the field where necessary. There is no technical substantiation to support the need for requirements to anticipate the level of misuse anticipated by the submitter." CMP-9 reaffirms this statement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-115 Log #3294 NEC-P09 **Final Action: Reject**

(404.11)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete: "in the event of a power failure".

Substantiation: Manual operation capability should not be limited to occasions of power failure.

Panel Meeting Action: Reject

Panel Statement: Although such switches will normally be operable with or without power available, the minimum requirement for safety, which is the purpose of this rule, is that these switches be additionally operable with the power off.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-116 Log #2555 NEC-P09 **Final Action: Reject**

(404.11, FPN)

Submitter: John Stuckwisch, Barth Electric / Rep. IEJATC Local 481 IBEW

Recommendation: Revise as follows:

404.11 FPN...240.83(D)

Substantiation: Only 240.83(D) applies to switched circuit breakers.

Panel Meeting Action: Reject

Panel Statement: A circuit breaker used as a switch needs to comply with all of 240.83, not only 240.83(D).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-117 Log #2297 NEC-P09 **Final Action: Accept in Principle**

(404.14(A)(1))

Submitter: John Marshall, Underwriters Laboratories Inc.

Recommendation: Article 404.14(A)(1) – Revised to

A form of general-use snap switch suitable only for use on ac circuits for controlling the following:

"(1) Resistive and inductive loads, including electric-discharge lamp~~s~~ ballasts, along with electronic ballasts and LED drivers for luminaires, not exceeding the ampere rating of the switch and at the voltage involved".

Substantiation: Current ratings of electronic ballasts and LED drivers are also to be used in determining the load for snap switches. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.

Panel Meeting Action: Accept in Principle

Instead of accepting the proposed language, in the existing Code text, delete the phrase "including electric discharge lamps".

Panel Statement: CMP-9 agrees that the loads identified in the proposal are permissible. This rule was never intended to include a list of permitted applications, which are far more extensive than the ones covered in this proposal. Elimination of this phrase removes the implication that this rule limits its applicability in this way.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-118 Log #726 NEC-P09 **Final Action: Accept in Principle**
(404.14(F) (New))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text and a new Fine Print Note and revise the numbering cross-reference correspondingly to read as follows:
404.14 Rating and Use of Snap Switches.
Snap switches shall be used within their ratings and as indicated in 404.14(A) through ~~(E)~~(F).
FPN No. 1: For switches on signs and outline lighting, see 600.6.
FPN No. 2: For switches controlling motors, see 430.83, 430.109, and 430.110.
(F) Cord-and-Plug-Connected Loads. Where a snap switch is used to control cord-and-plug-connected equipment on a general-purpose branch circuit, each snap switch controlling receptacle outlets or cord connectors that are supplied by permanently connected cord pendants shall be rated at not less than the rating of the maximum permitted ampere rating or setting of the overcurrent device protecting the receptacles or cord connectors, as provided in Article 210.
FPN: See 210.50(A) and 400.7(A)(1) for equivalency to a receptacle outlet of a cord connector that is supplied by a permanently connected cord pendant.
Exception: Where a snap switch is used to control not more than one single receptacle outlet on a branch circuit, the switch shall be permitted to be rated at not less than the rating of the receptacle.
[remainder of 404.14 unchanged by this Proposal]
Substantiation: Many ASSUME that the circuit rating defines the switch's rating, but 404.14 says only that the switch shall be used within *its* rating. That works when the load is known and hard-wired. 404.14(A), 404.14(B) and 404.14(D) adequately define the switch current rating when that ONE, NONINTERCHANGEABLE load is hard-wired to the branch circuit. When the load is plug-and-cord-connected through a receptacle or cord connector on a cord pendant (i.e., INTERCHANGEABLE), however, the current rating requirements of that switch are incompletely defined by existing 404.14.
210.3 establishes that the branch circuit's current rating is based upon the "maximum permitted ampere rating or setting of the overcurrent device". 210.21(B) requires that the receptacle's rating is based on the circuit rating. Article 404 (404.14 in particular) is silent, however, on the current rating of the switch controlling a receptacle outlet and Article 210 offers no coordination of the switch rating with anything else.
Once the switch is installed, the USER canNOT see the current rating of the switch behind a cover plate, only the receptacle's configuration or the marked current rating of the overcurrent device at the panelboard, and could exceed the switch's current rating with another plug-and-cord-connected load, resistive, inductive or tungsten filament, by the USER.
You can't go by the plug configuration of the interchangeable, cord-and-plug-connected load to determine the ampere rating of the branch circuit. Some receptacle configurations accept either an attachment plug of the same current rating or of a LOWER current rating. 406.3(F) mandates noninterchangeability of receptacle outlet and plug configurations based on different voltages, frequencies, or services (ac versus dc) on the same premises, but NOT based on amperage or horsepower current rating. The most common examples are that non-locking-type 20-ampere, 125-volt (NEMA 5—20R) and 250-volt (NEMA 6—20R) receptacles will accept either non-locking-type 15- or 20-ampere, 125-volt (NEMA 5—15P or NEMA 5—20P) and 250-volt (NEMA 6—15P or NEMA 6—20P) plugs, respectively.
For a multioutlet branch circuit, you cannot establish the ampere rating of the circuit [210.19(A)(2)] based on the ampere rating (or the associated outlet configuration) of an INDIVIDUAL receptacle. For example per 210.21(B), 15-ampere receptacles (NEMA 5—15R) could be on either 15-ampere or 20-ampere branch circuits. Per 220.14(I), a switch controlling a multioutlet branch circuit could be controlling 13 outlets on a 20-ampere branch circuit rather than 10 outlets on a 15-ampere branch circuit. Consequently, the switch's rating must be based on the rating of the branch circuit rather than rating of the receptacle.
The one exception would be where the snap switch is "downstream" of any other receptacles on the multioutlet branch circuit and controls only one outlet of known ampere rating. This scenario includes a switch controlling one single receptacle, a switch controlling one outlet face of a split-wired duplex receptacle, or the outlet of a combination receptacle with integral switch [UL product category RUSZ, CSA International product class 6233-84], where there are no further feed-through termination to supply other receptacles.
Here's a real-world example cited to us by Electrical Inspector Bill DeVoe with the City of Aurora, Colorado:
Some electricians in his jurisdiction have started to install individual branch circuits for plug-and-cord-connected kitchen garbage disposals (single-phase, motor-driven load rated ½ horsepower, 120 V ac, having a NEMA 5—15P plug) using a 20 A single receptacle (NEMA 5—20R), 12 AWG wire and a 20 A circuit breaker.
These electricians want to know if a 15 A, 120 V ac switch is permissible on this branch circuit. These electricians assert that the enclosed undersink cabinet interior is a dedicated space with a single receptacle on an individual branch circuit and intended only for connection of the garbage disposal.
If you go by the garbage disposal's motor rating of ½ horsepower (120 V ac), *NEC*® Table 430.248 gives you a full load current of 9.8 A. For an ac-only snap switch controlling a motor load, 404.14(A)(3), 430.83(C)(2), and 430.109(C)(2) all indicate that 80% of a 15 A switch rating is 12 A. So the full load current of 9.8 A for this garbage disposal's motor load can be controlled by a 15 A switch. IF the garbage disposal were a HARD-WIRED load!
But if the garbage disposal is NOT hard-wired and instead is plug-and-cord-connected, then per 430.42(C) this is an Article 210 general-purpose branch circuit. The last sentence of NEC® 430.42(C) indicates that the 20 A receptacle determines the circuit rating (12 AWG wire and a 20 A circuit breaker).
The receptacle, nonetheless, IS accessible, the plug of the garbage disposal CAN be disconnected from the receptacle outlet, and the plug (15 A NEMA 5—15P or 20 A NEMA 5—20P) of another plug-and-cord-connected equipment (non-motor load or higher horsepower motor loads) COULD be connected to this receptacle outlet, even if on only a temporary basis. So, a 1900 W space heater (resistive load) could be plugged into the 20 A single receptacle on an individual branch circuit, drawing 16 A through that 15 A snap switch supposedly "dedicated" to that garbage disposal. Article 404 does NOT address what rating the switch must have, only that the INTERCHANGEABLE plug-in loads, like a hard-wired load, cannot exceed the UNVIEWABLE rating of the snap switch behind its cover plate.
NOTE: Although the above EXAMPLE uses a motor-driven appliance, this example could have been for any other type of load and equipment. This needs to be handled under Article 404, NOT under Article 422.
Panel Meeting Action: Accept in Principle
Accept the proposal as written; however, in the exception change "one single receptacle outlet" to "one receptacle".
Panel Statement: The words "One single receptacle outlet", as in the sense of a solitary receptacle outlet, could literally encompass a ten-gang box filled with receptacles, because that ten-gang box is a single point on the wiring system and meets the definition of receptacle outlet in Article 100. This was surely not the intent of this proposal as indicated in the substantiation. A receptacle is a single contact point, and therefore the correct wording to meet the submitter's intent is "one receptacle." For example, a duplex receptacle is two receptacles and exceeds the permission granted by this panel action.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-119 Log #886 NEC-P09 **Final Action: Reject**
(404.15 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add 404.XX
LOCATION. Switches shall not be installed in a face-up position in any countertop or horizontal surface.
Substantiation: A requirement similar to 550.13(F) is warranted.
Panel Meeting Action: Reject
Panel Statement: The referenced section in the substantiation, presumably intended to be stated as 550.13(F)(2), mirrors 406.4(E) and only applies to receptacles in countertops. More substantiation would be required to support a blanket prohibition on face-up mounting for all switches of any description in all locations.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-120 Log #1042 NEC-P09 **Final Action: Reject**
(404.15 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
404.XX Switches and circuit breakers shall be listed and marked with the manufacturers name or identification and, voltage rating, and ampere or horsepower rating.
Substantiation: There does not appear to be such a general requirement for switches and circuit breakers except for switches covered by 404.14(C) and (D). Section 406.2 requires listing for receptacles, and switches are no less a critical part of wiring systems.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been presented that current industry practices are causing problems in the field. The proposed requirements for circuit breakers are beyond the scope of Article 404.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-121 Log #1144 NEC-P09 **Final Action: Reject**
(404.15 (New))

Submitter: Steven G. Waldman, Waldman Bros. Electric Inc.
Recommendation: Add text to read as follows:
Motion Activated On/Timed off Switches shall not be permitted in public places if they control area lighting.
Substantiation: The problem is that if you enter a public setting where these devices are used and you are out of range of the motion activated switch the lights will shut off, leaving you in the dark. This is unsafe if a person does not know his surroundings and could cause injury.
The specific reason for this proposal is that the above situation happened in a locker room of a YMCA where patrons have to find their way to get to the switches motion area to turn the lights back on.
Panel Meeting Action: Reject
Panel Statement: The proposal addresses a design consideration and not a code issue. No change in the NEC is required to address the issue.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-122 Log #1184 NEC-P09 **Final Action: Reject**
(404.15 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:
404.XX Listing. Switches, circuit breakers and switching devices shall be listed.
Substantiation: Items critical to safety, including limit switches, pressure and similar switches should provide indication that listing protocols have determined a level of safety. Listing should be a general requirement not limited to 404.14 (D)(E).
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-120.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-123 Log #979 NEC-P09 **Final Action: Reject**
(404.15(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Switches shall be marked with the current type (ac or dc) maximum voltage and current rating, and if horsepower rated, the maximum, rating(s) at the applied voltage(s) ~~for which they are designed.~~
Substantiation: Edit. The type of current should be specified, also the maximum voltage and current, and the horsepower at the voltage employed.
Panel Meeting Action: Reject
Panel Statement: The present language, by referencing “current,” reaches both the amount of current and its type. The word “voltage” covers the voltage information requested in this proposal. Finally, the provision for horsepower is qualified by the statement “the maximum rating”, which covers the testing provisions encompassed in this proposal. No change in the NEC is required. The requested information is routinely available on presently available switch designs, and this is further evidence that no changes in the NEC need to be made.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-124 Log #3243 NEC-P09 **Final Action: Reject**
(404.19 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:
404.XX Switching devices identified only for automatic operation by temperature, pressure, flow, movement, light, proximity, magnetism, and the like shall not be required to be externally manually operable.
Substantiation: Since 404.1 includes switching devices but no section (except 404.15(B)) specifically addresses them the requirement for switches must be assumed to apply.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-102.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-125 Log #4195 NEC-P09 **Final Action: Reject**
(404.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
404.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, not time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: In the 2005 NEC cycle, CMP-9 considered a serious, official proposal from electrical equipment manufacturers to require all pull boxes to be listed. That proposal was rejected on the grounds that it was excessive to require a listing, especially on pull boxes that may be made in local sheet metal shops to meet specific dimensional requirements. This is the second time over the past few code cycles that CMP-9 has refused to require listings on this equipment. Another good example is 314.40(B), which does not require listings in contradistinction to 314.40(B) Exception No. 2 that does require listings. These distinctions were very carefully drawn by CMP-9 at the time they were made. Although these examples do not occur in the article under consideration, they illustrate an appropriate decision-making process.
The NEC process is a transparent, open process, fully subject to opportunities for public participation and comment. Proposals such as this have the effect of making thousands of amendments throughout the NEC, in this case removing “approved” and “identified” and substituting “listed,” all without going through the consensus process on the merits of the specific equipment applications involved. CMP-9 recommends that interested parties submit proposals for listing requirements for specific equipment as they deem necessary. The fact that this proposal allows for field evaluations by testing laboratories as a second method of product acceptance and delays the effective date until 2017 does not address these issues and is still excessive in many cases.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: The AHJ should accept equipment unless he inspects it and identifies a specific NEC violation.

9-126 Log #4196 NEC-P09 **Final Action: Reject**
(404.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
404.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: In the 2005 NEC cycle, CMP-9 considered a serious, official proposal from electrical equipment manufacturers to require all pull boxes to be listed. That proposal was rejected on the grounds that it was excessive to require a listing, especially on pull boxes that may be made in local sheet metal shops to meet specific dimensional requirements. This is the second time over the past few code cycles that CMP-9 has refused to require listings on this equipment. Another good example is 314.40(B), which does not require listings in contradistinction to 314.40(B) Exception No. 2 that does require listings. These distinctions were very carefully drawn by CMP-9 at the time they were made. Although these examples do not occur in the article under consideration, they illustrate an appropriate decision-making process.
The NEC process is a transparent, open process, fully subject to opportunities for public participation and comment. Proposals such as this have the effect of making thousands of amendments throughout the NEC, in this case removing “approved” and “identified” and substituting “listed,” all without going through the consensus process on the merits of the specific equipment applications

involved. CMP-9 recommends that interested parties submit proposals for listing requirements for specific equipment as they deem necessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-127 Log #4197 NEC-P09 **Final Action: Reject**
(404.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
404.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: In the 2005 NEC cycle, CMP-9 considered a serious, official proposal from electrical equipment manufacturers to require all pull boxes to be listed. That proposal was rejected on the grounds that it was excessive to require a listing, especially on pull boxes that may be made in local sheet metal shops to meet specific dimensional requirements. This is the second time over the past few code cycles that CMP-9 has refused to require listings on this equipment. Another good example is 314.40(B), which does not require listings in contradistinction to 314.40(B) Exception No. 2 that does require listings. These distinctions were very carefully drawn by CMP-9 at the time they were made. Although these examples do not occur in the article under consideration, they illustrate an appropriate decision-making process.
The NEC process is a transparent, open process, fully subject to opportunities for public participation and comment. Proposals such as this have the effect of making thousands of amendments throughout the NEC, in this case removing "approved" and "identified" and substituting "listed," all without going through the consensus process on the merits of the specific equipment applications involved. CMP-9 recommends that interested parties submit proposals for listing requirements for specific equipment as they deem necessary. The fact that this proposal allows for field evaluations by testing laboratories as a second method of product acceptance does not address these issues and is still excessive in many cases.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-128 Log #4198 NEC-P09 **Final Action: Reject**
(404.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
404.19 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: In the 2005 NEC cycle, CMP-9 considered a serious, official proposal from electrical equipment manufacturers to require all pull boxes to be listed. That proposal was rejected on the grounds that it was excessive to require a listing, especially on pull boxes that may be made in local sheet metal shops to meet specific dimensional requirements. This is the second time over the past few code cycles that CMP-9 has refused to require listings on this equipment. Another good example is 314.40(B), which does not require listings in contradistinction to 314.40(B) Exception No. 2 that does require listings. These distinctions were very carefully drawn by CMP-9 at the time they were made. Although these examples do not occur in the article under consideration, they illustrate an appropriate decision-making process.
The NEC process is a transparent, open process, fully subject to opportunities for public participation and comment. Proposals such as this have the effect of making thousands of amendments throughout the NEC, in this case removing "approved" and "identified" and substituting "listed," all without going through the consensus process on the merits of the specific equipment applications involved. CMP-9 recommends that interested parties submit proposals for listing requirements for specific equipment as they deem necessary. The fact that this proposal postpones the effective time of implementation until 2017 does not address these issues.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-129 Log #4919 NEC-P09 **Final Action: Reject**
(404.19)

Submitter: Donald R. Cook, Shelby County Building Inspections
Recommendation: Add a new section 404.19 as follows:
404.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this options would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered Professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While Item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.

Panel Meeting Action: Reject
Panel Statement: Because the terminology "such as" is open ended, item 3 of this proposal is tantamount to recognizing an AHJ's approval under 110.2 of equipment that could simply be approved or could be identified as defined in Article 100 or listed as defined in Article 100 and therefore does not add anything to the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-130 Log #1070 NEC-P09 **Final Action: Reject**
(404.80(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 14 for action in 504.80(A).
This action will be considered by Code-Making Panel 14 as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "prevent" to "minimize".
Substantiation: Edit. Identification may minimize unintentional interference, but cannot prevent it.
Panel Meeting Action: Reject
Panel Statement: CMP-9 requests that the TCC refer this proposal to CMP-14 for action during the comment period. It apparently is intended to apply to 504.80(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 406 — RECEPTACLES, CORD CONNECTORS, AND ATTACHMENT PLUGS (CAPS)

18-8 Log #1192 NEC-P18 **Final Action: Reject**
(406(A), (B) and (C) and Exceptions)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
(A) Rating. Receptacles, cord connectors, and flanged surface outlets shall be of the grounding type except as permitted in 406.3(D)(2) and (B)(3).
(B) To be Grounded. Receptacles, cord connectors, and flanged surface outlets shall have equipment grounding terminals connected to an equipment grounding conductor of the circuit supplying the device(s).
FPN No. 1: For installation requirements for the reduction of electrical noise see 250.146(D).
FPN No. 2: For extension of existing branch circuits see 250.130(C).
Substantiation: Flanged surface outlets should be included. Grounding type receptacles, cord connectors and flanged surface outlets on portable and vehicle-mounted generators, should not be exempted by Exception No. 1 for (B) from connection to an EGC (see 110.3 (A)(1)). Receptacles, cord connectors, and flanged surface outlets should be permitted on circuits of a lower than rated voltage and current of the devices since a device rated 15 amperes, 125 volts is not hazardous if used on a lower rated circuit. Present (C) is superfluous, already covered by (B) and required elsewhere to be run with circuit conductors.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the NFPA Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
CMP-18 is unable to determine what is intended to be deleted and replaced.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-9 Log #4719 NEC-P18 **Final Action: Reject**
(406(B))

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Revise text as follows:
Receptacles installed in a wet location and/<u>or</u> subject to routine...".
Substantiation: Clarify wording as not to limit the use of exception.
Panel Meeting Action: Reject
Panel Statement: CMP-18 believes the proposal concerns 406(8)(B) Exception.
The submitter has given no reasoning to expand the limits of the exception. The existing wording is as intended. The submitter is encouraged to look at 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-10 Log #1191 NEC-P18 **Final Action: Reject**
(406.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Scope. This article covers the rating(s), type(s) and installation of receptacles, cord connectors, ~~and~~ attachment plugs (cord caps) <u>and flanged surface devices</u>.
Substantiation: Edit. Flanged surface devices are also covered.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been given for adding "flanged surface devices." See panel action and statement on Proposals 18-3 and 18-4.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-11 Log #2427 NEC-P18 **Final Action: Reject**
(406.1(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
DEFINITION: <u>Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify when there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.</u>
Substantiation: If Power Safe Protector is accepted in 406 only, a definition will be needed. There is a proposal for Article 100 also.
Panel Meeting Action: Reject
Panel Statement: There is nothing in the current edition of the NEC that prohibits such a receptacle. The substantiation raises questions as to its specific applicability to the proposal.
A thorough study of overheating terminations and wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code.
Over the past several code cycles, much of the same incident data has been used to support AFCI proposals indicating that the incidents are the result of arcing faults on the interior wiring. In the last code cycle, this data was used to support a thermally protected receptacle indicating that the incidents resulted from overheated receptacle contacts or terminals. Now the claim is that the incidents are resulting from thermal overload.
Furthermore, PSPs do not contain downstream (feed through) power connection.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-12 Log #675 NEC-P18 **Final Action: Reject**
(406.2)

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Add new text to read as follows:
<u>Child-Care facilities.</u>
(i) "Child day care center" means a facility providing regularly scheduled care for a group of children one month of age through twelve years of age for periods less than twenty-four hours.
(ii) "School-age child care center" means a program operating in a facility other than a private residence accountable for school-age children when is not in session.
(iii) "Family child day care home" means the same as "family child care home" and "a child day care facility" located in the family abode of the person or persons under whose direct care and supervision the child is placed, for the care of twelve or fewer children, including children who reside at the home.
Substantiation: Due to the concentration of children in these facilities and the ratio of supervision adults/children this would provide the same level of protection as is being accomplished in dwelling units.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
It is not clear what the proposal is intended to accomplish.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-13 Log #836 NEC-P18 **Final Action: Reject**
(406.2(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
(A) Receptacles, cord connectors, attachment plugs (cord caps) and flanged surface devices shall be rated... (remainder unchanged)
(B) Receptacles ~~and~~ cord connectors, attachment plugs (cord caps), and flanged surface devices shall be rated... (remainder unchanged)
Substantiation: Edit. Additional devices should be included.
Panel Meeting Action: Reject
Panel Statement: The proposal provides no technical data supporting substantiation for adding "cord caps." For flanged surface devices, see panel action and statement on Proposal 18-10.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-14 Log #845 NEC-P18 **Final Action: Reject**
(406.2(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
(A) Receptacles cord connectors, attachment plugs, and flanged surface devices shall be listed... (remainder unchanged)
(B) Receptacles ~~and~~ cord connectors, attachment plugs and flanged surface devices shall be rated... (remainder unchanged)
Substantiation: Additional proposed devices should be included.
Panel Meeting Action: Reject
Panel Statement: The proposal provides no technical data supporting substantiation for adding attachment plugs and flanged surface devices. See panel action and statement on Proposal 18-10.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-15 Log #1199 NEC-P18 **Final Action: Reject**
(406.2(A), (B) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

(A) Receptacles, cord connectors, and flanged surface devices shall be listed.... (remainder unchanged).
(B) Receptacles, cord connectors, and flanged surface devices shall be rated... (remainder unchanged).
(C) Receptacles, cord connectors, and flanged surface devices rated 20 amperes or less... (remainder unchanged)
Substantiation: The proposed additional devices should be included.
Panel Meeting Action: Reject
Panel Statement: The proposal provides no technical data supporting substantiation for adding flanged surface devices. See panel action and statement on Proposal 18-10.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-16 Log #2580 NEC-P18 **Final Action: Reject**
(406.2(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Receptacles ~~and~~ cord connectors, attachment plugs and flanged surface devices shall be rated not less than 15 amperes 125 volts, or 15 amperes 250 volts and shall be of a type not ~~suitable~~ identified for use as lampholders.
Substantiation: Edit. Since this article covers attachment plugs and flanged surface devices they should be included in the provision.
Panel Meeting Action: Reject
Panel Statement: The proposal provides no technical data supporting substantiation for adding flanged surface devices. See panel action and statement on Proposal 18-10.
No substantiation was provided for the proposed change from "suitable" to "identified."
The proposed revision is not considered editorial.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-17 Log #2689 NEC-P18 **Final Action: Reject**
(406.2(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Attachment plugs, ~~and~~ cord connectors, and flanged surface devices shall be... (remainder unchanged).
Substantiation: Flanged surface devices should be included.
Panel Meeting Action: Reject
Panel Statement: The proposal provides no technical data supporting substantiation for adding flanged surface devices. See panel action and statement on Proposal 18-10.
This section applies to receptacles and other female contact devices and does not apply to attachment plugs or flanged surface devices.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-18 Log #1901 NEC-P18 **Final Action: Reject**
(406.2(B) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Exception: Where a lower rating is permitted by 410.30(C)(2).
Substantiation: Edit. The lower rating permitted by 410.30(C)(2) (125%) of luminaire current) may be less than 15 amperes.
Panel Meeting Action: Reject
Panel Statement: The proposal provides no technical data supporting the substantiation. The panel believes the reference 410.30(C)(2) in the proposal is to a section in the 2005 edition of the NEC. The reference in the 2008 NEC would be 410.62(C)(2).
In either case, receptacles are not permitted to be rated less than that shown in 406.2(B). They may be a lower rating than the branch circuit; but they cannot be lower than required by 406.2(B).
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-19 Log #2428 NEC-P18 **Final Action: Reject**
(406.3(D)(2))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
(D) Replacements.
(2) ~~Ground-Fault Circuit-Interrupters~~ Power Safe Protector. ~~Ground-fault circuit-interrupter~~ Power safe protector ~~protected~~ receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in this Code.
Substantiation: A person can receive a serious shock when coming into contact with the blades of a partially inserted plug, or when plugging in faulty equipment or wiring, even with GFCI protection. Fires start as faulty appliances are not detected. Additional fires start when loose receptacle supply connections overheat and ignite nearby flammable material. These fires represent a leading cause of electrical fires in homes.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
There are several proposals made to require Power Safe Protectors throughout the code. Their approval would make it a needed change here.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-11.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-20 Log #500 NEC-P18 **Final Action: Reject**
(406.3(D)(3))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between “circuit” and “interrupter” in the first sentence in (b) and in two places in (c).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The panel believes the reference is incorrect and should be 406.3(D)(3)(c).
In this instance, the use of “ground-fault circuit-Interrupter” is a noun and therefore the lack of a hyphen is correct according to the NEC Style Manual. See Annex B of the NEC Style Manual.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-21 Log #2384 NEC-P18 **Final Action: Reject**
(406.3(D)(3))

Submitter: David G. Humphrey, Midlothian, VA
Recommendation: Add text to read as follows:
406.3(D)(3) Non-Grounding Type Receptacles. Where attachment to an equipment grounding conductor does not exist in the receptacle enclosure, <u>and cord and plug connected equipment required to be connected to an equipment grounding conductor is not intended to be used,</u> the installation shall comply with (D)(3)(a), (D)(3)(b), or (D)(34)(c).
Substantiation: The addition of the statement <u>*and cord and plug connected equipment required to be connected to an equipment grounding conductor is not intended to be used*</u> makes clear that the replacement methods described in 406.3(D)(3)(a), (b), and (c) do not provide a grounding means required by 250.114 for specific equipment and appliances. The current language may induce the user to conclude that the permissions given in 406.3 are absolute, especially with regard to protecting a circuit by the use of a ground-fault circuit interrupter. The marking of “No Equipment Ground” is often negated by the false perception that the shock hazard protection provided by a ground-fault circuit interrupter meets the requirement of 250.114. Placement of a GFCI type receptacle with no connected equipment grounding conductor per 406.3(B) or (C) at the intended location of the laundry equipment for example, invites the use of such equipment with a result of the appliance not being grounded. Adaptors and the like may prove to be unreliable especially with the expanded use of non-conductive water pipe in recent years.
The current provisions would allow a non-grounding type receptacle to be replaced with a gfci-protected receptacle at the obvious location of a refrigerator with no violation occurring until the appliance is plugged in. Adding the wording suggested, directs the installer to the installation of an equipment grounding conductor as detailed in 250.130(C) and provides the Inspector with a method of determining that the requirements of 250.114 are met when these non-grounding type receptacles are replaced in locations where appliances and equipment requiring grounding are intended to be used.
Panel Meeting Action: Reject
Panel Statement: The current code indeed anticipates supplying cord and plug-connected equipment (with a grounding plug cap) from a GFCI receptacle that is not connected to earth ground as allowed by the present text. A GFCI receptacle without a connection to earth ground is a safer alternative than a grounding receptacle without connection to earth ground when used as a replacement for a two-wire receptacle. CMP-18 notes that when a GFCI is installed as permitted by this section, a special label is required noting that there is no connection to earth ground.
This change would require the installer and AHJ to determine intent. This is impossible and impractical. See 3.2.1 of the NEC Style Manual.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-22 Log #2429 NEC-P18 **Final Action: Reject**
(406.3(D)(3))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
(3) Non-Grounding-Type Receptacles. Where attachment to an equipment grounding conductor does not exist in the receptacle enclosure, the installation shall comply with (D)(3)(a), (D)(3)(b), or (D)(3)(c).
(a) A non-grounding-type receptacle(s) shall be permitted to be replaced with another non-grounding-type receptacle(s).
(b) A non-grounding-type receptacle(s) shall be permitted to be replaced with a ~~ground-fault-circuit-interrupter~~ <u>power safe protector</u> type of receptacle(s). These receptacles shall be marked “No Equipment Ground.” ~~An equipment grounding conductor shall not be connected from the ground-fault circuit-interrupter receptacle to any outlet supplied form the ground-fault circuit-interrupter.~~
(c) ~~A non-grounding type receptacle(s) shall be permitted to be replaced with a grounding type receptacle(s) where supplied through a ground-fault circuit-interrupter. Grounding type receptacles supplied through the ground-fault circuit-interrupter shall be marked “GFCI Protected” and “No Equipment Ground.” An equipment grounding conductor shall not be connected between the grounding type receptacles.~~
Substantiation: A person can receive a serious shock when coming into contact with the blades of a partially inserted plug, or when plugging in faulty equipment or wiring, even with GFCI protection. Fires start as faulty appliances are not detected. Additional fires start when loose receptacle supply connections overheat and ignite nearby flammable material. These fires represent a leading cause of electrical fires in homes.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a “Power Off” safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
There are several proposals made to require Power Safe Protectors throughout the Code. Their approval would make it a needed change here.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-11.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-23 Log #2966 NEC-P18 **Final Action: Reject**
(406.3(D)(3))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise as follows:
406.3 General Installation Requirements.
Receptacle outlets shall be located in branch circuits in accordance with Part III of Article 210. General installation requirements shall be in accordance with 406.3(A) through (F).
[406.3(A) through 406.3(C) unchanged by this Proposal]
(D) Replacements. Replacement of receptacles shall comply with 406.3(D)(1), (D)(2), and (D)(3) as applicable.
[406.3(D)(1) and 406.3(D)(2) unchanged by this Proposal]
(3) Non–Grounding-Type Receptacles. Where attachment to an equipment grounding conductor does not exist in the receptacle enclosure, the installation shall comply with (D)(3)(a), (D)(3)(b), ~~or~~ (D)(3)(c)<u>, or (D)(3)(d)</u>.
(a) A non–grounding-type receptacle(s) shall be permitted to be replaced with another non–grounding-type receptacle(s).
(b) A non–grounding-type receptacle(s) shall be permitted to be replaced with a ground-fault circuit interrupter-type of receptacle(s). These receptacles shall be marked “No Equipment Ground.” An equipment grounding conductor shall not be connected from the ground-fault circuit-interrupter-type receptacle to any outlet supplied from the ground-fault circuit-interrupter receptacle.
(c) A non–grounding-type receptacle(s) shall be permitted to be replaced with a grounding-type receptacle(s) where supplied through a ground-fault circuit interrupter. Grounding-type receptacles supplied through the ground-fault circuit interrupter shall be marked “GFCI Protected” and “No Equipment Ground.” An equipment grounding conductor shall not be connected between the grounding-type receptacles.
<u>(d) A non–grounding-type receptacle(s) shall be permitted to be replaced with a grounding-type receptacle(s) where connections shall be as indicated in 250.130(C).</u>
[remainder of 406.3 unchanged by this Proposal]
Substantiation: Correlation issue and usability of the *Code*. Section 406.3(D)(3) recognizes the requirements of 406.3(D)(3)(a), 406.3(D)(3)(b), and 406.3(D)(3)(c) as ALTERNATIVES for the replacement of existing nongrounding receptacles, but NOT the requirements of Section 250.130(C) as another equally viable ALTERNATIVE. As the 2008 *NEC*® is presently structured, if a nongrounding receptacle is replaced by a grounding receptacle, the requirements of BOTH Section 250.130(C) AND Section 406.3(D)(3)(c) appear to apply to the grounding replacement, rather than EITHER 250.130(C) OR 406.3(D)(3)(c). By contrast, 382.10(A) more correctly recognizes the requirements of Section 250.130(C) as another ALTERNATIVE to the requirements of 406.3(D)(3)(b) and 406.3(D)(3)(c). [The requirements of 406.3(D)(3)(a) are not applicable to Article 382’s CNE wiring method.]
Panel Meeting Action: Reject
Panel Statement: This is already addressed in 406.3(D)(1).

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-24 Log #3467 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(3) (New))

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Add text to read as follows:

Create a new section 406.3(D)(3). Renumber existing 2005 NEC section 406.3(D)(3) to 406.3(D)(4) and so on for all subsequent existing sections.

(3) Tamper-Resistant Receptacles. Listed tamper-resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be tamper-resistant elsewhere in this Code.

Substantiation: Unless otherwise required in 406.3(D), it is presumed that tamper-resistant receptacles are only required to be installed at new receptacle outlet locations in existing occupancies where a receptacle outlet previously was not installed. For existing occupancies with existing receptacles, if it was the intent of the NEC to require the existing non-tamper-resistant receptacles to be replaced with tamper-resistant receptacles, the NEC needs to be properly correlated to reflect that requirement.

Panel Meeting Action: Accept in Principle

406.3(D)(3) to read as follows:

(3) Tamper-Resistant Receptacles. Listed tamper-resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be tamper-resistant elsewhere in the code.

Renumber subsequent sections.

Panel Statement: The submitter mistakenly asked for this change to the 2005 NEC code text.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-25 Log #4539 NEC-P18 **Final Action: Reject**
(406.3(D)(3))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the text of the 2008 NEC to read as follows:

(3) Non–Grounding-Type Receptacles. If ~~Where attachment to~~ an equipment grounding conductor does not exist in the receptacle enclosure, and the manufacturers' installation instructions for utilization equipment or appliances to be supplied from the receptacle do not require the equipment to be connected to an equipment grounding conductor, the installation shall be permitted to comply with (D)(3)(a), or (D)(3)(b)~~, or (D)(3)(c)~~.

(a) A non–grounding-type receptacle(s) shall be permitted to be replaced with another non–grounding-type receptacle(s).

(b) A non–grounding-type receptacle(s) shall be permitted to be replaced with a ground-fault circuit interrupter-type of receptacle(s) of the non-grounding type. These receptacles shall be marked "No Equipment Ground." An equipment grounding conductor shall not be connected from the ground-fault circuit-interrupter-type receptacle to any outlet supplied from the ground-fault circuit-interrupter receptacle.

~~(c) A non–grounding-type receptacle(s) shall be permitted to be replaced with a grounding-type receptacle(s) where supplied through a ground-fault circuit interrupter. Grounding-type receptacles supplied through the ground-fault circuit interrupter shall be marked "GFCI Protected" and "No Equipment Ground." An equipment grounding conductor shall not be connected between the grounding-type receptacles~~.

Substantiation: This section, as written, creates a conflict with 110.3(B) in that many small appliance manufacturers require their equipment be connected to an equipment grounding conductor. Section 110.3(B) requires that equipment be installed and used in compliance with instructions included in the listing. Installing a receptacle without an equipment grounding conductor connection violates that section and manufacturer's instructions. In addition, this section is in conflict with 250.4(A)(5) as a low-impedance ground-fault return path is not being provided. Section 250.114 requires many cord-and-plug appliances to have an equipment grounding conductor connected. The existing language in 406.3(D)(3) violates those rules.

In addition, the present language in 406.3(D)(3)(c) creates a possibly hazardous condition as the user of the grounding type receptacle has a reasonable expectation that an equipment grounding path is provided when a grounding type receptacle is installed. In essence, the practice of installing a grounding type GFCI without an equipment grounding conductor connected creates a "trap" of sorts. Since a ground-fault return path is not provided, a ground-fault in an appliance will simply energize the metal frame of the appliance waiting for the unsuspecting user (often a homeowner) to complete the fault return path by contacting the faulted appliance and a grounded appliance or ground-fault return path. The owner provides the test path for the GFCI device! This hardly seems appropriate!

If that isn't bad enough, recent published data from UL indicates nearly 10 percent of the existing GFCI devices tested as a part of the Aging Wiring Study would not operate properly. IAEI published an article several years ago that showed a significant number of GFCI devices tested by home inspectors would not function properly. Hardly the sort of reports needed to instill confidence in the technology!

The proposal suggests a non-grounding type GFCI could be used for replacement purposes but not serve in place of an equipment grounding conductor. An non-grounding GFCI would provide GFCI protection but without the indication of a grounding path being provided when in fact the grounding terminal is not connected at all.

These receptacles often supply electronic equipment that relies on the connection to the equipment grounding conductor for safety. These receptacles are often referred to as having a "phantom ground." The NEC should not allow this unsafe practice and should remove the conflict with other sections.

Present Section 250.130 provides a practical means of installing an equipment grounding conductor if one does not exist at the receptacle outlet. Granted, this may not be as convenient as installing a GFCI device but should provide a safe installation.

Panel Meeting Action: Reject
Panel Statement: There is no GFCI receptacle of the non-grounding configuration. Reference to aging wiring statistics of GFCIs not operating properly is being taken out of context. The non-operating GFCI statistics includes miswiring and other incorrect installation details.

The requirement of the label stating "No Equipment Ground" is intended to warn the user of the fact that a grounding connection does not exist in the circuit and to take proper precautions.

The proposal introduces a concept that is totally unenforceable. The AHJ would be required to know what equipment may be supplied by a receptacle and the manufacturer's installation instructions for the equipment.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-26 Log #599 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(4))

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Add new text as follows:

(4) Tamper Resistant Receptacles. Where replacements are made at receptacle outlets located in dwelling units, Tamper Resistant Receptacles shall be provided as required by 406.11.

Substantiation: The statistics used for the 2008 NEC requirement of 406.11 came from existing dwellings by majority. The cost difference between a standard residential receptacle and a Tamper Resistant Receptacle is minimal, less than one dollar. This requirement will reduce the risk of children being injured in existing dwellings.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-24.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-27 Log #1547 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(4))

Submitter: Richard Hollander, City of Tucson
Recommendation: Add new text as follows:

(4) Tamper Resistant Receptacles. Where replacements are made at receptacle outlets located in dwelling units, tamper resistant receptacles shall be provided as required by 406.11.

Substantiation: The statistics used for the 2008 NEC requirement of 406.11 came from existing dwellings by majority. The cost difference between a standard residential receptacle and a tamper resistant receptacle is minimal, less than one dollar. This requirement will reduce the risk of children being injured in existing dwellings.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-24.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-28 Log #2430 NEC-P18 **Final Action: Reject**
(406.3(D)(4))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
406.3(D)(4) Overheated receptacles. Receptacles that are being replaced due to overheating, burnt or glowing connections shall be replaced with a power safe protector receptacle with thermal protection.
Substantiation: Fires start as faulty appliances are not detected. Additional fires start when loose receptacle supply connections overheat and ignite nearby flammable material. These fires represent a leading cause of electrical fires in homes.
PSP receptacles monitor the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults. This recognition takes place before any melting, or other damage to the receptacle and surroundings can occur. A PSP receptacle calls immediate attention to any such problems by blinking a red warning lamp and sounding an alarm.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-11.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-29 Log #3148 NEC-P18 **Final Action: Reject**
(406.3(D)(4) (New))

Submitter: Steven R. Montgomery, 2D2C Inc.
Recommendation: Add new text to read as follows:
Electrical-Fault Circuit-Interrupter.
Electrical Fault Circuit Interrupter protected receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in this *Code*.
Substantiation: Resistive heating and arcing faults ignite most of the major residential electrical fires. Resistive heating faults ignite 59% of the fires, in spite of branch circuit over-current protection (see "Electrical Ignition Causes of Fires in Ontario 2002-2007," Electrical Safety Authority (ESA) report, 2008). The latest code enhancements, including Arc Fault Circuit Interrupters (per UL Std. 1699), are not designed to protect against resistive heating from current flowing through poor branch circuit connections (high resistance points), overloaded appliances and open neutral conditions. New homes may have aged and potentially faulty appliances, extension cords and lighting fixtures brought in by homeowners. The 2006 NFPA report titled "Selected Residential Electrical Fires" indicates these faults have resulted in numerous fire fatalities.
Electrical Fault Circuit Interrupter (EFCI) technology is designed to provide primary protection against resistive heating ignition mechanisms including high resistance points in branch circuit wiring (cause of 23% of residential electrical fires, per the attached ESA 2008 report), appliance overloads (cause of 17% of the electrical fires), and open neutral conditions (cause of 2% of the electrical fires). EFCI also provides supplementary protection against overloaded circuits (cause of 7% of the electrical fires) and insulation damage that leads to arc tracking (cause of 7% of the electrical fires). A large portion of residential electrical ignitions are caused by resistive heating that cannot be protected by branch circuit overcurrent devices but can be protected by EFCI.
EFCI protection must be located at the junction between the load and branch circuit wiring to detect these faults and cannot be located at the panelboard. EFCI technology is a superior approach compared all relevant alternatives. (see "Alternatives to Electrical Fault Circuit Interrupter (EFCI) Technology", Wayne Hartill, 2D2C Inc., 2008.)
The complete protection of EFCI technology has been previously referred to as the combination of Overload Fault Circuit Interrupter (OFCI) and Power Fault Circuit Interrupter (PFCI) technologies. For simplicity, OFCI and PFCI technologies have been renamed Electrical Fault Circuit Interrupter (EFCI). Some previous documentation refers to the old nomenclature.
Two Fact Finding Reports from independent NRTL's substantiate the performance of EFCI technology. (see "Descriptive Report and Test Results", Todd Hamden, CSA International, Feb 2006 & "Descriptive Report and Test Results", Intertek Testing Services NA Ltd., Jan 2006). A third NRTL Fact Finding Report has been request from Underwriters Laboratories (UL).
Products containing EFCI technology have NRTL certification against UL 498 and UL 498A standards and have been available for sale in the marketplace since 2006. Multiple producers of EFCI technology exist in the marketplace. With a mandate more producers will likely enter the marketplace.
A mandate of EFCI technology is required because the net safety benefit to society is far greater than that of voluntary sales alone.
Please review submitted letters of support from the following fire forensics experts including:
● Vytenis Babrauskas, Ph.D., President of Fire Science and Technology Inc. and author of the "Ignition Handbook".
● John S. Robison, President of Robison Forensic Consulting, previously Alabama State Fire Marshal, and previous President of International Fire Marshals Association.
● Chris W Korinek, P.E., President of Synergy Technologies and author of Chapter 10 of "Kirks Fire Investigation" book.
● Doug Crawford, Deputy Fire Marshal of the Ontario Office of the Fire Marshal.
Note that multiple sister proposals have been submitted as a new 100, 210.50(C), 406.3(D)(4) and 550.13(A)(4).
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The substantiation is insufficient in several respects. The several Fact Finding Reports submitted by CSA and Intertek confirm the performance characteristics of the product. No information or data has been presented to define the specific characteristics of the various hazards claimed to be mitigated by this product. No product standard has been offered against which a product can be evaluated to ensure that it safely mitigates the identified hazards and does so without adverse interaction with other products within the wiring system. Further, while incident data was presented and discussed, it is unclear exactly what incremental increase this product could offer without duplicating protective measures already required by this code. The NEC does not currently prohibit installation of these devices.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-30 Log #3561 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(4) (New))

Submitter: James T. Dollard, Jr., IBEW Local 98
Recommendation: Add a new list item to 406.3(D) as follows:
406.3(D)
(4) Arc-Fault Circuit Interrupters. Arc-Fault circuit-interrupter protected receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in this *Code*.
Substantiation: The NEC presently addresses receptacle replacement in 406.3(D). This proposal seeks to expand the present receptacle replacement requirements to include arc fault protected receptacles where required elsewhere in the NEC. The existing requirement in 406.3(D)(2) requires GFCI protected receptacles where replacements are made at receptacle outlets that are required to be so protected elsewhere in the NEC. There is no practical reason to limit the level of safety provided by AFCI's to new homes only.
The benefits of 210.12 have been well substantiated over the last few NEC cycles, but it is highly unlikely that the fire-reducing provisions of 210.12 will ever result in AFCI protection for existing dwelling units unless branch-circuit circuit breakers are replaced or the service is upgraded. There is no practical reason to limit the level of safety provided by an AFCI to new homes only. This proposal will provide that extra protection for older homes by requiring the gradual replacement, over time, of non-AFCI-protected receptacles with new AFCI-protected ones.
Panel Meeting Action: Accept in Principle
Add a new (4) to 406.3(D) as follows:
406.3(D)
(4) Arc-Fault Circuit-Interrupters. Listed combination arc-fault circuit-interrupter receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in this code.
Exception: Unless the receptacle is protected by an upstream AFCI.
Panel Statement: CMP-18 edited the proposed text for clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:
LOWRANCE, JR., A.: The panel in accepting this proposal has not taken into account the magnitude of this new requirement. In requiring the replacement receptacle, in areas required to be Arc Fault Circuit Interrupter protected, to be an AFCI receptacle type the panel is, in a large amount of the cases, requiring the circuit to be completely rewired. Many older houses have circuits with shared neutrals, multi wire branch circuits, loose connections, and degraded insulation. In all of these cases the wiring would have to be replaced for the AFCI receptacle to function. Additionally the homeowner would be tempted to do the replacement his or her self thus bypassing the electrical installation professional who is acquainted with the hazards inherent in such installations.
Enforceability is an additional issue in this change as again the homeowner would be tempted to do the work his or her self without taking advantage of the benefits that an inspection can provide.
We need more experience to be obtained regarding the installation of combination type AFCIs in new dwellings before requiring the installation of AFCIs in wide variety of existing dwellings that will have numerous different wiring configurations."
TODD, S.: The replacement of the receptacle on a circuit with the Combo AFCI receptacle will only protect the circuit down stream from the AFCI from parallel and series arcs and upstream from series arcs. The Submitter's substantiation is to make a requirement similar to the receptacle replacement where GFCI receptacles are required elsewhere in the code. The justification did not include any documented problems in the field of a safety concern. Many receptacles are replaced by homeowners who may or may not replace the receptacle with and AFCI type receptacle. This proposed requirement is

unenforceable. The committee discussed the operational issues of combining the AFCI technology with old construction. In addition, if the circuit is protected by an AFCI type circuit breaker then a standard receptacle is acceptable.

Comment on Affirmative:

COSTELLO, P.: The new requirement will now provide AFCI protection to those receptacles in older homes where it would be required today. This is a proactive approach to providing extra protection to a homes aging wiring system.

WELLS, J.: I am voting affirmatively because I believe the submitter has appropriately endeavored to address the problem of electrical fires in existing dwellings. Data indicates that a very significant portion of electrical fires, in fact, occur is such older homes.

During the comment period, I encourage the submitter and others to address what I consider flaws in the wording as Accepted in the panel action. First, the wording should allow AFCIs of either the circuit breaker or outlet branch circuit type to be used in a non discriminatory way for compliance. Second, I am not certain that replacement of an individual receptacle should serve as the trigger for requiring AFCI protection in existing buildings. Alternative triggers should be considered and proposed during the comment period.

18-31 Log #3857 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(4))

Submitter: Bill McGovern, City of Plano

Recommendation: Add new text as follows:

<u>(4) Tamper-Resistant Receptacles. Tamper-resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in the *Code.*</u>

Substantiation: Substantiation brought forth by CPSC (ROP 18-40) for the 2008 NEC revealed the high number of injuries to small children from inserting metal objects into receptacle outlets. Many first time home buyers are younger individuals moving into existing dwellings that have or will have young children in the future. As a minimum existing dwelling being either bought or sold usually receive a fresh coat of paint, along with new device outlets and luminaires. Requiring tamper-resistant outlets at the time of replacement will insure child safety for many more years to come.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-24.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-32 Log #4715 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(4) (New))

Submitter: Robert P. McGann, City of Cambridge

Recommendation: (D)(4) to be added and referenced in first paragraph:

<u>(D)(4) Receptacles in dwelling units must be tamper resistant as referenced in 406.11.</u>

Substantiation: It is obvious that this is the next logical safety step in the expansion of tamper resistant receptacle requirements. This is in light of the documentation that brought 406.11 into the Code.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-24.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-33 Log #3847 NEC-P18 **Final Action: Accept**
(406.3(D)(5))

Submitter: Bill McGovern, City of Plano

Recommendation: Add new text as follows:

<u>(4) Weather-Resistant Receptacles. Weather-resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in the *Code*.</u>

Substantiation: Without the requirement for weather-resistant receptacles to be installed at the time of replacement, ordinary receptacles will be installed and subjected to the same failures as the receptacles they were replacing in the first place.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-34 Log #4912 NEC-P18 **Final Action: Accept in Principle**
(406.3(D)(5))

Submitter: James T. Dollard, Jr., IBEW Local 98

Recommendation: Add a new list item to 406.3(D) as follows:

406.3(D)

<u>**(5) Tamper Resistant.** Tamper resistant receptacles shall be provided where replacements are made at receptacle outlets that are required to be so protected elsewhere in this *Code.*</u>

Substantiation: The NEC presently addresses receptacle replacement in 406.3(D). This proposal seeks to expand the present receptacle replacement requirements to include tamper resistant receptacles where required elsewhere in the NEC. The existing requirement in 406.3(D)(2) requires GFCI protected receptacles where replacements are made at receptacle outlets that are required to be so protected elsewhere in the NEC. There is no practical reason to limit the level of safety provided by tamper resistant receptacles to new homes only.

The inclusion of 406.11 in the 2008 NEC was well substantiated.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-24.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-35 Log #3889 NEC-P18 **Final Action: Reject**
(406.3(G))

Submitter: Ted “Smitty” Smith, Electrical Experts Consulting

Recommendation: Add new text as follows:

<u>Safeguarding of Termination Screws. Receptacles shall be installed in a manner that protects the termination screws, break of tabs, or other leads that are welded to the receptacle from accidental contact with persons and tools after installation.</u>

Substantiation: This was proposal 18-17 Log #2779 for the 2008 NEC and the panel rejected the proposal based primarily on three factors. 1. There was not listed device that could accomplish this, 2. Break off tabs and other areas of exposure were not addressed and 3. There was some fear that this cold encourage persons to work on devices while energized. A listed device is now available. Shockguard. I have addressed the break off tabs and other termination points. The intent of this change was not encourage persons to work on devices while energized. Circuits should be de-energized prior to working on them. This proposal is intended to address the situations when non-qualified personnel removed device covers to paint for example. This is often done even though it should not be done. When we know that something is done regularly and this action creates a safety hazard should we make corrections to the installation practices to minimize this hazard. The CMP originally believed that it should not be left up to the AHJ to determine what was suitable. I believe that is is within in the responsibility of the AHJ to make just those types of judgment calls when enforcing the NEC.

Panel Meeting Action: Reject

Panel Statement: There is nothing in the code that would prohibit the use of this product.

The product should not be required since it validates improper installation (i.e., cover plate removed) and endorses an unsafe practice of working on a receptacle when energized. Additionally, Article 590, temporary installations during construction, remodeling, maintenance, repair, or similar activates requires GFCI for personnel protection. This product should not be used as a substitute for GFCI protection.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-36 Log #3897 NEC-P18 **Final Action: Reject**
(406.4(B))

Submitter: Ronald Standley, E Light Electric Services

Recommendation: Add new text as follows:

<u>Exception No. 1: Where metal cover plates are installed, receptacles shall be mounted such that the ground pin opening is above the hot and neutral openings.</u>

Substantiation: If multiple failing conditions are encountered (i.e., plug not fully inserted, metal cover loosens, etc.) it is possible that the metal cover could contact the hot conductor creating a short circuit and a fire hazard.

Panel Meeting Action: Reject

Panel Statement: This proposal is not substantiated with incident data indicating burn or electrocution exposure or the circumstances surrounding such incidents.

Additionally, the proposal only addresses receptacles installed in a vertical plane. How does one insure in a receptacle mounted on a horizontal surface that the ground pin opening is above the hot and neutral openings?

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-37 Log #556 NEC-P18 **Final Action: Reject**
(406.4(E))

Submitter: Joe Riley, City of Arlington
Recommendation: Revise text as follows:
(E) Receptacles in Countertops and Similar Work Surfaces ~~in Dwelling Units~~ **or Floor Surfaces.** Receptacles shall not be installed in a face-up position in countertops ~~or~~ and similar work surfaces~~.~~ or floor surfaces.
Exception: Receptacles mounted in or on floor surfaces that are designed and listed as an assembly for the purpose.
Substantiation: The change helps to clarify the requirements for receptacle installations in or on floor surfaces in a face-up position. Obvious hazards are present when loose debris can fall into open blades of a receptacle and which can create a short circuit from use regardless of whether the receptacle is in a dwelling or other than dwelling countertop or floor surface.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide sufficient technical substantiation to support expanding this requirement to other than dwelling units and does not provide technical substantiation to support the recommendation as is required by 4-3.3(d) of the NFPA Regulations Governing Committee Projects.
CMP-18 also refers the submitter to 314.27(C).
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-38 Log #2230 NEC-P18 **Final Action: Reject**
(406.4(E))

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Revise text to read as follows:
Receptacles shall not be installed in face up position in countertops or similar work surfaces or under cabinets.
Substantiation: Receptacles installed face up under a kitchen sink cabinet, for a disposal or instant hot, have the potential of cleaners or other chemicals normally stored under a sink leaking or being spilled into a receptacle that could be a potential fire hazard.
Panel Meeting Action: Reject
Panel Statement: No data or incident evidence was provided to substantiate the need for this proposal.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-39 Log #2387 NEC-P18 **Final Action: Reject**
(406.4(E))

Submitter: Jamie McNamara, Hastings, MN
Recommendation: I put a strike through deleted text.
406.4(E) Receptacles in Countertops and Similar Work Surfaces ~~in Dwelling Units~~.
Substantiation: This requirement should not be limited to dwellings.
Panel Meeting Action: Reject
Panel Statement: No data or incident evidence was provided to substantiate the need for this proposal.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-40 Log #305 NEC-P18 **Final Action: Reject**
(406.4(F) (New))

Submitter: Eldon E. Jewson, Stantec Consulting
Recommendation: Add new Section 406.4(F) and move existing (F) to (G), move (G) to new Section (H).
406.4(F) Receptacles. Receptacles shall not be concealed above a dropped or suspended ceiling.
Substantiation: See National Electrical Code Section 400.8(5).
If flexible cords cannot be installed above a dropped or suspended ceiling, it then follows that receptacles should not be permitted above a dropped or suspended ceiling as well. Receptacles are specified on plans to be mounted above dropped t-bar or suspended ceilings on countless plans submitted to the AHJ for approval. This practice violates 400.8(5).
Panel Meeting Action: Reject
Panel Statement: The receptacle located above a dropped or suspended ceiling serves as a convenience outlet for a repairman to plug in tools while working in the drop or suspected ceiling. Extension cords are not a permanent wiring method.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-41 Log #1166 NEC-P18 **Final Action: Accept**
(406.5)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add a second paragraph as follows:
Receptacle faceplates mounted inside a box having a recess-mounted receptacle, shall effectively close the opening and seat against the mounting surface.
Substantiation: Boxes are provided with recess-access to receptacles mounted therein. The faceplates/cover plates for these receptacles necessarily must fit the inside dimensions of the box. A small tolerance is required, maximum 1/32 inch, to facilitate installation of the cover plate. The recessed design and the very small opening provide the necessary degree of safety against access to live parts. The term “effectively closed” is used in 110.12(A) to express the intent of the requirement, but to recognize the need for some tolerance in application of the requirement. The language in the existing text in 406.5 is absolute and does not afford listing standards any tolerance in applying the requirement. I don’t believe that the present text envisioned recess-mounted receptacles.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-42 Log #1895 NEC-P18 **Final Action: Reject**
(406.6(A), (B), and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A), delete “and cord connectors”.
Revise texts: (B): Attachment plugs shall be installed so that their prongs, blades, or pins are not energized unless inserted into an energized receptacle, cord connector, or flanged surface outlet. (remainder unchanged).
(D) A flanged surface inlet shall be installed such that the prongs, blades or pins are not energized unless inserted into an energized cord connector. ~~Is inserted into it.~~
Substantiation: In (A), cord connectors do not have exposed prongs, blades, or pins.
In (B), attachment plugs may be used with cord connectors and flanged surface outlets.
In (D), it is more accurate to indicate the prongs, blades, or pins are inserted into the cord connector.
Panel Meeting Action: Reject
Panel Statement: The substantiation of (A) is correct but misses the intent of prohibiting any exposed current carrying part other than the prongs, blades, or pins. Surely the submitter is not advocating having energized contacts or terminals of connectors exposed.
For the the substantiation of (B), see panel action and statement on Proposal 18-3.
Regarding (D), flanged surface inlets are affixed and are unable to physically move. An energized cord connector can be moved and inserted into a flanged surface inlet.
Additionally, the proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-43 Log #1408 NEC-P18 **Final Action: Reject**
(406.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Receptacles, cord connectors and ~~attachment plugs~~ flanged surface outlets shall be so constructed that they ~~receptacles or cord connectors do not accept~~ are not compatible with an attachment plug with a ~~different~~ higher voltage or current rating from that for which the ~~device is~~ they are rated.
Delete the last sentence.
Substantiation: Flanged surface outlets should be included. The word “different” should be changed to “higher” and makes the penultimate sentence superfluous. The last sentence is superfluous, as nongrounding type receptacles inherently do not accept grounding type attachment plugs with a fixed grounding member.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-44 Log #2688 NEC-P18 **Final Action: Reject**
(406.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

Receptacles, cord connectors ~~and~~ attachment plugs, <u>and flanged surface devices</u> shall be constructed such that <u>these devices</u> ~~receptacles or cord connectors~~ will not accept <u>other such devices</u> ~~an attachment plug~~ with a <u>higher</u> ~~different~~ voltage or current rating from that for which the device is <u>rated</u> ~~intended~~. ~~However a T slot receptacle or cord connector shall be permitted to accept a 15-ampere attachment plug of the same voltage rating.~~ Non-grounding type receptacles, <u>cord connectors, and flanged surface outlets</u> shall not accept grounding type attachment plugs.

<u>*Exception: Non-grounding type receptacles, cord connectors, and flanged surface outlets shall be permitted to accept a grounding type attachment plug with a movable self-restoring grounding pole on circuits operating at 150 volts, or less.*</u>

Substantiation: Flanged surface devices should be included. "Different" should be changed to "higher" since plugs and receptacles may be used on circuits of lower rating than the devices and there is no hazard. Proposed exception correlates with 406.9 and makes the reference to a T-slot receptacle unnecessary.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-45 Log #2068 NEC-P18 **Final Action: Reject**
(406.8)

Submitter: Robert D. Osborne, Underwriters Laboratories Inc.
Recommendation: 406.8 Receptacles in Damp or Wet Locations.

(A) Damp Locations. A receptacle installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure for the receptacle that is weatherproof when the receptacle is covered (attachment plug cap not inserted and receptacle covers closed).

An installation suitable for wet locations shall also be considered suitable for damp locations.

A receptacle shall be considered to be in a location protected from the weather where located under roofed open porches, canopies, marquees, and the like, and will not be subjected to a beating rain or water runoff. All 15- and 20-ampere, 125- and 250-volt nonlocking receptacles shall be a listed weather-resistant type <u>unless they are part of a listed assembly that has an environmental rating suitable for outdoor applications</u>.

FPN: The types of receptacles covered by this requirement are identified as 5-15, 5-20, 6-15, and 6-20 in ANSI/NEMA WD 6-2002, National Electrical Manufacturers Association Standard for Dimensions of Attachment Plugs and Receptacles.

(B) Wet Locations.
(1) 15- and 20-Ampere Receptacles in a Wet Location. 15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug cap is inserted. All 15- and 20-ampere, 125- and 250-volt nonlocking receptacles shall be listed weather-resistant type <u>unless they are part of a listed assembly that has an environmental rating suitable for outdoor applications</u>.

FPN: The types of receptacles covered by this requirement are identified as 5-15, 5-20, 6-15, and 6-20 in ANSI/NEMA WD 6-2002, National Electrical Manufacturers Association Standard for Dimensions of Attachment Plugs and Receptacles.

Exception: 15- and 20-ampere, 125- through 250-volt receptacles installed in a wet location and subject to routine high-pressure spray washing shall be permitted to have an enclosure that is weatherproof when the attachment plug is removed.

Substantiation: Current wording of Section 406.8 is appropriate for installation of receptacles in damp or wet locations that are not part of listed assemblies. Listed products with integral receptacles, such as power outlets, have an overall assembly environmental rating that is based off product Standard requirements intended to protect receptacles from the environmental conditions. Reliance on the listed product Standard is appropriate to verify acceptability for such use.
Panel Meeting Action: Reject
Panel Statement: Even as part of a listed assembly the receptacles must be listed and identified weather resistant type if used in a damp or wet location. The inclusion here makes the standard for the products include this requirement.

The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:

HEWITT, L.: Discussions at the panel meeting indicated a concern with what constituted a "listed assembly", since a factory assembly of an outlet box, receptacle, and cover plate could be considered a "listed assembly", and considered suitable without weather-resistant type receptacles. The submitter identifies listed products such as power outlets. Applying the weather resistant requirement to receptacles to power outlets or similar types of devices may not be supported by the original substantiation, and could form the basis for a modified proposal and additional substantiation during the comment period. The submitter should consider revised wording and additional substantiation to be submitted during the comment period.

18-46 Log #2885 NEC-P18 **Final Action: Reject**
(406.8)

Submitter: James Steven Bryan, Bryan Electrical Inspector PC
Recommendation: Revise text to read as follows:

Exception 15- and 20-ampere, 125- through 250-volt receptacles installed in a wet location and subject to routine high pressure spray washing shall be permitted to have an enclosure that is weatherproof when the attachment plug is removed, disconnected, and closed <u>prior to washing</u>.

Substantiation: The exception gives permission to routine spray wash with equipment plugged in and the enclosure is weatherpoof only when the attachment plug is removed. The revised exception requires the equipment to be disconnected before spray wash.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The exception does not deal with the act of spray washing. It only specifies what type of enclosure is permitted to be installed in a location where spray washing routinely takes place.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-47 Log #4718 NEC-P18 **Final Action: Reject**
(406.8(A))

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Revise text as follows:

All 15 and 20 ampere, 125 and 250 volt ~~non-locking~~ receptacles shall be listed weather resistant

Substantiation: These receptacles are susceptable to the same corrosive atmospheres.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-48 Log #4858 NEC-P18 **Final Action: Reject**
(406.8(A) and (B))

Submitter: John Steinke, Amish Electric
Recommendation: Delete this sentence from both sections:

"All 15- and 20-ampere 125- and 250-volt, nonlocking receptacles shall be a listed weather-resistant type."

Substantiation: These requirements either address an issue already addressed by the NEC, or are better served in other forums.

Section 110.11 of the NEC already requires requires that all equipment be suitable for the environment. Testing agencies already have sundry tests and requirements for equipment to be used in wet locations. Unlike 406.8, this section applies to ALL equipment, not just a few types of receptacles.

406.8 (A), by including the 'weather resistant' language, has the effect of requiring damp locations to be treated as though they were wet locations. This reverses decades of treating damp locations as though they were dry locations.

Nor does the language address other devices and enclosures in these damp, or wet, locations.

If we are already required to use 'wet location' receptacles in wet locations, and the materials are not standing up, then we need to address the testing of equipment for wet locations. Manufactures' standards, or testing agency protocols, are where this issue ought to be addressed - not in the NEC.

If improper equipment is being installed in wet locations, than we are not enforcing an existing requirement.
Panel Meeting Action: Reject
Panel Statement: These sections of the NEC provide the basis for new requirements in the product standard for more robust resistance to corrosion for receptacles intended for use in these locations.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-49 Log #4722 NEC-P18 **Final Action: Reject**
(406.8(A) and 406.8(B)(1))

Submitter: Matthew A. Piantedosi, B.A. Piantedosi, Jr., Master Electrician
Recommendation: Revise to read as follows: All 15- and 20-ampere, 125- and 250-volt nonlocking receptacles shall be a listed weather-resistant type.
Substantiation: The UL standard for weather-resistant GFCI receptacles does not recognize the damage of the internal circuit board due to humidity and condensation. I am proposing that the standard be revised to include circuit board protection against condensation. This type of protection is currently being used in ECM motors.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided a proposed change.
The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-50 Log #3616 NEC-P18 **Final Action: Reject**
(406.8(B))

Submitter: Jeffrey A. Duehlmeyer, City of Des Moines
Recommendation: Add new text to read as follows:
All enclosures that are weatherproof whether or not the attachment plug cap is inserted shall be metal hinged.
Substantiation: I'm an electrical inspector for the City of Des Moines. A common product problem we encounter is the weatherproof enclosures we require for receptacles located in wet locations are either broken or partially missing leaving the receptacle exposed to the weather. This only occurs when plastic covers are being used. Metal covers have never been a problem.
Panel Meeting Action: Reject
Panel Statement: CMP-18 recommends that the problem stated should be addressed in the product standard, not the installation standard.
Also, see the panel action and statement on Proposal 18-54 as well as the substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-51 Log #4717 NEC-P18 **Final Action: Reject**
(406.8(B))

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Revise text as follows:
All 15 and 20 ampere, 125 and 250 volt ~~nonlocking~~ receptacles shall be listed weather-resistant.
Substantiation: These receptacles are susceptible to the same corrosive atmospheres.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-52 Log #1198 NEC-P18 **Final Action: Reject**
(406.8(B)(3) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add (3) as follows:
(3) Cord Connectors. A cord connector or flanged surface device shall be identified for the use.
Substantiation: These devices in wet locations should be identified for the use.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-53 Log #1298 NEC-P18 **Final Action: Reject**
(406.8(B)(3) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add (3):
<u>Cord connectors and flanged surface devices installed in a wet location shall be identified for the use.</u>
Substantiation: Edit. Reliance should not be solely on 110.2, 110.3, and 110.11.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
The proposed revision is not considered editorial.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-54 Log #3732 NEC-P18 **Final Action: Accept in Principle**
(406.8(B)(1))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 406.8(B)(1) as follows:
(1) 15- 20-Ampere Receptacles in a Wet Location.
15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug is inserted. <u>For other than one or two family dwellings,</u> <u>an outlet box hood when installed for this purpose shall be listed and where installed on an enclosure supported from grade as described in Section 314.23(B) or as described in Section 314.23(F), shall be identified as "extra-duty".</u> All 15- and 20-ampere, 125- and 250-volt non-locking receptacles shall be listed weather-resistant type.
<u>FPN: Requirements for extra-duty outlet box hoods are found in ANSI/UL 514D, *Cover Plates for Flush-Mounted Wiring Devices*.</u>
Substantiation: The purpose of this proposal is to require outlet box hoods that are part of a weatherproof enclosure to have "extra duty" durability when the enclosure is mounted on an independent free standing post, stanchion, pillar, conduit, metal, polymeric, wood brace, or other rigid support.
The durability of presently listed outlet box hoods provided for compliance with the requirements in Section 406.8(B)(1) has been called into question by an increasing number of inspection authorities. NEMA manufacturers of these outlet box hoods have proposed more rigorous performance requirements in UL 514D to improve the general durability of all listed hoods. However, the inspection authorities that have been consulted during NEMA's investigation have indicated that outlet box hoods in particular installations are more susceptible to damage. Among these are temporary installations in wet locations such as construction jobsites. With enclosures supported from grade as described in Section 314.23 (B) and enclosures with enclosed devices supported as described in Section 314.23 (F). 15 and 20 ampere, 125 and 250 volt receptacles installed in such "free standing" enclosures in a wet location are presently required to comply with the requirements in Section 406.5 (B) but are often subject to greater physical abuse.
This proposal, and the companion proposal in Section 590.4(D) recognize that more durable products already exist that will help ensure that the degree of protection for receptacles envisioned by the requirement in 406.8(B) will be retained in these harsher use environments. Requirements for listed "extra-duty" outlet box hoods are under development in UL 514D.
Panel Meeting Action: Accept in Principle
Revise 406.8(B)(1) as follows:
(1) 15- 20-Ampere Receptacles in a Wet Location.
15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug is inserted. <u>For other than one- or two-family dwellings,</u> <u>an outlet box hood when installed for this purpose shall be listed and where installed on an enclosure supported from grade as described in 314.23(B) or as described in 314.23(F) shall be identified as "extra-duty".</u> All 15- and 20-ampere, 125- and 250-volt non-locking receptacles shall be listed weather-resistant type.
<u>FPN: Requirements for extra-duty outlet box hoods are found in ANSI/UL 514D, *Cover Plates for Flush-Mounted Wiring Devices*.</u>
Retain existing FPN and Exception.
Panel Statement: CMP-18 agrees with the submitter's text and clarifies that the existing FPN and exception are to be retained.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-55 Log #176 NEC-P18 **Final Action: Reject**
(406.8(B)(2)(a))

Submitter: Tommy Young, Commonwealth of Kentucky
Recommendation: Add:
For commercial and industrial shall use aluminum die-cast in use cover.
Substantiation: Due to heavy usage.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-56 Log #1299 NEC-P18 **Final Action: Reject**
(406.8(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Receptacles, cord connectors, and flanged surface devices shall not be within or directly over a bathtub, hot tub, spa, or shower stall.
Substantiation: Edit. Cord connectors and flanged surface devices should be included; "tub" should include hot tubs and spas, not just bathtubs.
Panel Meeting Action: Reject
Panel Statement: The proposed revision is not considered editorial; cord connectors and flanged devices are not part of the installed premise wiring. Rules concerning receptacles with respect to hot tubs and spas are covered by other articles in this code.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-57 Log #2254 NEC-P18 **Final Action: Reject**
(406.8(C))

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector
Recommendation: Add new and delete text to read as follows:
(C) Bathtub and Shower ~~Space~~ Areas. No receptacles shall be located within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. This zone is all encompassing and includes the space directly over the tub or shower stall.
Substantiation: The intention for this new text is to clarify the hazard that a receptacle could bring to these areas. 410.10(D) does not allow the use of certain types of luminaries and paddle fans near these areas. By extending the requirement to receptacles, the AHJ would ease the interpretation regarding "bathtub and shower area" instead of "bathtub and shower space". I have provided pictures of certain examples that I have encountered in the field.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: All bathroom receptacles are required to be grounded and protected by a GFCI. This is the primary protection from shock hazards. Were the proposed text to be accepted, a number of bathrooms would not be able to have any receptacles installed because even those adjacent to the sink would be within 3 feet of the tub.
This would create a conflict with 210.52(D) and would lead to the use of extension cords from adjacent rooms where GFCI protection is not present and result in a greater hazard.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-58 Log #1894 NEC-P18 **Final Action: Reject**
(406.9(A), (B), and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise texts: (A) Grounding type receptacles, cord connectors, ~~and~~ attachment plugs, adapters, and, flanged surface devices shall be provided with...(remainder unchanged).
(B) Grounding type receptacles, cord connectors, ~~connections and~~ attachment plugs, and flanged surface devices shall have a mean...(remainder unchanged).
Revise (D): Grounding type attachment plugs, and flanged surface inlets ~~and cord connectors and receptacles~~ shall be designed such that the grounding connection is made before the current-carrying connections. Grounding type devices shall be so designed that grounding poles of attachment plugs and flanged surface inlets cannot be brought into contact with current-carrying parts of receptacles or cord connectors.
Substantiation: Flanged surface devices should be included. The design of the grounding pole or plugs and surface inlets determines that the grounding connection is made first, not the design of the receptacle, cord connector, or flanged surface outlet.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-59 Log #236 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Sprague Owings, Nassau County, FL
Recommendation: Add new text to read:
406.11 Daycare and Kindergarten Receptacles. Receptacles located within the rooms, bathrooms, playrooms, activity rooms and play yards of daycare centers and kindergarten classrooms shall be listed tamper resistant or shall employ a listed tamper resistant cover.
Substantiation: This is already required in pediatric locations in health care facilities and will be required in residences as of 2008.
Panel Meeting Action: Reject
Panel Statement: The proposal as written would eliminate the requirement for tamper-resistant receptacles in Dwelling units. No substantiation was provided to support this proposal.
The proposal would also introduce listed tamper-resistant covers. CMP-18 is not aware of such a product. See panel action and statement on Proposal 18-90 for daycare facilities.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-60 Log #554 NEC-P18 **Final Action: Accept in Principle in Part**
(406.11)

Submitter: Joe Riley, City of Arlington
Recommendation: Add new text as follows:
406.11 Tamper-Resistant Receptacles ~~in Dwelling Units~~
(A) Dwelling Units. In all areas specified in 210.52, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper resistant receptacles.
(B) Other Than Dwelling Units. In all public areas where children are predominately present, such as daycares, classrooms, churches, restaurants, restrooms, bathrooms, playrooms, activity rooms, playgrounds, swimming pools, and as described in 517.18 (C), all 125-volt, 15- and 20-ampere receptacles shall be listed tamper resistant receptacles.
Substantiation: Extending the areas required for the installation of tamper resistant receptacles to other than dwelling units where children are predominately present will prevent electrical shock hazards and help to safeguard children.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: CMP-18 accepts the recommendation concerning "daycares." CMP-18 considers daycare to be a subset of childcare facilities. See panel action and substantiation on Proposal 18-90.
CMP-18 rejects the balance of the proposal for lack of definition and substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-61 Log #674 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Revise text to read as follows:
406.11 Tamper-resistant Receptacles in Dwelling Units and Child-Care Facilities. In all areas specified in 210.52, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles in day-care facilities.
Substantiation: Due to the concentration of children in these facilities and the ratio of supervision adults/children, this would provide the same level of protection as is being accomplished in dwelling units.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and substantiation on Proposal 18-90.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-62 Log #727 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
406.11 Tamper-Resistant Receptacles in Dwelling Units.
In all areas specified in 210.52, all 125-volt, 15- and 20-ampere nonlocking receptacles shall be listed tamper-resistant receptacles.
Substantiation: "In all areas specified in 210.52" addresses not only the receptacle outlet REQUIRED to be present but also ANY additional, optional receptacles also located in those same areas. Based on the injury data cited in Proposal 18—40 for the 2008 *NEC*®, the requirement is warranted for any and all 125-volt, 15- and 20-ampere NONLOCKING receptacles. The requirement, however, is not limited to all 125-volt, 15- and 20-ampere NONLOCKING receptacles. In some AREAS specified in 210.52, some of the receptacles are mandated to be of the LOCKING type; these may be rated 125-volt, 15- and 20-ampere. There are no known 125-volt, 15- or 20-ampere LOCKING receptacles Listed as tamper-resistant receptacles.
Permanently installed pools and their associated water-pumps can be located inside or outside of dwellings. 210.52(A) identifies areas such as sunrooms, recreation rooms, etc. 210.52(E) identifies outdoor outlets. 210.52(G) identifies basement and garage areas. 680.22(A)(1)(1) requires that receptacles supplying cord-and-plug-connected water pumps for permanently installed pools be of the LOCKING-type configuration. These LOCKING receptacles are frequently rated 125-volt, 15- or 20-amperes. Often, these pool-pump receptacles are located in the outdoor areas adjacent to dwellings. For some dwellings, these pool-pump receptacles are within the dwelling's interior.
Events such as wedding receptions and fund-raisers held at residences (large ones, outside my pay grade) may fall under Article 525. 525.23(B) requires use of locking receptacles for quick disconnection and reconnection of electrical equipment not required to be provided with GFCI protection for personnel.

This could include electrical equipment rated 125-volt, 15- or 20-amperes.

Proposal 18—40 did not specifically identify that LOCKING receptacles were amongst the injuries in the cited NEISS and CHIRPP reports and it is unlikely these were.

Panel Meeting Action: Accept in Principle

Add text to read as follows:

406.11 Tamper-Resistant Receptacles in Dwelling Units.

In all areas specified in 210.52, all nonlocking type 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.

Panel Statement: CMP-18 clarified that nonlocking applies to both 15- and 20-ampere receptacles and added "type" for clarity.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-63 Log #1734 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: Bryan Walter, Wichita Electrical JATC

Recommendation: Revise text to read as follows:

406.11 Tamper-Resistant Receptacles. ~~in Dwelling Units.~~

<u>(A) In Dwelling Units.</u> In all areas specified in 210.52, all 125-volt, 15 and 20-ampere receptacles shall be listed tamper-resistant receptacles.

<u>(B) Other Than Dwelling Units. In all areas designated for children or similar areas, all 125-volt, 15 and 20-ampere receptacles that are accessible to children shall be listed tamper-resistant receptacles.</u>

<u>FPN: Examples of these areas would be daycare, preschool, indoor play areas or areas designated for children.</u>

Substantiation: This proposal is the work of a task group formed by the 2nd Year Apprenticeship Class 2C of 2008. Kenneth Bascombe, Pedro Diaz, Josh Hershey, Philip King, Dan Mruk, Matt Rader, Austin Snook, Bryson Stanhope, Paul Underwood, Bryan Walter and Darryl Hill. This task group has concluded the following substantiation:

Shock hazards exist at day cares, pre-schools, and similar areas for children, where child to adult ratios can be high. It can only take seconds for children to come in contact and be exposed to a potential shock hazard. If the concern for children exists in a dwelling unit, shouldn't we have the same concern in other areas where children can come in contact with receptacles? We must not forget that 90.1(A) says this code is for the *Practical* safeguarding of persons and property from hazards arising from the use of electricity. We feel as a task group that tamper-resistant receptacles are a very practical way of safeguarding our children regardless of where their location may be, in a dwelling or in a day care/pre-school setting.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and substantiation on Proposal 18-90.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-64 Log #2255 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: Lorenzo Adam, City of Mason/Building-Electrical Inspector

Recommendation: Add text to read as follows:

406.11 Tamper-Resistant Receptacles in Dwelling Units<u>, Educational Occupancies, and Day Cares</u>.

Substantiation: Since the majority of accidents happen with children, therefore extending the protection to educational and day care occupancies (see NFPA 5000, 2006 edition) will enhance the safety of the children. Thus reducing the statistics already set by NEMA. This protection would extend only to the assembly areas of such occupancies (example: classrooms, bathrooms, halls, playrooms, etc.). NEC has already included it for pediatric locations in 517.18(C).

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and substantiation on Proposal 18-90.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-65 Log #2431 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Michael Baxter, Energy Safe Technologies Inc.

Recommendation: Revise text to read as follows:

406.11 ~~Tamper Resistant~~ <u>Power Safe Protector</u> Receptacles in Dwelling Units. In all areas specified in 210.52, all 125 volt, 15- and 20-ampere receptacles shall be listed <u>power safe protector</u> ~~tamper resistant~~ receptacles.

Substantiation: Tamper resistant receptacles can deter the novice toddler; an older child can easily defeat them rending the protection ineffective. The Power Safe Protector (PSP) device uses a new "Power Off" safety paradigm that keeps the electrical power off until it is actually needed. This eliminates the shock and electrocution hazard. In contrast, today's devices leave the power on continuously and respond only after a problem has occurred. The new Power Off paradigm allows several important safety checks to be performed before unsafe fault conditions can cause injury or cause a fire. These include checks for short circuits, line-to-ground faults, neutral-to-ground faults. The power is turned on only when it is safe to do so. When power is no longer needed the PSP receptacle turns the power off. Thus, the default condition is for the receptacle to be unenergized. Additionally, while the PSP receptacle is energized, it monitors for over-temperature conditions that can lead to fires.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 18-11.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-66 Log #2550 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: John Chernock, Hazle Township Bldg. Dept.

Recommendation: Change present 406.11 to 406.11(A) and add a new 406.11(B) Child Day Care Centers.

Substantiation: In the NEC code section 406.11 states that the tamper proof receptacles are required in all dwelling units as specified in 210.52. For many years, they were also required in pediatric wards. See 517.18(C). The use of the tamper proof receptacles should now be required in child day care centers and other buildings where children are placed for long hours where the possibility of coming in contact with a hazardous condition is possible.

The children at day care centers range in age from one (1) year and up. The total number of children at daycare is far greater than in dwellings, and the possibility of the children tampering with the electrical devices is far greater. At times, these centers are understaffed which makes it more likely for some children to be at risk for an accident. Requiring tamper proof receptacles would greatly reduce the risk of shocks, burns and possible fatalities.

Also see section 10.1.17 of the (U.S. General Services, Administration Child Care Center Design Guide) that I have provided. This requires tamper proof receptacles. Reference publication PBS-100 March 2003.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and substantiation on Proposal 18-90.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-67 Log #2573 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Charles Palmieri, Palmieri Assoc.

Recommendation: Add the following sections to existing text requiring the use of tamper resistant receptacles.

406.11 Tamper-Resistant Receptacles in Dwelling Units. In all areas specified in 210.52, <u>and those units described in 210.60 with permanent provisions for cooking,</u> all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.

Substantiation: In 210.60, titled Guest Rooms, Guest Suites, Dormitories, and Similar Occupancies. Sub-part (A) General, requires "for those units provided with permanent provisions for cooking" that they shall have receptacle outlets installed in accordance with all of the applicable rules in 210.52. There are no rules in 210.52 proper requiring tamper resistant receptacles. One must refer to 406.11, and at present that section does not include mandatory language for tamper resistant receptacles in 210.60 occupancies. This panel agreed during the 2008 code process to require tamper resistant receptacles in dwelling units. That new language was adopted to reduce injury or death to children. If the panel deemed a danger of shock or electrocution to children in all dwelling units, then logic should apply that 210.60 occupancies (with permanent provisions for cooking) likewise present a real hazard to children.

Panel Meeting Action: Reject

Panel Statement: Current code already requires tamper-resistant receptacles where such facilities meet the Article 100 definition of dwelling unit, which states where such units provide complete and independent living facilities for one or more person(s), including permanent provisions for living, sleeping, cooking, and sanitation.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-68 Log #2786 NEC-P18 **Final Action: Accept**
(406.11)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise the title of 406.11 as shown:

406.11 Tamper-Resistant ~~in~~ <u>for</u> Dwelling Units.

Substantiation: The title is proposed to be revised to reflect the fact that the actual requirement applies to receptacles that are not only "in" the dwelling unit, but other locations as well (such as outside, etc.).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-69 Log #2954 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Fred W. Brown, HI Electron
Recommendation: Change the wording to read: 406.11 **Tamper-Resistant** <u>**or Electrical-Fault Circuit-Interrupter (EFCI)**</u> **Receptacles in Dwelling Units**. In all areas specified in 210.52, all receptacles on 120-volt, single phase, 15- and 20-ampere branch circuits shall be listed tamper-resistant <u>or Electrical-Fault Circuit-Interrupter (EFCI)</u> receptacles.
Substantiation: U.S. Consumer Product Safety Commission (CPSC) conducted a 10 year study (1991 – 2001) of National Electronic Injury Surveillance Systems (NEISS). The data shows 24,000+ children less than 10 years old were treated in Emergency Rooms for incidents related to electrical receptacles. A similar study done by Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) 8 Year Study (1996-2003) from 14 CHIRPP Hospitals 465 children less than 9 years old were treated in Emergency Rooms for incidents related to electrical receptacles. The National Electrical Code, NFPA 70 2005 & 2008, has added requirements for tamper resistant receptacles in dwellings and Health Care pediatric areas. Electrical-Fault Circuit-Interrupter (EFCI) type receptacles give an additional type of protection to children and persons.

GFCI outlets and breakers are designed and tested to prevent death for most adults from line to ground leakage, but do not protect against death from line to neutral contact. Young adults, older adults, and children have a lower resistance to electrical current affects and are more vulnerable to injury. Tamper Resistance Receptacles are not tamperproof. These receptacles provide a reasonable means of protection against shock but are not child or foolproof.

Protection from line-to-neutral shocks is needed around children, since they do not all recognize the shock hazards and risks. Tamper Resistance outlets use a mechanical insulating shutter system to shield children from accessing live voltages on electrical receptacle sockets. Electrical-Fault Circuit-Interrupter (EFCI) uses a relay to normally disconnect electricity at the receptacle sockets. EFCI only turns electricity on at the socket when it detects the insertion of an electrical plug. The detection mechanism is an RFID tag embedded in a device plug or attached to the face of a device plug that complies with the Right Plug standard. Both Tamper Resistance and EFCI outlets provide a reasonable means of preventing line-to-neutral shocks. If proper receptacle installation is not accomplished then it may lead to more children injuries.

In the 2008 National Electrical Code Arc-Fault Circuit-Interrupter (AFCI) has been expanded to protect most 120 volt, single phase, 15 and 20 ampere branch circuits in dwelling units. AFCI technology senses parallel arcing faults in the range of 70 amperes, series arcing faults in the range of 5 amperes, and de-energize the branch circuit. Electrical-Fault Circuit-Interrupter (EFCI) would greatly improve the protection of persons and property from the use of electricity. This type of protection would help to minimize the risk of fires in dwelling units. Their sensitivity to some electrical fault conditions would be to isolate the dangerous causes of electrical fires.

During the 1999 National Electrical Code cycle there were extensive documentation presented that pointed out that most of the electrical fires that occurred in dwelling units were in wiring and equipment beyond the branch circuit overcurrent protection device. Overcurrent protection devices are to protect conductors and equipment if currents reach a value that will cause an excessive or dangerous temperature in conductors or conductor insulation. This protection is for large currents caused by short circuit, ground faults, or overloads. Article 210.19(A)(4) in the National Electrical Code (NEC) recognizes the use of ‘tap conductors’ connected to branch circuits. Tap conductors have overcurrent protection ahead of its point of supply that exceeds the value permitted for branch circuit conductors that are protected according their calculated load and allowable ampacity. Article 210.19(A)(4) Exception No. 2 allows small than 14 AWG cords where approved for and used with a specific listed appliance or luminaire. Article 310.5 in the NEC requires the minimum size conductor to be 14 AWG copper except as permitted elsewhere in the Code. The article “How Electricity Ignites Fires by John S. Robison” points out that currents far less than the design limits of branch circuit overcurrent protection devices and AFCIs are some of the causes for fires in electrical equipment, wiring, appliance cords, and other cords.

Electrical-Fault Circuit-Interrupter (EFCI) sense a lower level of fault and overload current conditions than branch circuit protection devices and AFCIs. The article “Stop Fires Before They Start by Steve Montgomery” points out that EFCI provide protection against over and under voltage, open neutral conductors, high resistance connections, damage wiring, overloading of small appliance cords, etc. that branch circuit overcurrent protection devices and AFCIs might not protect against. Even with the increased sensitive the EFCI they will not be a cause of nuisance tripping. EFCI detect a potential cause of electrical fires and safely segregate it.

A proposal similar to this was submitted to the State of Wisconsin Electrical Committee during the adoption of the 2008 National Electrical Code and to National Fire Protection Health Care (NFPA 99-82 Log #197 HEA-ELS, 4.3.2.2.6.2(D) **Receptacles for Special Area**) 2010. Both of these committees were supportive of this new technology but felt that this requirements belonged elsewhere. The State of Wisconsin Department of Commerce felt that the EFCI requirement should best be adopted at the National Fire Protection was more appropriate for NFPA 70.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-70 Log #3844 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: Ted “Smitty” Smith, Electrical Experts Consulting
Recommendation: Revise text to read as follows:

Tamper resistant receptacles in Dwelling units. In ~~all areas specified in 210.52,~~ <u>dwelling units,</u> all 125-volt, 15- and 20-ampere receptacles located below 2 m (6-1/2) from the finished floor shall be listed tamper resistant receptacles.
Substantiation: The current wording leads to interpretation and confusion. In all areas specified in 210.52, 210.52 does not really specify areas, it specifies receptacle placement requirements. The current wording could be interpreted that this tamper proof listing is only required on receptacles required by 210.52. In a bedroom for example, I am required to have a receptacle within 6 of any space along the wall. If I put in more receptacles that required, do they need to be tamper resistant? I am not required to put a receptacle in for a garbage disposal which is located under the kitchen sink. Under kitchen sink is not an area specified in 210.52, so it does not need to be tamper resistant I believe the intent of the code was to require tamper resistant receptacles everywhere in the home. Therefore the revised wording will make that clear. The addition of the height requirement to the language will allow receptacles installed in the ceiling for garage door openers and the like to be accepted from this requirement. After all, the intent is to protect small children from accidental shock, a receptacle mounted above 2 meters should be safe from small children.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and substantiation on Proposal 18-71.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-71 Log #3848 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: Bill McGovern, City of Plano
Recommendation: Revise text as follows:

Tamper-Resistant Receptacles in Dwelling Units. In all areas specified in 210.52, all 125-volts, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.

<u>Exception No. 1: Receptacles located more than 1.7 m (5 1/2 ft.) above the floor.</u>

<u>Exception No. 2: A single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance that in normal use is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).</u>
Substantiation: Required spacing of receptacles in 210.52 must be installed at a height below 1.7 m (5 1/2 ft.) to be considered as meeting the requirements for wall spacing. Receptacles installed above 1.7 m (5 1/2 ft.) are not accessible and well out of reach of small children. By allowing the exception for a single receptacle or duplex receptacle located within dedicated space will eliminate the need for tamper-resistant receptacles to be installed behind dishwashers, refrigerators, washing machines and the like.
Panel Meeting Action: Accept in Principle

Revise 406.11 to read as follows:

406.11 Tamper-Resistant Receptacles for Dwelling Units. In all areas specified in 210.52, all nonlocking type 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.

Exception No. 1: Receptacles located more than 1.7 m (5 ½ ft) above the floor.

Exception No. 2: Receptacles that are part of a luminaire or appliance.

Exception No. 3: A single receptacle or a duplex receptacle for two appliances located within dedicated space for each appliance that in normal use is not easily moved from one place to another and that is cord-and-plug connected in accordance with 400.7(A)(6), (A)(7), or (A)(8).
Panel Statement: The text was revised for clarity. The submitter’s No. 2 exception was renumbered as No. 3. CMP-18 added Exception No. 2 for clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-72 Log #4329 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Steven Orlowski, National Association of Home Builders
Recommendation: Delete Section 406.11
~~406.11 Tamper-Resistant Receptacles in Dwelling Units.~~
~~In all areas specified in 210.52, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.~~
Substantiation: During the previous code cycle, there was no scientific research presented which showed that tamper-resistant receptacles are more effective than other listed safety devices that are currently available. Specifically, the listed plastic outlet covers have been proven to be safe and reliable in preventing electrical injury to young children. The fact sheet produced by the National Fire Protection Association, states that tamper resistant receptacles are preferred over plastic safety caps, but lacks scientific data dispute that these listed plastic safety caps provide a practical safeguarding to young children. The committee failed to provide a compelling argument or any substantial justification that these devices be required in all new dwellings, when the fact remains that less than 2% of all existing dwellings are occupied by families with children under the age of 6 (2006 US Consensus data). Furthermore the NEISS report which the committee reviewed to base their decision, did not provide any supporting information that the majority of the reported injuries occurred in a dwelling unit or whether there was a listed safety device was present at the time of the injury.
Panel Meeting Action: Reject
Panel Statement: Contrary to the statement in the substantiation that no scientific research was presented supporting the current requirement, the panel reviewed substantiation of the proposal including a study by the Temple University Biokinetics Research Laboratory documenting the ability of 2 to 4 year old children to remove plastic caps within seconds. The panel further reviewed a Consumer Union Report on plastic out caps indicating the possibility of a choking hazard. Finally, the substantiation of the proposal for this requirement clearly indicated that 71% of the reported incidents (the NEISS data) occurred in the home.

In addition to making a blatantly incorrect and misleading statement concerning this panel's diligence in accepting this requirement during the last code cycle, the submitter suggests that children under the age of 6 will never, ever, under any circumstances enter and be exposed to this hazard in 98% of all new homes constructed.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-73 Log #4330 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Steven Orlowski, National Association of Home Builders
Recommendation: Revise Text:

406.11 Tamper-Resistant Receptacles in Dwelling Units.

In all areas specified in ~~210.52~~ <u>210.8</u>, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.

Add New Section:

<u>210.8 Tamper Resistant Receptacles Protection for Children.</u>
<u>(A) Dwelling Units. All 125-volt, single-phase, 15- and 20-ampere receptacles shall be tamper-resistant where the receptacle is located within 44 inches of the finished floor in the habitable rooms of the dwelling unit. Tamper resistant receptacles shall no be required in the following locations specified in (1) through (7).</u>
<u>(1) Bathrooms</u>
<u>(2) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use</u>
<u>(3) Outdoors</u>
<u>(4) Crawl spaces — at or below grade level</u>
<u>(5) Unfinished basements — for purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms and limited to storage areas, work areas, and the like</u>
<u>(6) Kitchens where the receptacles are installed to serve the countertop surfaces or appliances</u>
<u>(7) Laundry, utility, and wet bar sinks</u>
(Renumber subsequent sections)

A companion proposal has been sent to CMP-2 for action on the 210.8 portion of this proposal.
Substantiation: Currently the code requirement for tamper-resistant receptacles is too broad in scope and requires tamper-resistant receptacles in areas of the home that should not pose a threat to, or are inaccessible to, young children. This proposal lists several locations within the dwelling where there is no need to provide safeguarding for unattended children. Receptacles that are not readily accessible or that are dedicated for equipment should not be required to be tamper resistant. Examples of these areas that tamper-resistant receptacles should not be required are those found in attics, crawlspaces, mechanical rooms, behind equipment such as dishwasher, stoves, refrigerators, countertops, etc. To require tamper-resistant receptacles in these and other areas, not accessible to children under the age 5, shows a lack of forethought for this code requirement. Regarding last cycle, there were some members of the committee who felt it was best to require all the receptacles within the dwelling to be protected so the installer would not mistakenly miss a location. This belief is unfounded and may reflect a misunderstanding on the abilities of the electrician. For years now, along with all of the other NEC requirements one needs understand, installers have the knowledge to know which circuits are required to be connected to AFCI and which receptacles require GFCI protection. With proper training and clearly identifying the required locations for tamper resistant receptacles within the NEC, the installer will not be confused.
Panel Meeting Action: Reject
Panel Statement: CMP-18 agrees in principle with a height requirement. See panel action and statement on Proposal 18-71.

CMP-18 rejects the remaining portions for lack of substantiation that children of greatest risk (2 to 6 years) cannot contact the receptacles proposed for exclusion given their curious nature and propensity to explore.

CMP-18 does not agree with the submitter that these requirements belong in 210.8.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-74 Log #4390 NEC-P18 **Final Action: Accept in Principle**
(406.11)

Submitter: John R. Kovacik, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:

406.11 Tamper-Resistant Receptacles in Dwelling Units.
In all areas <u>required</u> ~~specified~~ in 210.52, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.
Substantiation: The revised text clarifies that only receptacles "required" by 210.52 shall be tamper-resistant. Although 210.52 has requirements for the location of dwelling unit receptacles, there are additional receptacles described in this section which are considered to be dwelling unit receptacles such as those that are part of a luminaire or appliance. Those would not be "required" receptacles.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-71, specifically Exception No. 2.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-75 Log #4409 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Dean Hunter, Hunter Electric
Recommendation: Revise text as follows:

406.11 Tamper Resistant Receptacles in Dwelling Units. In all areas specified in 210.52, a All 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.
Substantiation: This small change clarifies the intent of this section.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) and (d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-76 Log #4622 NEC-P18 **Final Action: Reject**
(406.11)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows:

Receptacles rated 125-volt, 15- and 20 amperes and installed in dwelling units to comply with 210.52, or of comparable accessibility to children, shall be listed tamper-resistant receptacles.
Substantiation: The 2008 language is subject to some interpretation, because some believe that since 210.52 applies to dwelling units, the requirement reaches every such receptacle installed in a dwelling unit. Others point out that the panel could have said all receptacles in a dwelling unit and chose not to. Further, 210.52 itself leads off with a list of applications for which an installed receptacle must not be interpreted as complying with 210.52 requirements. This could certainly be interpreted that those areas are not included in the new requirement. In some cases that makes sense and in others it doesn't. For example, a receptacle in an appliance or luminaire doesn't count, and this makes practical sense since those little single receptacles are unlikely to be available with tamper-resistant features. Receptacles in a cabinet or cupboard, or over 1.7 m (5½ ft above the floor) probably aren't too accessible to toddlers anyway. On the other hand, the switched receptacle is normally at toddler height and should be included, although the literal text makes this one questionable as well. Another area for interpretation involves receptacles installed to meet 210.50(B) even though no placement rule in 210.52 is involved. For example, a receptacle behind a refrigerator or a gas-fired stove for its igniter almost certainly could be exempted without disturbing the purposes for this section.

This proposal reaches all receptacles qualifying as 210.52 receptacles, and others in the same relative position installed for other reasons (such as attempts to say that a receptacle is in addition to the required 210.52 outlets). It does this through an express reference (accessibility to children) that squarely addresses the purpose for the rule in the first place. What a concept: say what you really mean, and mean what you say you mean.

Panel Meeting Action: Reject

Panel Statement: The resulting language would be vague and ambiguous. The panel has said what it means and means what it says.

See panel action and statement on Proposal 18-71.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-77 Log #4716 NEC-P18 **Final Action: Accept in Principle**

(406.11)

Submitter: Robert P. McGann, City of Cambridge

Recommendation: Revise text as follows:

406.11 Tamper-Resistant Receptacles in Dwelling Units. In all areas <u>readily accessible within 5 1/2 ft of floor</u> ~~Specified in 210.52~~. All 125 volt, 15 and 20 amp receptacles shall be listed tamper resistant receptacles.

Substantiation: There are too many holes with existing wording. It allows the dedicated outlet for the window AC unit in the habitable room not to be tamper resistant but requires the outlet behind the refrigeration to be TR. This is only one of many scenarios the contractor and inspectors are up against daily. This also correlates with the 5 1/2 ft rule in 210.52.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-71.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-78 Log #4856 NEC-P18 **Final Action: Reject**

(406.11)

Submitter: John Steinke, Amish Electric

Recommendation: Delete entire section.

Substantiation: "If it saves but one life" has been used as justification for this section. Such a though may sound nice, but it exceeds the mandate of the NEC. It is also overly broad, to the point of being illogical.

Article 90.1 defines the scope of the NEC. 90.1(A) states that the purpose is the practical safeguarding; 90.1(B) claims that the provisions are considered mandatory for safety. 90.1(C) bluntly states that the code is not a design manual.

In short, the code is a minimum (as all laws should be), and is not intended to be an ideal. By trying to 'raise the bar,' one begins to enter into design issues.

The requirement of tamper resistant receptacles is clearly a design issue. There are already numerous codes that require their use in day care centers, etc... on the theory that the insertion of foreign objects is a danger unique to young children. Oddly enough, many of these rules will allow the continued use of ordinary receptacles, provided GFCI protection is provided.

The NEC has gone considerably beyond these existing regulations.

This is where the section begins to be illogical. There is no distinction between an unprotected receptacle in a childs' room, a GFCI protected receptacle above the kitchen counter, and essentially inaccessible receptacles (such as those behind refrigerators and the one for the garage door operator).

Another argument that has been advanced is that such receptacles are required in other countries. While it may sound trite, we are not 'other countries.' Perhaps they ought to imitate us - not the other way around. More importantly, these other countries have entirely different approaches to electricity. For example, Great Britain requires tamper-resistant receptacles, but also essentially bans receptacles from bathrooms at all - while we not only require them, but require them to be 20 amp circuits. Also, ironically, they justify their position by arguing 'safety.'

Finally, there is the detail of testing a receptacle. OSHA requires us to test that the power is off before we work on receptacles; yet it is impossible to test them with a 'ticker,' and even inserting meter probes is a challenge with 'ordinary' receptacles.

Testing agencies have absolutely no problem imposing their own requirements on the products they endorse. If this is truly a necessary 'safety' feature, it ought to be integral to their standards. Alternatively, if this is what manufacturers desire, they have their standards to address. The NEC is not the place for this decision to be made.

Panel Meeting Action: Reject

Panel Statement: CMP-18 upholds the requirement for tamper-resistant receptacles based on over 10 years of electrical shock and burn incident data. This proposal is to delete the requirement based on 90.1, when, in fact, the previous incident data completely supports the requirement as one that is "the practical safeguarding" contained in 90.1.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-79 Log #4874 NEC-P18 **Final Action: Reject**

(406.11)

Submitter: David Zinck, Wiring Inspector / Rep. Newburyport, MA

Recommendation: Add text to read as follows:

In all areas specified in 210.52, all 125 volt, 15 and 20 ampere receptacles shall be listed tamper-resistant receptacles. <u>This requirement shall apply to new or completely renovated dwelling units only.</u>

Substantiation: When this requirement was sold to the panel for the 2007 NEC, it was supposed to be for new construction only (see the panel statements in the ROP). Sometime between the time when they passed it to the time when it went into the NEC, the new construction only part was removed. If Best Buy had pulled a "bait-and-switch" like that with flat screen TV's, there would be rioting in the streets.

Here is the great injustice to this requirement. A couple does a complete kitchen renovation. Maybe they do not have any kids. Maybe their kids are grown and gone. They have to use tamper resistant receptacles behind the stove, on the counter, for the microwave hood outlet, the trash compactor outlet, and the dishwasher outlet, even though they are not accessible to small children. All this in a house that has 200 readily accessible plugs that are not tamper-resistant.

Adding the second sentence clears up this problem.

Panel Meeting Action: Reject

Panel Statement: It was never the intent of CMP-18 to limit this requirement as described in the substantiation. Note that CMP-18 has accepted adding a requirement that replacement receptacles be tamper-resistant. See panel action and statement on Proposal 18-24.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-80 Log #2348 NEC-P18 **Final Action: Accept in Principle**

(406.11, Exceptions No. 1 and 2)

Submitter: Julian R. Burns, Quality Power Solutions, Inc.

Recommendation: Add new text as follows:

<u>*Exception No. 1: Receptacles installed at or above 1.5 m (5 ft) above the finished floor shall not be required to be listed tamper-resistant receptacles.*</u>

<u>*Exception No. 2: Receptacles installed for appliances occupying dedicated space shall not be required to be listed tamper-resistant receptacles.*</u>

Substantiation: The requirement for tamper-resistant receptacles was to protect children. The receptacles installed above 5 ft. are out of reach for children. Some examples of these receptacle locations are; wall mounted TVs, audio visual equipment, central vacuums and garage door operators.

Where appliances occupy dedicated space, children do not have access to. Some examples of these receptacles would include; refrigerators, dishwashers, disposals, freezers, microwaves, hydromassage bathtubs, gas cooktops and gas dryers.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-71.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-81 Log #252 NEC-P18 **Final Action: Accept in Principle**

(406.11 Exception)

Submitter: Mario L. Mumfrey, Cincinnati, OH

Recommendation: Add text to read as follows:

Exception: Excludes receptacles installed at a height exceeding 24 in. from the floor level to the bottom of the receptacle yoke and behind appliances that are fixed in place.

Note: This exception is for the use of TR (tamper-resistant) receptacles.

Substantiation: This addition to the 2008 NEC gave little explanation for the change other then to say that it safeguards small, unsupervised children from inserting small metallic objects into accessible electrical receptacles. I agree that safety should be priority and especially child safety wherever possible. However, by requiring TR receptacles basically everywhere in dwelling units it now becomes more adult competence then child safety. Article 90.1(C) states that this code is not a training manual for untrained persons. 406.3(D) covers replacement receptacle(s) and does not refer to 406.11 as requiring TR type. By limiting the use of TR receptacles, safety can still be achieved.

Panel Meeting Action: Accept in Principle

Panel Statement: CMP-18 accepts in principle the intent of "behind appliances" see panel action and statement on Proposal 18-71.

CMP-18 rejects the 24 in. limitation from the floor as such receptacles are well within access of children. The panel further rejects the substantiation relating to "adult competence" or "untrained persons". The panel heard child safety experts from the American Burn Association advise that supervision is not a viable solution and that "a safer environment provides better injury prevention than behavior modification."

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

18-82 Log #728 NEC-P18 **Final Action: Accept in Principle**
(406.11 Exception (New))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add a new Exception to read as follows:
406.11 Tamper-Resistant Receptacles in Dwelling Units.
In all areas specified in 210.52, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.
Exception: Nongrounding receptacles used for replacements as permitted in 406.3(D)(3)(a).
Substantiation: There are no known 125-volt, 15- or 20-ampere NONGROUNDING receptacles Listed as tamper-resistant receptacles.
Panel Meeting Action: Accept in Principle
Add Exception No. 4 to read as follows:
Exception No. 4: Nongrounding receptacles used for replacements as permitted in 406.3(D)(3)(a).
Panel Statement: This is added as Exception No. 4 to 406.11. See panel action and statement on Proposal 18-71.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-83 Log #3152 NEC-P18 **Final Action: Reject**
(406.11 Exception No. 1)

Submitter: Terry Cromer, NC Association of Electrical Contractors
Recommendation: Add new text as follows:
Exception No. 1: Receptacles installed above countertop in kitchens and bathrooms shall not be required to be listed tamper-resistant receptacles.
Substantiation: The tamper-resistant receptacles requirement was to protect young children. These receptacles are required to be GFCI protected and are installed out of reach of young children.
Panel Meeting Action: Reject
Panel Statement: Young children (2 to 6 years old) are frequently placed on the countertops in kitchens and bathrooms. GFCIs are not intended to prevent insertion of objects into receptacle outlets.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-84 Log #3151 NEC-P18 **Final Action: Accept in Principle**
(406.11 Exception No. 2)

Submitter: Terry Cromer, NC Association of Electrical Contractors
Recommendation: Add text as follows:
Exception No. 2: Receptacles installed at or above 1.5 m (5 ft) above the finished floor and outdoor receptacles shall not be required to be listed tamper-resistant receptacles.
Substantiation: The tamper-resistant receptacles requirement was to protect young children. Receptacles installed at or above 1.5 m (5 ft) are out of the reach for young children. Some examples of these locations are; garage door receptacles, wall mounted TV. Outdoor receptacles are required to be GFCI protected and have a cover that is weatherproof.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-71.
Outdoor receptacles are required to be tamper resistant. See panel action on Proposal 18-68.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-85 Log #684 NEC-P18 **Final Action: Accept in Principle**
(406.12 (New))

Submitter: Joe Penachio, Peabody, MA
Recommendation: Add new text to read as follows:
406.12 Tamper Resistant Receptacles in Other Than Dwelling Units.
In areas such as child care, day care, kindergarten, play school, preschool, nursery school, and similar locations, where the possibility of tampering exists, all 125 volt, 15- and 20-ampere receptacles shall be listed tamper proof receptacles.
Substantiation: This requirement would be consistent with the codes intent to protect young children from inserting paper clips and similar objects into the receptacles in these areas. This would also correlate with 406.11 for dwelling units and 517.18(C), Pediatric Locations. I'm not sure of how many of the 24,000 children reported injured by inserting objects into receptacles from the NEISS (National Electronic Injury Surveillance System) were in these areas, but I'd venture that there were many.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and substantiation on Proposal 18-90.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-86 Log #688 NEC-P18 **Final Action: Reject**
(406.12)

Submitter: Joseph E. Rossi, Township of Clinton
Recommendation: Add new text to read as follows:
Receptacles installed in all areas shall have a minimum branch circuit of 20 amperes.
Substantiation: It is time we take a look at field inspections vs. codes written on paper. During rough, final and after certificate of occupancy are issued there are not additional appliances other then that which are required in place. Many times a builder will sell a house that is completely empty of furniture, appliances and electronic devices.
As an electrical inspector, I enter people's houses and see many receptacles overloaded, mainly in the bedrooms of children. They each have their own computer systems along with fish tank, hair dryers, etc. all in one room. Worst over are the efficiency apartments and one bedroom townhouses. These places are totally over packed. It will be a small price to pay for the safety and integrity of branch circuits.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
CMP-18 requests the TCC to redirect this proposal to CMP-2, which has jurisdiction over branch circuits.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-87 Log #1167 NEC-P18 **Final Action: Accept in Principle in Part**
(406.12)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add a new subparagraph 406.12 to read as follows:
406.12 Tamper-Resistant Receptacles in Guest Rooms, Guest Suites, Dormitories, and Similar Occupancies.
In all areas specified in 210.60, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.
Substantiation: 406.11 Requires listed tamper resistant receptacles in all areas specified in 210.52 for dwelling units to increase the level of safety for children. 210.60 requires guest rooms or guest suites in hotels, motels, sleeping rooms in dormitories, and similar occupancies to have receptacle outlets installed in accordance with 210.52. These locations are also likely to be occupied by children and should require the same level of protection. People will come to expect this level of safety for their children when occupying these facilities.
Panel Meeting Action: Accept in Principle in Part
Add a new subparagraph 406.12 to read as follows:
406.12 Tamper-Resistant Receptacles in Guest Rooms and Guest Suites.
All nonlocking type 125-volt, 15- and 20-ampere receptacles shall be listed tamper-resistant receptacles.
Panel Statement: Current code already requires tamper-resistant receptacles where such facilities meet the Article 100 definition of dwelling unit, which states where such units provide complete and independent living facilities for one or more person(s) including permanent provisions for living, sleeping, cooking, and sanitation.
There is insufficient substantiation for additional expansion of the requirement.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-88 Log #1193 NEC-P18 **Final Action: Reject**
(406.12 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text to read as follows:
406.XX Location. Receptacles, cord connectors, attachment plugs (caps), and flanged surface devices shall be installed in accessible locations.
Substantiation: Edit. Section 422.16 (B)(2) and (B)(4) require a receptacle to be accessible, which implies other receptacles may be inaccessible.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-89 Log #2955 NEC-P18 **Final Action: Reject**
(406.12)

Submitter: Fred W. Brown, HI Electron
Recommendation: Add a new text as follows:
406.12 **Electrical-Fault Circuit-Interrupter (EFCI) Receptacles in Dwelling Units**. In all areas of dwelling units, all receptacles on 120-volt, single phase, 15- and 20-ampere branch circuits shall be Electrical-Fault Circuit-Interrupter (EFCI) receptacles.
Substantiation: U.S. Consumer Product Safety Commission (CPSC) conducted a 10 year study (1991 – 2001) of National Electronic Injury Surveillance Systems (NEISS). The data shows 24,000+ children less than 10 years old were treated in Emergency Rooms for incidents related to electrical receptacles. A similar study done by Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) 8 Year Study (1996-2003) from 14 CHIRPP Hospitals 465 children less than 9 years old were treated in Emergency Rooms for incidents related to electrical receptacles. The National Electrical Code, NFPA 70 2005 & 2008, has added requirements for tamper resistant receptacles in dwellings and Health Care pediatric areas. Electrical-Fault Circuit-Interrupter (EFCI) type receptacles give an additional type of protection to children and persons.

GFCI outlets and breakers are designed and tested to prevent death for most adults from line to ground leakage, but do not protect against death from line to neutral contact. Young adults, older adults, and children have a lower resistance to electrical current affects and are more vulnerable to injury. Tamper Resistance Receptacles are not tamperproof. These receptacles provide a reasonable means of protection against shock but are not child or foolproof.

Protection from line-to-neutral shocks is needed around children, since they do not all recognize the shock hazards and risks. Tamper Resistance outlets use a mechanical insulating shutter system to shield children from accessing live voltages on electrical receptacle sockets. Electrical-Fault Circuit-Interrupter (EFCI) uses a relay to normally disconnect electricity at the receptacle sockets. EFCI only turns electricity on at the socket when it detects the insertion of an electrical plug. The detection mechanism is an RFID tag embedded in a device plug or attached to the face of a device plug that complies with the Right Plug standard. Both Tamper Resistance and EFCI outlets provide a reasonable means of preventing line-to-neutral shocks. If proper receptacle installation is not accomplished then it may lead to more children injuries.

In the 2008 National Electrical Code Arc-Fault Circuit-Interrupter (AFCI) has been expanded to protect most 120 volt, single phase, 15 and 20 ampere branch circuits in dwelling units. AFCI technology senses parallel arcing faults in the range of 70 amperes, series arcing faults in the range of 5 amperes, and de-energize the branch circuit. Electrical-Fault Circuit-Interrupter (EFCI) would greatly improve the protection of persons and property from the use of electricity. This type of protection would help to minimize the risk of fires in dwelling units. Their sensitivity to some electrical fault conditions would be to isolate the dangerous causes of electrical fires.

During the 1999 National Electrical Code cycle there were extensive documentation presented that pointed out that most of the electrical fires that occurred in dwelling units were in wiring and equipment beyond the branch circuit overcurrent protection device. Overcurrent protection devices are to protect conductors and equipment if currents reach a value that will cause an excessive or dangerous temperature in conductors or conductor insulation. This protection is for large currents caused by short circuit, ground faults, or overloads. Article 210.19(A)(4) in the National Electrical Code (NEC) recognizes the use of ‘tap conductors’ connected to branch circuits. Tap conductors have overcurrent protection ahead of its point of supply that exceeds the value permitted for branch circuit conductors that are protected according their calculated load and allowable ampacity. Article 210.19(A)(4) Exception No. 2 allows small than 14 AWG cords where approved for and used with a specific listed appliance or luminaire. Article 310.5 in the NEC requires the minimum size conductor to be 14 AWG copper except as permitted elsewhere in the Code. The article “How Electricity Ignites Fires by John S. Robison” points out that currents far less than the design limits of branch circuit overcurrent protection devices and AFCIs are some of the causes for fires in electrical equipment, wiring, appliance cords, and other cords.

Electrical-Fault Circuit-Interrupter (EFCI) senses a lower level of fault and overload current conditions than branch circuit protection devices and AFCIs. The article “Stop Fires Before They Start by Steve Montgomery” points out that EFCI provide protection against over and under voltage, open neutral conductors, high resistance connections, damage wiring, overloading of small appliance cords, etc. that branch circuit overcurrent protection devices and AFCIs might not protect against. Even with the increased sensitive the EFCI they will not be a cause of nuisance tripping. EFCI detect a potential cause of electrical fires and safely segregate it.

A proposal similar to this was submitted to the State of Wisconsin Electrical Committee during the adoption of the 2008 National Electrical Code and to National Fire Protection Health Care (NFPA 99-82 Log #197 HEA-ELS, 4.3.2.2.6.2(D) **Receptacles for Special Area**) 2010. Both of these committees were supportive of this new technology but felt that this requirements belonged elsewhere. The State of Wisconsin Department of Commerce felt that the EFCI requirement should best be adopted at the National Fire Protection was more appropriate for NFPA 70.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-90 Log #1168 NEC-P18 **Final Action: Accept in Principle**
(406.14 (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add text to read as follows:
406.14 Child Care Facilities.
(A) Definition: Child Care Facility. A building or structure, or portion thereof, for educational, supervision or personal care services for more than four children 7 years or less of age.
(B) Tamper Resistant Receptacles. In all child care facilities, all 125-volt, 15- and 20-ampere receptacles shall be listed tamper resistant receptacles.
Substantiation: Sections 406.11 and 517.18(C) require tamper resistant receptacles to prevent incidents of electrical burns and shock that result when children insert conductive objects into receptacles. Both of these sections recognize that listed tamper resistant receptacles provide the most effective means of preventing children from inserting foreign objects into receptacles. The use of tamper resistant receptacles is also recognized in the US General Services Administration Child Care Center Design Guide as a critical design feature for child care areas. This Guide contains the criteria for planning and designing child care centers. Section 10.1.17 : “The following safety issues shall be incorporated into the design of the center:

● Outlets in areas accessible to children must be tamper resistant as defined by NEC Article 517.18(C). The intent is to “child proof” outlets that are within children’s reach to avoid any possibility of electrocution. Where practical locate them out of the child’s reach (at least 1380 mm above floor level).”

(The GSA design guide is available at:
http://www.gsa.gov/gsa/cm _attachments/GSA_DOCUMENT/Design%20 Guide_R2FD38_0Z5RDZ-i34K-pR.pdf)

For purposes of this code section, a child care facility has been defined as the use of a building or structure for educational, supervision or personal care services for more than four children 7 years of age or less. This definition takes into consideration various aspects of the current definitions for such facilities that appear in the International Building Code, Sections 305 and 308 as well as the definition in the US General Services Administration Child Care Center Design Guide.

The statistics provided with the 2005 NEC proposal for tamper resistant receptacles required by Section 406.11 indicated that approximately 89% of the electrical burn and shock incidents occurred to children 6 years of age or less. The current code requirements for tamper resistant receptacles ensure that children will be protected in closely supervised areas such as pediatric care locations and in less structured residential environments. However, there is no code requirement for tamper resistant receptacles in child care areas where young children are normally present for extended periods. Children in child care facilities have ready access to electrical receptacles and the same potential hazard for electrical burns and shock exists if a child inserts a foreign object into a receptacle. The same level of protection required by the code in pediatric care areas and in dwellings should be provided for children in child care facilities.
Panel Meeting Action: Accept in Principle
Add new section 406.2 to read as follows:
406.2 Definitions
Child Care Facility. A building or structure, or portion thereof, for educational, supervision, or personal care services for more than four children 7 years or less of age.
Renumber current 406.2 to 406.3 and renumber remainder of Article 406.
Add new 406.15 to read as follows:
406.15 Child Care Facilities. In all child care facilities, all nonlocking type 125-volt, 15- and 20- ampere receptacles shall be listed tamper-resistant receptacles.
Panel Statement: CMP-18 moved the new definition to section 410.2 in accordance with 2.2.2.2 of the NEC Style Manual. Additionally, the panel added “nonlocking type”. See panel action and statement on Proposal 18-62.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 408 — SWITCHBOARDS AND PANELBOARDS

9-130a Log #CP901 NEC-P09 **Final Action: Accept**
(408.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee accepts the panel action with the following revisions:

"408.1 Scope. This article covers switchboards and panelboards operating at 600 volts, nominal, or less, except as specifically referenced elsewhere in the Code."

The Technical Correlating Committee recognizes that Code-Making Panel 1 deleted the wording "Distribution Boards" in 110.26(F).

Submitter: Code-Making Panel 9,

Recommendation: I. Revise 408.1 to read as follows:

This article covers switchboards and panelboards. It does not apply to equipment operating at over 600 volts except as specifically referenced elsewhere in the Code.

II. Revise 408.2 by changing "used on switchboards, panelboards, and distribution boards" to "used on switchboards and panelboards."

III. Revise 110.26(F) to read "All switchboards, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage."

Substantiation: This proposal removes the terminology "distribution boards" and "battery-charging panels" from the scope of this article, and also clarifies that it normally does not apply to equipment operating over 600 volts unless some specific provision is cited elsewhere. Over the last four code cycles CMP 9 has been reluctant to remove the obsolete terminology on distribution boards because of concerns regarding inadvertent effects on installed equipment, even though contemporary product standards do not use this wording. No instances have come to light, and CMP 9 is prepared to remove it at this time. The deletion of the language on battery-charging panels follows from the deletion of the phrase "light and power circuits". Any panelboard or switchboard that meets the applicable definition in Article 100 should be and now will be covered in this article, regardless of the specific loads it supplies.

To correlate with this change the second part of this proposal removes the "distribution boards" terminology from 110.26(F). This terminology is only in 110.26(F) because that provision used to be part of former Article 384, which is now Article 408. When these rules were moved to Article 110, the scope of 110.26(F) had to agree with the scope of the article from which it came (now Article 408). It follows that if the "distribution boards" terminology is now removed, it should be removed from Article 110 as well.

The exclusion of systems operating over 600 volts reserves the coverage of this equipment to Article 490. When medium voltage applications were covered in Chapter 7 (former Article 710), the provisions of 90.3 automatically resolved inadvertent conflicts between this article and specific rules for equipment operating at higher voltages. Now that these rules have been moved to Chapter 4, inadvertent conflicts such as the one addressed in Proposal 9-101 may crop up, and the suggested change in scope agrees with the relevant product standards and should restore the independence of Article 490 in these cases. As part of this action, CMP 9 is reviewing the content of both Articles 490 and 408 and making correlating changes accordingly.

CMP 9 solicits specific public comment on the removal of the terminology "distribution boards" and will revisit this issue should inadvertent consequences be identified from this change. In addition CMP 9 also recognizes that CMP 1 now has jurisdiction over 110.26(F) and requests that the TCC place this change on the agenda of CMP 1 for action in the comment period. Finally, CMP 9 recognizes that final authority for revisions to article scope provisions rest with the TCC and makes this recommendation accordingly.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

HARTWELL, F.: A preliminary review of provisions in Article 490 during the panel meeting did not raise any specific areas where additional correlating actions would be necessary. Comment is invited on this point.

9-131 Log #3790 NEC-P09 **Final Action: Accept in Principle**
(408.1)

Submitter: James Grant, Rochester, NH

Recommendation: Revise text to read as follows:

408.1 Scope.

This article covers the following:

(1) All switchboards, panelboards, ~~and distribution boards~~ installed for the control of light and power circuits

(2) Battery-charging panels supplied from light or power circuits

Substantiation: The scope of the article mentions distribution boards, however, there is no mention of them in the rest of the article.

Panel Meeting Action: Accept in Principle

Refer to the action on panel proposal 9-130a that addresses the concerns in this proposal.

Panel Statement: The terminology has been removed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-132 Log #2047 NEC-P09 **Final Action: Accept in Principle**
(408.1(1) Scope)

Submitter: Larry T. Smith, National Electrical Seminars, Inc.

Recommendation: Revise text to read as follows:

408.1 Scope. This article covers the following:

(1) All switchboards, <u>and</u> panelboard~~s, and distribution boards~~ installed for the control of light and power circuits

(2) Battery-charging panels supplied from light or power circuits.

Substantiation: The 1937 NEC makes this statement, "**3841. Scope.** The requirements of this article shall apply to all switchboards, panelboards, and *distribution boards* used for the control of light and power circuits...".

But what is a distribution board? No one seems to know. The title of Article 408 is Switchboards and Panelboards and we have clear definitions of both in Article 100, but *distribution boards* are not defined in Article 408 or Article 100. In 1937, everyone in the electrical industry probably knew what a *distribution board* was, but not today. At least one AHJ in a major city considers a UPS a distribution board and is requiring dedicated space (110.26(F)) above all UPS equipment. In the opinion of another AHJ, separate safety switches mounted on a 2 ft x 4 ft sheet of plywood constitutes a distribution board.

Distribution board appears to be an archaic term that should be deleted. If not deleted, it should be defined because distribution boards are listed in 110.26(F) as equipment requiring dedicated space. Isn't the title of Article 408 Switchboards and Panelboards?

Panel Meeting Action: Accept in Principle

Refer to the action on panel proposal 9-130a that addresses the concerns in this proposal.

Panel Statement: The terminology has been removed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-133 Log #2048 NEC-P09 **Final Action: Accept in Principle**
(408.1(2) Scope)

Submitter: Larry T. Smith, National Electrical Seminars, Inc.

Recommendation: Revise text to read as follows:

408.1 Scope. This article covers the following:

~~(2) Battery charging panels supplied from light or power circuits.~~

Substantiation: The 1937 NEC makes this statement, "**3841. Scope**... The requirements of this article shall apply to battery-charging panels if current is taken from light or power circuits."

Is there anyone alive today who knows what that statement was intended to cover? What is a *battery-charging panel*? No one seems to know, but a lot of people are willing to offer various opinions. Some people believe that it was intended to exclude old Delco systems, but who knows? Others believe that it was meant to cover UPS equipment, but UPS equipment hadn't even been developed yet. In 1937, everyone in the electrical industry probably knew what was intended, but not today.

Battery charging panel appears to be an archaic term that should be deleted and if not deleted, defined. Isn't the title of Article 408 Switchboards and Panelboards?

Panel Meeting Action: Accept in Principle

Refer to the action on panel proposal 9-130a that addresses the concerns in this proposal.

Panel Statement: The terminology has been removed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-134 Log #2138 NEC-P09 **Final Action: Accept in Principle**
(408.2)

TCC Action: The Technical Correlating Committee understands that the reference is to 9-130a not 9-56a.
Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Revise text as follows:
408.2 Other Articles. Switches, circuit breakers, and overcurrent devices used on switchboards, <u>and</u> panelboards, ~~and distribution boards,~~ and their enclosures shall comply with this article and also with the requirements of Articles 240, 250, 312, 314, 404, and other articles that apply. Switchboards and panelboards in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.
Substantiation: The 1937 NEC makes this statement, "**3841. Scope.** The requirements of this article shall apply to all switchboards, panelboards, and distribution boards used for the control of light and power circuits...".
What is a distribution board? No one seems to know. The title of Article 408 is Switchboards and Panelboards and we have clear definitions of both in Article 100, but *distribution boards* are not defined in Article 408 or Article 100. In 1937, everyone in the electrical industry probably knew what a *distribution board* was, but not today. At least one AHJ in a major city considers a UPS a distribution board and is requiring dedicated space (110.26(F)) above all UPS equipment. In the opinion of another AHJ, separate safety switches mounted on a 2 ft. x 4 ft. sheet of plywood constitutes a distribution board.
Distribution board appears to be an archaic term that should be deleted. If not deleted, it should be defined because distribution boards are listed in 110.26(F) as equipment requiring dedicated space. Isn't the title of Article 408 Switchboards and Panelboards?
Panel Meeting Action: Accept in Principle
See the action on Panel Proposal 9-56a.
Panel Statement: The terminology has been removed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-135 Log #3293 NEC-P09 **Final Action: Accept in Part**
(408.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Switchboards, panelboards, <u>control panels, and motor control centers</u> in hazardous (classified) locations shall comply with <u>applicable</u> ~~requirements~~ <u>provisions</u> of Articles 500 through 517.
Substantiation: Edit. This provision should not be limited to switchboards and panelboards or requirements; any applicable exceptions and provisions that are permissive should be included.
Panel Meeting Action: Accept in Part
Accept the change to "applicable provisions"; reject the addition of control panels and motor control centers.
Panel Statement: The rejected material is out of the scope of this article. Hazardous (classified) location requirements for control panels are covered in 409.3, and for motor control centers the coverage occurs in 430.5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-136 Log #3651 NEC-P09 **Final Action: Reject**
(408.3(A)(2))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(2) Service Switchboards <u>and Panelboards</u>. Barriers shall be placed in all service switchboards <u>and panelboards</u> such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations. <u>The barrier shall provide shock and arc flash protection equivalent to that provided by the switchboard or panelboard enclosure.</u>
Substantiation: With the current design of panelboards used as service equipment, it is not possible to comply with the electrical safe work rules required by OSHA and NFPA 70E, unless the utility disconnects the line side power any time the service equipment enclosure cover is opened or removed. This code change will make it possible to do work in the service equipment without having the utility disconnect the line side power, by removing the (unacceptable) exposure to the unprotected line side connections. This requirement has been in place for Canadian service equipment for many years. There is no reason why we can't have the same protection for the electrical workers here in the US.
Canadian Standards Association Standard C22.2 No. 29, Clause 7.4.1.2 states: "The main switch or circuit breaker shall be located in a separate section of the enclosure with a sheet-metal barrier or the equivalent, of the same thickness as the walls of the enclosure, having bushed holes or the equivalent, for the necessary wiring between compartments". The major manufacturers of switchboards and panelboards currently make products that are in compliance with the CSA Standard so it will not be a hardship on them to comply with this safety rule. Please review the included pictures of a panel design that complies with the CSA Standard.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Canadian and US requirements are different in many ways including the US allowance for six service disconnects, which is not allowed in Canada. Alternative methods exist to provide shock and arc flash protection equivalent to that provided by an enclosure. No substantiation of field issues has been provided.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-137 Log #3410 NEC-P09 **Final Action: Accept**
(408.3(C))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
408.3(C) Used as Service Equipment. Each switchboard or panelboard, if used as service equipment, shall be provided with a main bonding jumper sized in accordance with 250.28(D) or the equivalent placed within the panelboard or one of the sections of the switchboard for connecting the grounded service<u>-entrance</u> conductor on its supply side to the switchboard or panelboard frame. (The remaining text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-138 Log #764 NEC-P09 **Final Action: Reject**
(408.3(E))

Submitter: Robert Sogla, Coon Rapids, MN
Recommendation: Revise text to read as follows:
408.3(E) Phase Arrangement. The phase arrangement on 3-phase buses shall be A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the switchboard or panelboard. The ~~B~~ C phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta-connected systems.
Substantiation: Over the years since this was changed from C phase to B phase, the metering was never changed. As such, there are many installations where C phase in the meter is not C phase in the panel. I think we should go back to C phase so that C phase is the same throughout the building. If it becomes C phase and orange then there will be no more confusion with the common practice of using brown, orange, and yellow on 480v systems since orange here is also B phase. Also, there is no good reason to change phase orientation between the meter and the panel.
Panel Meeting Action: Reject
Panel Statement: When metering is involved, the Exception allows C phase high leg construction. Color coding is an industry practice and not a Code requirement. No substantiation has been provided to indicate that this practice has caused confusion.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-139 Log #3652 NEC-P09 **Final Action: Reject**
(408.3(E))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(E) Phase Arrangement. The phase arrangement on 3-phase buses shall be so that when the leads of a phase rotation meter are connected A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the switchboard or panelboard that the phase rotation meter shall indicate a clockwise rotation. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta-connected systems. Other busbar arrangements shall be permitted for additions to existing installations and shall be marked.
Substantiation: As this section is currently written it has no meaning. It appears that the intent is to require a clockwise rotation. If this is not the intent, then the section does not accomplish anything as the terms A, B and C are only arbitrary terms and the section should be deleted from the code.
Panel Meeting Action: Reject
Panel Statement: 408.3(E) is intended to be a construction requirement for panelboards and switchboards as a matter of consistency. The proposal is a design consideration for connected equipment which is not the purpose of this section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-140 Log #2764 NEC-P09 **Final Action: Accept in Principle**
(408.3(F))

Submitter: Donald R. Offerdahl, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
(F) Switchboard or Panelboard Identification
1. High-Leg Identification. A switchboard or panelboard containing a 4-wire, delta-connected system where the midpoint of one phase winding is grounded shall he legibly and permanently field marked as follows:
"Caution ______ Phase Has ______ Volts to Ground"
2. Ungrounded electrical systems as permitted in 250.21(1), (2) and (3) and for general power distribution systems in accordance with 250.21(4). 1 shall be legibly and permanently field marked as follows:
"Caution Ungrounded electrical system ________ Volts"
Substantiation: Ungrounded electrical systems are permitted but need to be identified. If the equipment bonding conductor are not marked correctly (white rather than green) it leaves the impression than this is a grounded system, which it is not. The power supplier has no requirement to label the transformer when the system is changed from grounded to an ungrounded system. This situation has happen in several occasions. The disadvantage of operating systems ungrounded is increased susceptibility to high transient voltages that can hasten insulation deterioration.
Panel Meeting Action: Accept in Principle
Revise proposed item (2) to read as follows:
(2) Ungrounded Systems. A switchboard or panelboard containing an ungrounded electrical system as permitted in 250.21 shall be legibly and permanently field marked as follows:
"Caution Ungrounded System Operating _____ Volts Between Conductors"
Panel Statement: CMP-9 agrees with the submitter but has made editorial changes that make the new wording parallel to that for high-leg systems. Since all numbered parts of 250.21 potentially are covered (and are included in this proposal) the cross reference has been simplified accordingly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
RUPP, B.: This proposal should be rejected. Switchboards and panelboards have been used in ungrounded electrical systems for decades without issue. The substantiation provided does not indicate the safety issue or hazard that the proposed marking will address. Normal operation of an ungrounded electrical system will provide balanced voltages between phases and phases to ground, unlike the high-leg system for which the marking in 408.3(F) is justified.

9-141 Log #1297 NEC-P09 **Final Action: Accept in Principle**
(408.4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"and circuit breaker" after "switch" in the penultimate sentence.
Substantiation: To clarify the identification is required at circuit breakers whether or not used as switches.
Panel Meeting Action: Accept in Principle
Revise 408.4 as follows:
Every circuit and circuit modification shall be legibly identified as to its clear, evident, and specific purpose or use. The identification shall include sufficient detail to allow each circuit to be distinguished from all others. Spare positions that contain unused overcurrent devices or switches shall be described accordingly. The identification shall be included in a circuit directory that is located on the face or inside of the panel door in the case of a panelboard, and located at each switch or circuit breaker ~~on~~ in a switchboard. No circuit shall be described in a manner that depends on transient conditions of occupancy.
Panel Statement: At any specified location covered in this section, either a switch or a circuit breaker, but not both, will be found. For contemporary switchboard construction, the preposition "in" is preferred to "on" with regard to the location of switches and circuit breakers.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-142 Log #1494 NEC-P09 **Final Action: Accept in Principle**
(408.4)

Submitter: Robert G. Fahey, City of Janesville
Recommendation: Add new text as follows:
408.4 Signage
(A) Circuit Directory or Circuit Identification
Every circuit and circuit modification shall be legibly identified as to its clear, evident, and specific purpose or use. The identification shall include sufficient detail to allow each circuit to be distinguished from all others. Spare positions that contain unused overcurrent devices or switches shall be described accordingly. The identification shall be included in a circuit directory that is located on the face or inside of the panel door in the case of a panelboard, and located at each switch on a switchboard. No circuit shall be described in a manner that depends on transient conditions of occupancy.
(B) Switchboards and Panelboards. All switchboards and panelboards shall be identified as to where the power supply originates for each switchboard and panelboard.
Exception No. 1. Dwelling units and associated residential buildings panelboards.
Exception No. 2. Service equipment.
Substantiation: In many commercial and industrial occupancies, where there are many panelboards and switchboards located throughout the building and/or premises, making it difficult at times to locate the circuit breaker, main distribution panel, or fused disconnect which supplies the individual panelboard or switchboard. In many engineered jobs, this type of labeling already takes place through the specifications the electrical engineer has written up for the electrical contractor to follow. This practice enhances safety for the people who service the equipment, it will save time locating the circuit breaker in the case of an emergency and when normal maintenance is performed. I believe this small change will benefit the facility owner, facility staff, electricians and others who will work on the equipment in the future. I am currently inspecting a high school where this labeling is being applied to all equipment, panelboards, transformers and main distribution panels and the cost is very minimal to the facility.
Panel Meeting Action: Accept in Principle
Change the proposed section title from "Signage" to "Field Identification Required." Revise (B) to read as follows: "Source of Supply. All switchboards and panelboards supplied by a feeder in other than one- or two-family dwellings shall be marked as to where the power supply originates."
Panel Statement: CMP-9 has made editorial changes but agrees that such sources should be identified. The identifying marking will not be an actual sign, and the wording of (B) needs a title. The exceptions have been included in the restatement of the rule. Panelboards in multifamily housing present similar concerns and CMP-9 has broadened the wording accordingly. The panel action does not intend to affect the action on Proposal 9-141.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-143 Log #1893 NEC-P09 **Final Action: Accept in Part**
(408.4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: The identification shall be included in a circuit directory that is located on the face or inside of the panel door of a panelboard and located at each switch or circuit breaker on a switchboard or motor control center.
Substantiation: Edit. Circuit breakers and motor control centers should be included in the provision.
Panel Meeting Action: Accept in Part
Accept the addition of "or circuit breaker."
Reject the addition of "or motor control center."
Panel Statement: Motor control centers are not within the scope of Article 408. The requirement is covered by 110.22(A). CMP-9 does not intend to disturb its action on Proposal 9-141.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-144 Log #1601 NEC-P09 **Final Action: Reject**
(408.8)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 1 for Action in Article 110.
This action will be considered by the Code-Making Panel 1 as a public comment.
Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Add new section as follows:
Switchboards and panelboards shall be field marked with a sign or plaque to warn qualified and unqualified persons of the work spaces required to be kept clear by 110.26(A)(1), (2), (3) or 110.32 as applicable. The sign or plaque shall be located so as to be clearly visible to persons in the workspace and shall be permitted to be on or adjacent to the equipment. The marking shall include the words:

WARNING!
AREA IN FRONT OF ELECTRICAL PANEL MUST BE KEPT CLEAR FOR ________________________

The marking shall also include the dimensions of the depth, width, and height required to be kept clear for the workspace.
Substantiation: I am continually being forced to work on panelboards and switchboards that were originally installed with plenty of work space, but over time have had the work space encroached upon by other trades or unknowing individuals who install shelves, pipes, ductwork, walls, and all kinds of other obstructions too close to the electrical equipment. This places me and every other electrical worker in peril if I need to work on the equipment while energized. I have surveyed HUNDREDS of students that attend my classes and seminars and they all agree that they have also been put into this dangerous situation. Members of the Code Making Panel themselves may have worked in these situations. This is NOT just an enforcement issue, but also rather immediately DANGEROUS situation if the equipment is unreachable in an emergency, such as firefighters, or other emergency personnel (or anyone else for that matter) needing to turn the power off because of an emergency!!!!! They certainly cannot wait for the wire inspector to show up and "enforce" the code. It will be too late by that time. But maybe, just maybe the plumber won't put the pipe in the way, or the carpenter won't build the wall too close, or the shop owner won't install shelves right in front of the panel if there were a sign to warn them! It's certainly not a guarantee, but if the warning sign were to prevent ONE tragedy, then making this a requirement will certainly be worth it. These signs are already available for just a few dollars. Well worth the minimal cost. The wording in my proposal also allows for the sign to be placed on a wall or perhaps on the door to the electrical room, as long as the sign is clearly visible to anyone standing in the workspace thinking of putting an obstruction in front of the electrical panel.
Signs and plaques are required in several sections of the Code such as 110.15, 110.27(C), 110.31(B)(1), 225.37, 230.2, 426.13, 427.13, 450.8(D), 460.22(B)(2), 516.10(B)(3), 690.14(D)(4), 690.56(A), 690.56(B), 692.4(B), and 705.10. The sign or plaque that I am proposing is at least equal in importance to any of the other signs required by Code and perhaps MORE important than others.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: CMP-9 recommends to the TCC that this proposal be forwarded to CMP-1 during the public comment period for action in Article 110. The subject matter is directly related to the dedicated workspace requirements and should be addressed in Chapter 1.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-145 Log #4275 NEC-P09 **Final Action: Reject**
(408.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 408.9.
408.9 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-128.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: The AHJ should approve equipment unless he inspects and identifies a specific non-compliance with the NEC.

9-146 Log #4276 NEC-P09 **Final Action: Reject**
(408.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 408.9.
408.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the statement on Proposal 9-126.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-147 Log #4277 NEC-P09 **Final Action: Reject**
(408.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 408.9.
408.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment

construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-148 Log #4278 NEC-P09 **Final Action: Reject**
(408.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 408.9.
408.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-129.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-149 Log #4279 NEC-P09 **Final Action: Reject**
(408.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 408.9.
408.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-127.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-125 (Log #4195).

9-150 Log #1315 NEC-P09 **Final Action: Reject**
(408.17)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Switchboards panelboards and motor control centers shall be ~~placed~~ located so as to ~~reduce to a minimum~~ minimize the probability of communicating sparks or fire to ~~adjacent~~ combustible material. Where open bottom switchboards, panelboards, motor control center, or other enclosures are ~~over a~~ installed on a combustible floor or platform ~~suitable protection there to~~ an identified noncombustible barrier shall be provided.
Substantiation: Edit. "Minimum" is subjective, not defined or quantified, as is "adjacent", a term to be avoided. The provision should include panelboards, motor control centers and other equipment.
Panel Meeting Action: Reject
Panel Statement: Motor control centers are not within the scope of this article. Panelboards are not within the coverage of Part II of the article. The other changes do not increase clarity. No field issues have been identified with the existing language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-151 Log #3290 NEC-P09 **Final Action: Reject**
(408.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Switchboards, panelboards and motor control centers that have any exposed live parts shall be located in permanently dry locations and then only where under competent supervision and accessible only to qualified persons. ~~Switchboards~~ Such equipment shall be located or protected by identified means ~~such that the probability of damage from equipment or processes is reduced to a minimum or protected~~ so that it is not likely to be subject to physical damage or destructive agents.
Substantiation: Edit. Motor control centers should be included. Where it is not practical for location to provide protection identified means of protection should be permitted. "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: Motor control centers are not within the scope of this article. Panelboards are not within the coverage of Part II of the article. The other changes do not increase clarity. No field issues have been identified with the existing language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-152 Log #1703 NEC-P09 **Final Action: Accept**
(408.30)

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise the text of 408.30 as follows:
408.30 General. All panelboards shall have a rating not less than the minimum feeder capacity required for the load calculated in accordance with Parts ~~II~~, III, IV, or V of Article 220 as applicable.
Substantiation: By deleting Part II from the list of Article 220 sections referenced in 408.30, this revision will clarify that the rating in question is the feeder or service, not a branch circuit. Part II is referenced in Part III of Article 220, so no requirements are lost.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-153 Log #2765 NEC-P09 **Final Action: Reject**
(408.36 Exception No. 1)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 4 for comment.
Submitter: Donald R. Offerdahl, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
Exception No. 1: Individual protection shall not be required for a panelboard used as service equipment ~~with~~ when multiple disconnecting means are installed in accordance with 230.71(A). For the purposes of determining a disconnecting means, a disconnecting means is an circuit breaker that serves a single load. A single pole 120 volt single phase breaker feeding a single phase 120 volt load is considered as one disconnecting means. A two pole 240 volt single phase breaker feeding a single phase 240 volt load is considered as one disconnecting. A three pole 208 volt three phase breaker feeding a three phase 208 volt load is considered as one disconnecting means, respectively. In panelboards protected by three or more main circuit breakers or sets of fuses, the circuit breakers or sets of fuses shall not supply a second bus structure within the same panelboard assembly.
Substantiation: The language in 230.72(B) is vague which states “Single-Pole Units. Two or three single-pole switches or breakers, capable of individual operation, shall be permitted on multiwire circuits, one pole for each ungrounded conductor, as one multipole disconnect, provided they are equipped with identified handle ties or a master handle to disconnect all conductors of the service with no more than six operations of the hand.” Changing the reference to 230.72(A) clarifies the 6 disconnect rule. The added language of determining the number of disconnecting means better explains that the exception are limited to 6 disconnecting means feeding 6 loads. The language in 230.72(B) could be interpreted that the 3 single pole breakers could have a master tie and 18 single pole breakers could be operated by 6 master tie or handles. I don’t believe it was the objective of the code panel to allow this.
Panel Meeting Action: Reject
Panel Statement: The intent of this rule is to correlate this requirement, as simply as possible, with requirements in Article 230. The reference to 230.71 means that CMP-4 governs what constitutes appropriate disconnecting means for services, and CMP-9 does not want to second-guess those requirements. The panelboards covered in this proposal will function safely regardless of the number of disconnects within them. CMP-9 requests that the TCC send this proposal to CMP-4 for comment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-154 Log #4865a NEC-P09 **Final Action: Reject**
(408.36(C))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 2 for information.
Submitter: John Steinke, Amish Electric
Recommendation: Add: Where, in a single phase system, a device has both a two-pole and a single-pole outlet on the same yoke, a three-pole disconnect will be used.
A companion proposal has been submitted to 210.7(B).
Substantiation: There exist combination devices that, for example, have a 240v receptacle and a 120v receptacle mounted on the same yoke. One ought to have these both become disconnected at the same time, as with a multi-wire branch circuit.
Yet, 408.36(C) would seem to prohibit this practice. I do not believe that was the intent of 408,36 as that section addresses an obsolete device that was used to ‘create’ limited three phase power from a single phase source.
210.4(C) appears to address this issue, and even to allow one ‘leg’ of the two-pole circuit to also supply the single-pole device, but I believe the NEC needs to be more specific.
Panel Meeting Action: Reject
Panel Statement: A three-pole breaker is not a delta breaker unless it actually supplies three-phase power through a third pole that is not connected to the panelboard bus structure. Therefore 408.36(C) does not prohibit the practice identified in the proposal. The technical merit of this proposal must be evaluated by CMP-2 and covered in Article 210, as the submitter has apparently recognized in his companion proposal. CMP-9 requests the TCC forward this proposal to CMP-2 for information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-155 Log #2960 NEC-P09 **Final Action: Reject**
(408.40)

Submitter: Paul A. Keleher, Paul Keleher Electrical Services
Recommendation: 408.40 Grounding of Panelboards. Panelboard cabinets and panelboard frames, if of metal, shall be in physical contact with each other and shall be connected to an equipment grounding conductor. Where the panelboard is used with nonmetallic raceway or cable or where separate equipment grounding conductors are provided, the requirements of 250.130(A) or (B) shall apply. ~~A terminal bar for the equipment grounding conductors shall be secured inside the cabinet. The terminal bas shall be bonded to the cabinet and panelboard frame, if of metal; otherwise it shall be connected to the equipment grounding conductor that is run with the conductors feeding the panelboard.~~ …~~Equipment grounding conductors shall not be connected to a terminal bar provided for grounded conductors or neutral conductors unless the bar is identified for the purpose and is located where interconnection between equipment grounding conductors and grounded circuit conductors is permitted by Article 250.~~
Substantiation: This language in 408.40, is confusing without a specific reference to 250.130(A) or (B), and appears to be (although it on close scrutiny may actually not be) in conflict with 250.130(A) and (B). As a consequence of this confusion, installers are confused as to which requirement applies to the connection of equipment grounding conductors in non-metallic raceway or cable, often installing an equipment grounding bus in violation of 250.130(A) or (B). The text will be clearer by simply deferring to 250.130(A) or (B) when terminating equipment grounding conductors in non-metallic raceway or cable at a panelboard. The last paragraph of the section should be deleted as it creates confusion.
Panel Meeting Action: Reject
Panel Statement: This section (408.40) is written to correlate with 250.24(A)(5) or 250.30(A) as applicable. It then includes some installation requirements that are specific to panelboard enclosures that follow from the general rules here and in Article 250. CMP-9 does not agree with the submitter that the text is confusing or inconsistent with any provision in Article 250.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-156 Log #2540 NEC-P09 **Final Action: Reject**
(408.42)

Submitter: Lowell Bradbury, Vergas, MN
Recommendation: Add new text as follows:
408.42 Location. Panelboards back shall be located no less than 1 1/4 in. from the nearest framing member.
Substantiation: Siding installers with power nailers are shooting nails into load centers and panelboards that are flush mounted on exterior walls. We have seen numerous installations where the pneumatic staples or nails penetrate the back of flush-mounted panelboards, often directly contacting energized conductors or bus.
Panel Meeting Action: Reject
Panel Statement: Similar issues exist with many types of electrical components, including outlet boxes and conductors in wall cavities. No level of protection can always protect against poor workmanship by other trades on the jobsite. The examples cited in the submitter’s substantiation are anecdotal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-157 Log #4540 NEC-P09 **Final Action: Accept in Principle**
(408.51)

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the negative comments expressed in the voting and that this proposal be referred to Code-Making Panel 5 for comment.
Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC by adding a new sentence as follows:
408.51 Busbars. Insulated or bare busbars shall be rigidly mounted. Busbars for the equipment grounding conductor in switchboards listed for use as service equipment shall be sized in compliance with 250.102(C).
Substantiation: The new sentence will ensure that the equipment grounding busbar in service equipment is sized properly for termination of bonding jumpers and main bonding jumpers. It is very common to terminate bonding jumpers for raceways containing service-entrance conductors on the equipment bonding busbar. The bonding jumpers are required to be sized in accordance with 250.102(C). The bonding jumpers for main and system bonding jumpers are required to be sized according to 250.28(D) which is identical to the requirement in 250.102(C).
Panel Meeting Action: Accept in Principle

Accept the proposal as modified by adding the words "or the busbar location shall be labeled to prohibit bonding connections associated with service-entrance conductors" at the end of the proposed requirement.
Panel Statement: CMP-9 agrees with the technical concerns of the submitter but chooses to allow current busbar designs to continue where the manufacturer chooses to apply the appropriate warning label.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
OSBORNE, R.: The Panel should reject this proposal. The example used in the substantiation is a Code violation, as 250.80 requires service raceways and enclosures to be bonded to the grounded system conductor, with the method of bonding detailed in 250.92(B). Identifying Section 250-102(C) as the source of requirements for the equipment grounding conductor is incorrect, as this applies to the sizing of supply side enclosure bonding jumpers.
RUPP, B.: The requirements of 250-102(C) apply to the sizing of supply side enclosure bonding jumpers and do not pertain to equipment grounding conductors. Service raceways and enclosures are required to be bonded to the grounded system conductor per 250.80 with one of the methods specified in 250.92(B). Section 250.86 provides the requirements for other than service with 250.94 providing the methods permitted and 250.102(D) the bonding jumper sizing. The substantiation example of connecting bonding jumpers for service conductor raceways to the equipment grounding busbar is a violation of 250.80 and 250.92(B).

9-158 Log #2563 NEC-P09 **Final Action: Accept**
(408.55)

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise text as follows:
408.55 Wire-Bending Space ~~in Panelboards~~ <u>within an Enclosure Containing a Panelboard.</u>
Substantiation: The current wording is not accurate, as the section pertains to the wire bending space about the panelboard within an enclosure. The proposed wording will enhance clarity.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-159 Log #243 NEC-P09 **Final Action: Reject**
(408.57)

Submitter: Robert Losaw, Ridge Electric, Inc.
Recommendation: Add new text to read as follows:
<u>**408.57** Each panel board shall be manufactured to contain a number of separate connection places for ground wires and for neutral wires, that number to meet or exceed the maximum number of circuits the panel may contain. This applies without concern for the intended use for the panel board as a main panel, sub-panel, or disconnect box.</u>
Substantiation: Many manufactured panels do not contain sufficient lugs or connection points for circuit's ground wires. For example, a Square D 200-amp QO panel allows 40 circuits, but has only 30 ground wire connection points. This requires installing an additional lug or combining multiple ground wires under one lug bolt, both producing unnecessary ground error possibilities.
Panel Meeting Action: Reject
Panel Statement: The submitter has substantiated a need to pay attention to detail when ordering electrical equipment but no safety issue. Many panels are used with wiring methods that do not require separate equipment grounding conductors. Many equipment grounding terminals, including those in the panel cited in the substantiation, are listed for more than one equipment grounding termination at a single terminal. This proposal is not necessary. Additional terminals are readily available in kit form.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 409 — INDUSTRIAL CONTROL PANELS

11-4 Log #4270 NEC-P11 **Final Action: Reject**
(409.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 409.5 in Part I.
<u>409.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-5.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-5 Log #4271 NEC-P11 **Final Action: Reject**
(409.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 409.5 in Part I.
<u>409.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: The proposal limits the ability of installing and constructing electrical equipment. The authority having jurisdiction already has the authority to require listing of electrical equipment through NEC Sections 90.4, 90.7, and 110.2. Information is provided for the basis of approval in Section 409.1.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-6 Log #4272 NEC-P11 **Final Action: Reject**
(409.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 409.5 in Part I.
<u>409.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>
<u>(1) Equipment listing or labeling</u>
<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>
<u>(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-5
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-7 Log #4273 NEC-P11 **Final Action: Reject**
(409.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 409.5 in Part I.
409.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-5
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-8 Log #4274 NEC-P11 **Final Action: Reject**
(409.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 409.5 in Part I.
409.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-5
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-9 Log #4404 NEC-P11 **Final Action: Reject**
(409.22)

Submitter: Jay Tamblingson, Rockwell Automation
Recommendation: Add new paragraph 409.22 as follows:
409.22 Short-Circuit Current Rating. An industrial control panel shall not be installed at a point on the electrical system where the available fault current is in excess of its short-circuit current rating as marked per 409.110(3).
Substantiation: The present language in 409.110 includes requirements for short-circuit current rating (SCCR) markings on industrial control panels. In many cases, the SCCR rating for the panel may be less than the interrupting rating(s) of the branch circuit protective devices and SCCR's of other components in the panel, which can lead to confusion to the suitability for the available fault current. The added paragraph provides clear language that the overall SCCR rating on the panel as determined by 409.110(3) is to be used to evaluate suitability.
Similar language can be found in Article 285.6 for TVSS devices and in Paragraph 4.8 of the 2007 NFPA 79.
Panel Meeting Action: Reject
Panel Statement: The submitter's concerns are addressed in Sections 110.3(B) and 110.10.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-10 Log #985 NEC-P11 **Final Action: Reject**
(409.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Multisectional industry control panels shall be bonded together with ~~an equipment grounding~~ conductor in the form of a wire or ~~an equivalent grounding~~ bus sized in accordance with Table 250.122 for the largest overcurrent device protecting the control panel. Equipment grounding conductors shall terminate on this ~~grounding~~ bus or to a grounding termination point provided in a single section industrial control panel.
Substantiation: Edit. Conductors that provide bonding are not generally designated as equipment grounding conductors. Bonding in itself does not necessarily provide grounding.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-11.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-11 Log #1305 NEC-P11 **Final Action: Reject**
(409.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
BONDING. Multisection industrial control panels shall be bonded together with a conductor in the form of a wire sized in accordance with Table 250.122 or a bus of equal or greater ampacity. Wire-type equipment grounding and bonding conductors shall be connected to the bus (if provided) or to equipment grounding terminals in the industrial control panel(s).
Substantiation: "Bonded together" involves bonding conductors, not equipment grounding conductors. Bonding conductors should be specified to be connected to the bus (if provided). The word "provided" implies, but does not require a grounding termination point.
Panel Meeting Action: Reject
Panel Statement: The present language is consistent with the definition of equipment grounding conductors as defined in Article 100. It is recognized that the equipment grounding conductor also performs bonding. Section 250.118 specifies the types of equipment grounding conductors permitted. The submitter's proposed reference to using the largest overcurrent device for sizing the equipment grounding conductor is presently required by 250.122 and is not needed.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-12 Log #3883 NEC-P11 **Final Action: Reject**
(409.102(A))

Submitter: Thomas Hull, E Light Electric Services
Recommendation: Revise text as follows:
Busbars shall be protected from physical damage and ~~be held firmly in place~~ be installed according to manufacturers torque ratings
Substantiation: The word "family" is listed in the NEC Style manual as a word not to be used in the NEC because it is potentially unenforceable. The revised wording is more specific and enforceable.
Panel Meeting Action: Reject
Panel Statement: The submitter's proposal changes the meaning and intent of the section. "Held firmly in place" addresses bracing, whereas torqueing primarily addresses connection integrity. There are situations where bus bars are field fabricated and installed in industrial control panels and do not have manufacturers' recommendations. The submitter's intent is unclear.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-13 Log #3886 NEC-P11 **Final Action: Reject**
(409.102(A))

Submitter: Kathy Garcia, E Light Electric Services
Recommendation: Revise text as follows:
Busbars shall be protected from physical damage and ~~be held firmly~~ shall be installed firmly in place.
Substantiation: The wording of the paragraph above needs to be changed from a busbar being held firmly in place to be installed firmly in place so that the reader of text and installer of equipment are not mislead or confessed about information provided. The text needs to be clear so that no mistakes are made installing busbar properly.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add any clarity to the section.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-14 Log #884 NEC-P11 **Final Action: Accept in Principle**
(409.102(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
Other busbar arrangements for additions to existing installations and the phases shall be effectively identified marked.
Substantiation: Edit. Present wording does not indicate what is to be marked or the purpose of marking.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 11-15.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-15 Log #989 NEC-P11 **Final Action: Accept in Principle in Part**
(409.102(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Other busbar arrangements shall be permitted for additions to existing installations and the phases shall be effectively identified ~~marked~~.
Substantiation: Edit. Present wording does not indicate what is to be marked or the purpose of marking.
Panel Meeting Action: Accept in Principle in Part
Revise the last sentence of 409.102(B) to read:
Other busbar arrangements shall be permitted for additions to existing installations, and the phases shall be permanently ~~effectively identified~~ marked.
Panel Statement: The term "identified" is defined in Article 100 and relates to listings by testing agencies. The present language more accurately describes the identification requirements.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-16 Log #3653 NEC-P11 **Final Action: Reject**
(409.102(B))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(B) Phase Arrangement. The phase arrangement on 3-phase horizontal common power and vertical buses shall be so that when the leads of a phase rotation meter are connected A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the industrial control panel that the phase rotation meter shall indicate a clockwise rotation. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta-connected systems. Other busbar arrangements shall be permitted for additions to existing installations and shall be marked.
Substantiation: As this section is currently written it has no meaning. It appears that the intent is to require a clockwise rotation. If this is not the intent, then the section does not accomplish anything as the terms A, B and C are only arbitrary terms and the section should be deleted from the code.
Panel Meeting Action: Reject
Panel Statement: The added language does not enhance the safety to the installation. The NEC is not a design manual in accordance with 90.1(C).
This is consistent with Sections 408.3(E) on panelboards and switchboards and 430.97(B) on motor control centers.
This section, as written, does provide a benefit. For example, it requires that the middle phase, the B-phase, be the phase with the higher voltage to ground, if such a situation exists.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-17 Log #333 NEC-P11 **Final Action: Accept**
(409.104)

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
409.104 Wiring space ~~in Industrial Control Panels~~.
Substantiation: "In Industrial Control Panels" is redundant to the article's heading.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-18 Log #334 NEC-P11 **Final Action: Reject**
(409.104(A))

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
Industrial control panel enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices, unless associated with the control panel and adequate space for this purpose is provided.
Substantiation: Too often you can shut down the power to a control panel with switches or overcurrent devices to comply with NFPA 70E only to find live wiring not associated with said control panel occupying the same space.
Panel Meeting Action: Reject
Panel Statement: The proposal conflicts with other provisions in the code and is too limiting in scope. Section 312.8 specifically allows what the submitter is proposing to prohibit.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-19 Log #335 NEC-P11 **Final Action: Reject**
(409.104(A))

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
(A) ~~General.~~ Conductors, splices, and taps within industrial control panel enclosures for switches or overcurrent devices.
Substantiation: The existing heading does not effectively describe the content of the article.
Panel Meeting Action: Reject
Panel Statement: The present heading more accurately describes the contents of the section and gives general requirements for wiring within an industrial control panel. The proposed language does not include all of the requirements of the section as stated in the substantiation.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-20 Log #1429 NEC-P11 **Final Action: Accept in Principle in Part**
(409.104(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Industrial control panel enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches, or overcurrent devices, or other equipment unless adequate space for this purpose is provided and the conductors shall not fill the wiring space to more than 40 percent of the cross sectional area at any cross section and taps shall not fill the cross sectional area wiring space at any cross section to more than 75 percent . ~~of the cross sectional area of that space.~~
Substantiation: Edit. Conductors feeding through or tapping off to equipment other than switches or overcurrent devices should be included. "Adequate" is a term to be avoided per the Style Manual, and is effectively covered by the fill requirements.
Panel Meeting Action: Accept in Principle in Part
Revise (A) to read as follows:
(A) General. Industrial control panel enclosures shall not be used as junction boxes, auxiliary gutters, or raceways for conductors feeding through or tapping off to other switches or overcurrent devices or other equipment unless the conductors fill less than 40 percent of the of the cross-sectional area of the wiring space. In addition, the conductors, splices, and taps shall not fill the wiring space at any cross section to more than 75 percent of the cross-sectional

area of that space.
Panel Statement: The addition of the text "or other equipment" improves clarity as these conductors may supply other components, such as contactors or relays. The last part of the last sentence will remain as is. It specifies where the 75% applies and adds to clarity of the intent of this requirement.
The panel editorially changed the first and second sentences for more clarity and usability.
In addition, substantiation was not provided for the removal of the last phrase.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
DESJARLAIS, J.: The first sentence of (A) should be revised as follows "... conductors feeding through or tapping off to other switches, ~~or~~ overcurrent devices or other equipment....". Delete "or" and add comma.

11-21 Log #1161 NEC-P11 **Final Action: Accept in Principle in Part**
(409.106)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Replace existing text and add new table as follows:
~~409.106 Spacing. Spacings between live bare metal parts in feeder circuits shall not be less than specified in Table 430.97.~~
<u>409.106 Spacings. Spacings in feeder circuits between uninsulated live parts of adjacent components, between uninsulated live parts of components and grounded or accessible dead metal parts, between uninsulated live parts of components and the enclosure, and at field wiring terminals, shall be maintained as shown in Table 409.106.</u>
Exception: Spacings shall be permitted to be less than those specified in Table ~~430.97~~ <u>409.106</u> at circuit breakers and switches and in listed components installed in industrial control panels.

Table 409.106 Minimum Spacing Between Bare Metal Parts in Feeder Circuits

	Opposite Polarity Over Surface		Opposite Polarity Through Air		Live Parts to Ground	
	mm	**in.**	**mm**	**in.**	**mm**	**in.**
Nominal Voltage						
Not over 125 volts, nominal	19.1	3/4	12.7	½	12.7	1/2
Not over 250 volts, nominal	31.8	1 ¼	19.1	¾	12.7	½
Not over 600 volts, nominal	50.8	2	25.4	1	25.4	1

Substantiation: The existing text and the reference to Table 430.97 is unclear as to whether it is addressing spacing within components or spacings between components, between components and ground, and at field wiring terminals. The new text and table is based on UL 508A and clarifies that the spacings only apply between components, between components and ground, and at field wiring terminals.
Panel Meeting Action: Accept in Principle in Part
Revise existing 409.106 to read as follows:
409.106 Spacings. Spacings in feeder circuits between uninsulated live parts of adjacent components, between uninsulated live parts of components and grounded or accessible non-current-carrying metal parts, between uninsulated live parts of components and the enclosure, and at field wiring terminals shall be as shown in Table 430.97.
Exception: Spacings shall be permitted to be less than those specified in Table 430.97 at circuit breakers and switches and in listed components installed in industrial control panels.
Panel Statement: The panel revisions to the proposal replaces the term "dead" with "non-current-carrying." The language improves the usability and satisfies the submitter's concern. The panel rejects the insertion of the proposed table. The present reference to Table 430.97 adequately addresses the submitter's intent; accepting the proposed table is redundant. In addition, the word "maintained" was removed because maintenance is beyond the scope of the NEC.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-22 Log #987 NEC-P11 **Final Action: Reject**
(409.108)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence: Where used as service equipment each industrial control panel shall be of the type that is <u>identified</u> ~~suitable~~ for use as service equipment.
Substantiation: Edit. "Suitable" is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The use of the word "suitable" is appropriate in this context. The proposal is, in fact, not simply editorial but would make a change in the requirement.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-23 Log #4465 NEC-P11 **Final Action: Accept in Principle**
(409.110(3))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal concerning the use of the word "when" since the NEC Style Manual considers "when" as a condition of time.
This action will be considered by the panel as a public comment.
Submitter: Robert G. Fahey, City of Janesville
Recommendation: Revise text to read as follows:
409.110 <u>(3) When an industrial control panel is provided with more than one power source such that more than one disconnect switch is required to disconnect all power within the control panel shall be marked: "CAUTION²: Industrial Control Panel is supplied by more than 1 power source.</u>
Renumber existing subsection (3) to (4) and renumber subsequent subsections to follow.
Substantiation: Without the text included in NEC Article 409, the person servicing the industrial control panel may not realize there is more than power supply to the industrial control panel, with this required labeling the personnel servicing the equipment will be better protected from shock hazards or possibly electrocution. This same requirement is found in UL 508A, section 55.4, the Standard which is used for "listed" industrial control panels. I would propose the new wording be the new paragraph (3) so as to follow the wording in paragraph (2) which relates to the incoming supply circuit(s) and renumber the present (3) as (4) and renumber the remaining paragraphs accordingly.

Panel Meeting Action: Accept in Principle
Revise text to read as follows:
409.110 (3) When an industrial control panel is supplied by more than one power source such that more than one disconnecting means is required to disconnect all power within the control panel, it shall be marked to indicate that more than one disconnecting means is required to de-energize the equipment. Renumber existing subsection (3) to (4) and renumber subsequent subsections to follow.
Panel Statement: The action meets the intent of the submitter while improving the clarity.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 410 — LUMINAIRES (LIGHTING FIXTURES), LAMPHOLDERS, AND LAMPS

18-91 Log #2296 NEC-P18 **Final Action: Reject**
(410.1)

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.1 – Revised to
"This article covers luminaires, portable luminaires, lampholders, pendants, incandescent filament lamps, electric-discharge lamps and ballasts, LED drivers, decorative lighting…".
Substantiation: Article also covers ballasts for discharge lamp and LED drivers. The components are specially called out, as there are references to the direct installation of these components, not that they are usually components for luminaires. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.
Panel Meeting Action: Reject
Panel Statement: Ballasts and LED drivers are included in the scope of this article because they are included as part of a luminaire.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-92 Log #2861 NEC-P18 **Final Action: Reject**
(410.2, Exception No. 1 to (2))

Submitter: Randall Clacys, Lone Pine Lake Electric
Recommendation: Add to 410.2:
Lighting in closet storage space shall not be required if the space is not considered habitable.
Substantiation: None given.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-93 Log #994 NEC-P18 **Final Action: Reject**
(410.5 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "floor" to "standing surface".
Substantiation: Edit. There may not be a "floor" per se; standing surface may be earth, platforms, walkways, etc.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-94.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-94 Log #1196 NEC-P18 **Final Action: Reject**
(410.5 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Exception No. 1: Cleat type lampholders located at least 2.5m (8ft) above the floor or standing surface shall be permitted to have exposed terminals. Add: Exception No. 2: Exposed live parts of lighting systems shall be permitted in accordance with 411.5 (C) and (D).
Substantiation: Cleat type lampholders may be installed with open wiring on insulators in agricultural establishments (barns) where there is no "floor", and in lighting systems of 30 volts or less outdoors where there is no floor.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation. See 4.3.3 of the NFPA Regulations Governing Committee Projects. Standing space may include the treads on a stair. Present wording is acceptable, and the proposed changes would only cause confusion as to its intent.
Further, the submitter is requested to review the definition of "floor" in the dictionary, which would include the surfaces in his proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-95 Log #3076 NEC-P18 **Final Action: Reject**
(410.6)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Delete the following text:
~~410.6 Listing Required.~~
~~All luminaires and lampholders shall be listed.~~
Substantiation: This requirement is overly restrictive and should be deleted. There was very inadequate technical substantiation in adding it to the 2008 NEC.
Panel Meeting Action: Reject
Panel Statement: There is no information to support the submitter's statement that there was insufficient technical substantiation to require luminaires and lampholders to be listed.
The submitter does not provide sufficient substantiation. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-96 Log #833 NEC-P18 **Final Action: Reject**
(410.8(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revisit: LUMINAIRE TYPES Only listed luminaries of the following types shall be permitted to be installed in a closet.
Substantiation: Edit. "Permitted" per 90.3(B) does not constitute a requirement.
Panel Meeting Action: Reject
Panel Statement: See 4.3.3 of the NFPA Regulations Governing Committee Projects. The submitter has failed to reference a proper section in the 2008 NEC. The submitter does not seem to be using the 2008 edition of the NEC.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-97 Log #993 NEC-P18 **Final Action: Reject**
(410.10(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Wiring methods and materials supplying the luminaire(s) shall not be ~~exposed within~~ installed on the exposed surface of the cooking hood.
Substantiation: Edit. The definition of exposed applies to wiring methods behind panels which allow access which includes wiring methods so installed which are not subject to vapors or grease.
Panel Meeting Action: Reject
Panel Statement: CMP-18 finds the phrase "installed on the exposed surface" to be vague, confusing, and potentially subject to misinterpretation. Since there is no indication that the present wording has resulted in misinterpretations, CMP-18 finds the current wording acceptable.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-98 Log #4623 NEC-P18 **Final Action: Reject**
(410.10(C)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change the word "identified" to "marked".
Substantiation: Since all luminaires installed pursuant to the current version of Article 410 must be listed, they must also meet the definition of "identified" in Article 100 (recognizable as suitable, etc.). Therefore, this requirement means nothing as worded. Almost surely, what is intended is a marking requirement showing the appropriate use. Identified as defined in Article 100 does not mean marked, and care must be taken to avoid misusing the term.
Panel Meeting Action: Reject
Panel Statement: The term "identified" in Article 100 states "Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-99 Log #2767 NEC-P18 **Final Action: Reject**
(410.10(D))

Submitter: Greg Schmidt, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
(D) Bathtub and Shower Areas. No parts of cord-connected luminaires, chain-, cable-, or cord-suspended luminaires, lighting track, pendants, or ceiling-suspended (paddle) fans shall be located within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. This zone is all encompassing and includes the space directly over the tub or shower stall. Luminaires located within the actual outside dimension of the bathtub or shower to a height of 2.5 m (8 ft) vertically from the top of the bathtub rim or shower threshold shall be marked for damp locations, or marked for wet locations where subject to shower spray, and shall be GFCI protected.
Substantiation: 680.22(C)(4) and 680.43(B)(1)(a-c) requires GFCI protection for luminaires installed in zones surrounding pool and hot tub areas. The same shock hazard exists in bathrooms where Luminaires are installed above shower stalls, bathtubs and hydro-massage tubs. People could come in contact with the luminaire when in the bathtub, shower stall, or hydro-massage tub. In situations when a person may have to re-lamp the luminaire, the area may still be wet. For example: While a person was taking a shower the bulb burns out. The individual, (still in their bathrobe) stands in a wet shower when changing the bulb. The Authority Having Jurisdiction should not have to rely upon the installation instructions of the luminaire to specify GFCI protection and 410.10(D) should cover this requirement.
Panel Meeting Action: Reject
Panel Statement: The submitter has documented no hazard.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-100 Log #1918 NEC-P18 **Final Action: Reject**
(410.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Luminaires and lampholders that operate with a surface temperature higher than 90°C (194°F) shall be clearly marked to indicate a separation distance from combustible material and constructed, installed or equipped with identified means to minimize the likelihood of igniting combustible material.
Substantiation: Lampholders should be included. Unless there is a marking, the installer and AHJ are not likely to be aware of operating temperature.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-101 Log #4624 NEC-P18 **Final Action: Accept in Principle in Part**
(410.11)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "Luminaires" in the title and in the beginning of the text to read "luminaires and lampholders".
Substantiation: This section fails to include lampholders, even though an incandescent lampholder, particularly one with a large lamp, is probably the most potent heat source available. This proposal corrects this oversight.
Panel Meeting Action: Accept in Principle in Part
Add 410.97(New) to Part VIII to read as follows:
410.97 Lampholders Near Combustible Material. Lampholders shall be constructed, installed, or equipped with shades or guards so that combustible material is not subjected to temperatures in excess of 90°C (194°F).
Panel Statement: CMP-18 agrees with the submitter that lampholders need to be addressed.
CMP-18 disagrees that 410.11 is the correct location to change the text. As such, a new section 410.97 is created.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
CARPENTER, F.: The Panel Action text is likely to result in issues concerning enforceability since in most cases the AHJ will not be able to determine if an installation will result in material operating in excess of 90 C. Additionally, the submitter has not provided any data to support a conclusion that a problem exists with current installation practices.

18-102 Log #1917 NEC-P18 **Final Action: Reject**
(410.11(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 410.11 which includes flush and recessed types.
Panel Meeting Action: Reject
Panel Statement: The submitter does not reference a legitimate section of the Code. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-103 Log #992 NEC-P18 **Final Action: Reject**
(410.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "floor" in the last sentence to "standing surface" or "finished grade".
Substantiation: Edit. There may be no "floor" per se; the standing surface may be earth, walkways, platforms, etc.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-94.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-104 Log #747 NEC-P18 **Final Action: Reject**
(410.16)

Submitter: Phillip Hyche, City of Hoover
Recommendation: Revise text to read as follows:
Luminaires in clothes closets (and storage areas).
Substantiation: ● To help with the new definition of clothes closet.
● 2 Fires caused by open bulbs in storage spaces with clothes.
● Clarity between Insp. and Contractor where clothes may be located and cause fire hazard.
Panel Meeting Action: Reject
Panel Statement: No details in the substantiation support the expansion of the requirements to other types of storage areas that are completely undefined.
The submitter is encouraged to write in complete sentences and to elaborate so the panel does not have to guess at what the submitter is trying to convey.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-105 Log #4463 NEC-P18 **Final Action: Accept**
(410.16)

Submitter: Frederick L. Carpenter, Lithonia Lighting
Recommendation: Revise 410.16 as shown below:
410.16 Luminaires in Clothes Closets
(A) Luminaire Types Permitted. Listed luminaires of the following types shall be permitted to be installed in a closet:
(1) ~~A surface-mounted~~ Surface-mounted or recessed incandescent or LED luminaires with ~~a~~ completely enclosed ~~lamp~~ light sources
(2) ~~A surface-mounted~~ Surface-mounted or recessed fluorescent luminaires
(3) Surface-mounted fluorescent or LED luminaires identified as suitable for installation within the closet storage ~~area~~ space
(B) Luminaire Types Not Permitted. Incandescent luminaires with open or partially enclosed lamps and pendant luminaires or lampholders shall not be permitted.
(C) Location. The minimum clearance between luminaires installed in clothes closets and the nearest point of a closet storage space shall be as follows:
(1) 300 mm (12 in.) for surface-mounted incandescent or LED luminaires with a completely enclosed light source installed on the wall above the door or on the ceiling
(2) 150 mm (6 in.) for surface-mounted fluorescent luminaires installed on the wall above the door or on the ceiling
(3) 150 mm (6 in.) for recessed incandescent or LED luminaires with a completely enclosed light source installed in the wall or ceiling
(4) 150 mm (6 in.) for recessed fluorescent luminaires installed in the wall or ceiling
(5) Surface-mounted fluorescent or LED luminaires shall be permitted to be installed within the closet storage space where identified for this use.
Substantiation: 1. The 2008 NEC moved the definition for "Storage Space" from this section to Section 410.2 and renamed the definition "Closet Storage Space". The remaining uses of the terms "storage space" and "storage area" in 410.16 need to be updated to "closet storage space" to be consistent with the definition in 410.2.

2. The 2008 NEC added provisions for the use of LED luminaires in 410.16(C)(1), 410.16(C)(3), and 410.16(C)(5); however, 410.16(A) implies that LED luminaires are only permitted when “identified as suitable for installation within the storage area”. This was only the intent when an installation complies with 410.16(C)(5). This can be rectified by adding the provision for LED luminaires in 410.16(A)(1).

3. 410.16(A)(1) and 410.16(A)(2) should be changed to the plural tense to be consistent with the rest of the section.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-106 Log #1383 NEC-P18 **Final Action: Reject**
(410.16(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise texts:
(A) ~~Listed~~ Only luminaires of the following types shall ~~be permitted to~~ be installed in a closet:
(B) Lampholders and incandescent luminaires with open or partially enclosed lamps and pendant luminaires and lampholders shall not be permitted.
Substantiation: Edit. Luminaires and lampholders are already required to be listed by 410.6. “Permitted” does not entail any requirement per 90.5(B).
Panel Meeting Action: Reject
Panel Statement: Without the words “be permitted to,” the installation of luminaires becomes mandatory in a clothes closet. See 3.1.2 for permissive Rules in the NEC Style Manual.
The substantiation is incorrect in implying that the proposal is editorial, nowhere in the NEC are luminaires required in clothes closets. Therefore, the present wording “permitting” certain types (and not others) is correct.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-107 Log #1921 NEC-P18 **Final Action: Reject**
(410.18)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Luminaires, lampholders, and other equipment installed in coves and which are likely to require inspection or maintenance shall be accessible.
Substantiation: Edit. “Adequately” and “properly” are subjective and terms to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The proposed revision is not considered editorial. Further, it opens the requirement to permit lampholders, which are not permitted in the current wording.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-108 Log #665 NEC-P18 **Final Action: Reject**
(410.19 (New))

Submitter: Michael L. Savage, Sr., Middle Department Inspection Agency, Inc.
Recommendation: Add new Section 410.19 to read as follows:
410.19 Space for Luminaires. A space of not less than 6 in. above a recessed suspended ceiling luminaire shall be maintained clear of all building systems for maintenance and replacement of the luminaire.
Substantiation: It has been my experience while conducting hundreds of electrical inspections on new and old buildings that systems foreign to the luminaires are installed directly over the luminaires, thereby effectively preventing or adversely affecting maintenance and replacements of said luminaires.
Panel Meeting Action: Reject
Panel Statement: The submitter has not indicated that the proposal will eliminate any hazard. It is not the purpose of the code to ensure installations are efficient, convenient, or adequate for good service or future expansion of electrical use. See 90.1(B).
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-109 Log #983 NEC-P18 **Final Action: Accept in Principle in Part**
(410.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Canopies and outlet boxes and fittings taken together shall provide ~~adequate~~ free space for conductors in accordance with 314.16.
Substantiation: Edit. Fittings such as conduit bodies should be included. “Properly” is subjective and a term to be avoided per the Style Manual. Reference to 314.16 is specific.
Panel Meeting Action: Accept in Principle in Part
Revise 410.20 to read as follows:
Canopies and outlet boxes taken together shall provide enough space so that luminaire conductors and their connecting devices shall be installed in accordance with the provisions of 314.16.
Panel Statement: CMP-18 does not accept inclusion of fittings.
The submitter has provided no substantiation for the inclusion of a conduit body in the calculation of volume for a fixture mounted to a box. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-110 Log #1382 NEC-P18 **Final Action: Accept in Principle**
(410.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Canopies and outlet boxes taken together shall comply with 314.16(A) ~~provide adequate space so that luminaires and their connecting devices can be properly installed~~.
Alternatively, delete this section.
Substantiation: Already more comprehensively covered in 314.16(A) which applies. “Adequate” and “properly” are terms to be avoided per the Style Manual.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-109.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-111 Log #2539 NEC-P18 **Final Action: Reject**
(410.20)

Submitter: Edward B. Vogt, Ed Trains
Recommendation: Delete text as follows:
~~410.20. Space for Conductors. Canopies and outlet boxes taken together shall provide adequate space so that luminaire conductors and their connecting devices can be properly installed.~~ (Delete the whole rule)
Substantiation: This rule directly contradicts 314.16 which states: “In no case shall the volume of the box...be less than the fill calculation... “Application of 410.20 for a small box installation could potentially cause ignition of combustible material under the canopy.
Panel Meeting Action: Reject
Panel Statement: The submitter has failed to provide sufficient substantiation for removal of this section. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
The submitter is also requested to look at 314.16(A) where it states “The volume of a wiring enclosure (box) shall be the total volume of the assembled sections and, where used, the space provided by plaster rings, domed covers, extension rings, and so forth, that are marked with their volume or are made from boxes the dimensions of which are listed in Table 314.16(A).”
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-112 Log #2309 NEC-P18 **Final Action: Accept in Part**
(410.24)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with respect to subdivision titles.
This action will be considered by the panel as a public comment.
Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.24 Revise heading to
Connection of Electric-Discharge and LED Type Luminaires
Article 410.24(A) “Electric-discharge and LED type luminaires supported independently…”
Article 410.24(B) “Electric-discharge and LED type luminaires surface mounted…”.
Substantiation: Luminaires employing LED lamp technology will be replacing similar shaped products that have employed fluorescent lamp technology.
Panel Meeting Action: Accept in Part
Revise the heading of 410.24 to read as follows:
Connection of Electric-Discharge and LED Luminaires.
Revise the heading of 410.24(A) to read as follows: Electric-discharge and LED luminaires supported independently…
Revise the heading of 410.24(B) to read as follows: Electric-discharge and LED luminaires surface mounted…
Panel Statement: CMP-18 removed the word “type” from the submitter’s proposed text for consistency.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-113 Log #1095 NEC-P18 **Final Action: Reject**
(410.24(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Electric-discharge lumunaires, where not installed over outlet boxes and where supported independently of ~~the~~ an outlet box or conduit body shall be connected to the branch circuit ~~through metal raceway, nonmetallic raceway, Type MC cable, Type AC cable, Type MI cable, nonmetallic sheathed cable~~ by an identified raceway or cable, or flexible cord as permitted in 410.62(B) or 410.62(C).
Substantiation: Some recessed fixtures are mounted to yokes which incorporate an attached outlet box over the opening required by (B), but the box does not support the fixtures. It is not practical and not designed for connection to these boxes with raceways or cables. Proposal eliminates a laundry list of raceways and cables, requires the raceways and cables to be identified for the purpose, and provides for wiring methods of Articles 394 and 398.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no substantiation to allow the inclusion of UF cable or TC cable to be used in this installation. In his substantiation the submitter refers to sub-part (B), but the proposal deals with the requirements of sub-part (A) only and makes no provisions for access to the conductors in the outlet box.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-114 Log #991 NEC-P18 **Final Action: Reject**
(410.24(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Electric discharge luminaries ~~surface~~ mounted over ~~concealed~~ outlet, pull, or junction boxes ~~and designed to be supported solely by the outlet box~~ shall be provided with ~~suitable~~ openings in the back of the luminaire to provide access to the wiring in the box.
Substantiation: Access should also be required to boxes where luminaries are flush mounted or where surface mounted over surface mounted boxes. Outlet boxes are not permitted to be concealed (rendered inaccessible) per 314.29 and 314.72(D).
Panel Meeting Action: Reject
Panel Statement: Stating that something “should” be done does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.
It appears the submitter does not realize that the luminaire in (B) is designed not to be supported solely by the box. This cannot be readily accomplished with a surface mounted box.
314.29 requires that the wiring in the box be accessible. This section accomplishes this by requiring a suitable opening in the back of the box for access to the wiring.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-115 Log #1381 NEC-P18 **Final Action: Reject**
(410.24(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete: “concealed”.
Substantiation: Concealed outlet boxes (per definition for concealed) are inaccessible and openings in the luminaire will not provide access to inaccessible boxes. 314.29 requires wiring in boxes to be accessible which can’t be accomplished if the boxes are concealed (inaccessible).
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-114.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-116 Log #1994 NEC-P18 **Final Action: Reject**
(410.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first paragraph and substitute: metal or nonmetal poles identified for the use shall be permitted to support luminaires, lampholders, loudspeakers, cameres, and other equipment and to enclose conductors, coaxial cables, or fiber optic cables, and to be used as a raceway mast provided the following conditions are met; Add: (7) Coaxial cables and fiber optic cables shall be supported at the top by identified means if the vertical rise exceeds _____m (_____ft). Identified means shall be provided to prevent strain on termination.
Substantiation: Poles may support more than luminaires and should be permitted to support aerial spans and used as a raceway mast. Coaxial and fiber optic cables should be included. If proposal is accepted, the panel can determine support intervals for vertical rise of coaxial and fiber optic cables.
Panel Meeting Action: Reject
Panel Statement: The submitter has given no substantiation to support the mixing of line voltage and coaxial cables, fiber optic cables, or service conductors in the same raceway or enclosure. There is no data included to support the aerial spans the submitter has suggested. The proposal is in violation of sections 230.7, 725.48(B), and 820.47.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-117 Log #1386 NEC-P18 **Final Action: Reject**
(410.30(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change “suitable” to “identified”.
Substantiation: Suitable is subjective and a term to be avoided per the Style Manual; “identified” is defined.
Panel Meeting Action: Reject
Panel Statement: The submitter provides no information to substantiate the requirement for listing of poles. This would suggest that materials such as wood need to be listed. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-118 Log #3320 NEC-P18 **Final Action: Reject**
(410.30(C)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: and not less than specified in 406.2(B).
Substantiation: Edit. Correlation with 406.2 (B).
Panel Meeting Action: Reject
Panel Statement: See 4.3.3 of the NFPA Regulations Governing Committee Projects. The submitter has failed to reference a proper section in the 2008 NEC. The submitter does not seem to be using the 2008 edition of the NEC.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-119 Log #1041 NEC-P18 **Final Action: Reject**
(410.30(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
and not less than 15 amperes.
Substantiation: This section appears to conflict with 406.2(B) which requires a minimum ampere rating of 15 amperes since 125 percent of a luminaire load current may be substantially less than 15 amperes.
Panel Meeting Action: Reject
Panel Statement: See 4.3.3 of the NFPA Regulations Governing Committee Projects. The submitter has failed to reference a proper section in the 2008 NEC. The submitter does not seem to be using the 2008 edition of the NEC.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-120 Log #3319 NEC-P18 **Final Action: Reject**
(410.31)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Except as permitted in 410.32 luminaires (fixtures) shall not be used as a raceway ~~for circuit conductors~~ unless listed and marked for use as a raceway.
Substantiation: Edit. Correlation with 410.32. “Circuit conductors” may be deemed not to include grounding and bonding conductors and optical fiber cables.
Panel Meeting Action: Reject
Panel Statement: See 4.3.3 of the NFPA Regulations Governing Committee Projects. The submitter has failed to reference a proper section in the 2008 NEC. The submitter does not seem to be using the 2008 edition of the NEC.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-121 Log #1421 NEC-P18 **Final Action: Reject**
(410.40)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
General. Metal luminaires and lampholders shall be grounded ~~as required in Article 250~~ and comply with Part V of this article.
Substantiation: Article 250 has exceptions and alternatives to grounding which conflict with (A) and 410.46 which have no such provisions.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not specify where any conflict exists with Article 250.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-122 Log #4541 NEC-P18 **Final Action: Reject**
(410.40 and 410.42)

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
410.40 General.
Luminaires and lighting equipment shall be grounded as required in 250.112(J) ~~Article 250 and Part V of this article~~.
410.42 ~~**Exposed Luminaire.**~~
~~**(A) Exposed Conductive Parts.** Exposed metal parts shall be connected to an equipment grounding conductor or insulated from the equipment grounding conductor and other conducting surfaces or be inaccessible to unqualified personnel. Lamp tie wires, mounting screws, clips, and decorative bands on glass spaced at least 38 mm (1½ in.) from lamp terminals shall not be required to be grounded.~~
~~**(B) Made of Insulating Material.** Luminaires directly wired or attached to outlets supplied by a wiring method that does not provide a ready means for grounding attachment to an equipment grounding conductor shall be made of insulating material and shall have no exposed conductive parts.~~
~~*Exception No. 1: Replacement luminaires shall be permitted to connect an equipment grounding conductor from the outlet in compliance with 250.130(C). The luminaire shall then comply with 410.42(A).*~~
~~*Exception No. 2: Where no equipment grounding conductor exists at the outlet, replacement luminaires that are GFCI protected shall not be required to be connected to an equipment grounding conductor.*~~
~~**410.44**~~ **Equipment Grounding Conductor Attachment.**
Luminaires with exposed metal parts shall be provided with a means for connecting an equipment grounding conductor for such luminaires.
~~**410.46 Methods of Grounding.**~~
~~Luminaires and equipment shall be mechanically connected to an equipment grounding conductor as specified in 250.118 and sized in accordance with 250.122.~~
Substantiation: This proposal intends to move the installation requirements for luminaires to 250.112(J) under the jurisdiction of CMP-5. The construction requirements are appropriate to remain in Article 410.
Panel Meeting Action: Reject
Panel Statement: 250.112(J) contains no requirements for grounding luminaires other than a reference to part V of this article, which would be removed by this proposal.
CMP-18 objects to moving these installation requirements to Article 250.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-123 Log #982 NEC-P18 **Final Action: Reject**
(410.40(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~A~~ An identified means shall be provided in each metal box and cabinet for the connection of ~~an~~ a wire-type equipment grounding or bonding conductor. The means shall be permitted to be a tapped hole with at least two machine screw threads or a nut and bolt connection.
Substantiation: This provision appears related to wire type conductors. The means should be identified for the use. Nut and bolt connections are usually one identified means.
Panel Meeting Action: Reject
Panel Statement: The submitter does not reference a legitimate section of the code. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-124 Log #1420 NEC-P18 **Final Action: Reject**
(410.42(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
(A) Exposed ~~Conductive~~ Parts Luminaires. Exposed metal parts of luminaires and lampholders shall be...". (remainder unchanged)
(B) Made of Insulating Materials. Luminaires and lampholders directly wired or attached to outlets...". (remainder unchanged).
Exception No. 1: Replacement luminaires and lampholders shall be permitted...". (remainder unchanged).
Exception No. 2: Where no equipment grounding conductor exists at the outlet, replacement luminaires and lampholders that are GFCI protected...". (remainder unchanged).
Substantiation: This article covers lampholders such as for floodlights, which should be included in the provisions.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been given for adding lampholders to the requirements. Additionally, CMP-18 notes that floodlights are luminaires, not lampholders.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-125 Log #1303 NEC-P18 **Final Action: Reject**
(410.42(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Replacement luminaires and lampholders directly wired or attached to outlets supplied by an existing wiring method that does not provide a ~~ready~~ means for grounding ~~attachment to an equipment grounding conductor~~ shall have enclosures made of ~~insulating~~ nonconductive material and shall have no exposed conductive parts.
Substantiation: Since practically all wiring methods are required to provide an equipment grounding conductor, this provision should apply to existing installations as does 250.130(C) and replacement fixtures. Present wording can be construed as a retroactive requirement.
Panel Meeting Action: Reject
Panel Statement: Lampholders are not luminaires. Product standards for them do not require a ground.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-126 Log #1419 NEC-P18 **Final Action: Reject**
(410.44)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "lampholders" after "luminaries".
Substantiation: This provision should also apply to lampholders.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-127 Log #1954 NEC-P18 **Final Action: Reject**
(410.45)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Lamps shall not be located where ~~normally~~ likely to be subject ~~exposed~~ to physical damage.
Substantiation: Edit. "Normally" is a term to be avoided per the Style Manual. "Likely" is defined as a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter does not reference a legitimate section of the code. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-128 Log #1418 NEC-P18 **Final Action: Reject**
(410.46)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Metal luminaires and lampholders shall be..." (remainder unchanged).
Alternatively, delete this section.
Substantiation: Metal should be specified and lampholders included. This section is superfluous; already covered by Article 250 which applies.
Panel Meeting Action: Reject
Panel Statement: Lampholders are not luminaires. Product standards for them do not require a ground.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-129 Log #1304 NEC-P18 **Final Action: Reject**
(410.52)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "suitable" to "identified".
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: "Suitable" is an appropriate term. A conductor current is not identified.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-130 Log #3122 NEC-P18 **Final Action: Reject**
(410.53 (New))

TCC Action: The Technical Correlating Committee directs that the chairs of Code-Making Panels 9 and 18 establish a Task Group to review Proposal 9-75 and 18-130 with regard to application within their respective articles.
Submitter: Patricia Barron, Safety Quick Light
Recommendation: Add the following new text:
Luminaires shall be designed with a power plug for mating with receptacle in accordance with 314.27(A).
Substantiation: Statement Of Problem – There are many cases of electrocutions and accidents that occur during installations of luminaires, that result in a significant amount of **injuries, including death**.
Substantiation for Proposal - There is a receptacle and plug system available designed for **safe** installation of luminaires that enables luminaires to be simply plugged "in" or "out" **without touching any wires.** This type of system will **save lives** and substantially **reduce or eliminate electrocutions or accidents** caused during installation of light fixtures or even when replacing light bulbs. If the outlet box is supplied with the safety receptacle, luminaires for ceiling or wall become plug "in" to install and "out" to remove **safely and simply** without touching wires. Luminaires can be unplugged from the branch circuit when changing bulbs or maintenance and plugged in safely when done. **There are cases of death and severe injury even** when changing light bulbs. This type of luminaire receptacle and plug system will **save lives and prevent injuries** and **needs** to be implemented into the code. Please refer to attached report outlining cases of electrocution
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Installation of this device has the same level of risk as installing a luminaire. There is no compelling reason to believe that a user would remove the luminaire before relamping and if they did they would be exposed to conductors and splices in the outlet box, which should be avoided by untrained individuals.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-131 Log #1417 NEC-P18 **Final Action: Reject**
(410.62(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "and lampholders" after "luminaires".
Substantiation: The provision should also apply to lampholders such as for floodlights.
Panel Meeting Action: Reject
Panel Statement: Stating that something "should" be done does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.
The submitter has failed to provide sufficient substantiation for this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-132 Log #2712 NEC-P18 **Final Action: Reject**
(410.62(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Adjustable luminaires and lampholders that are secured in place shall be permitted to be connected by identified flexible wiring methods. Where connected by flexible cord, the cord shall be hard-usage or extra-hard usage type identified for the use and contain an equipment grounding conductor. The wiring method shall not be longer than necessary for maximum adjustment and shall not be subject to strain at terminations. A flexible cord shall be permitted to be permanently connected or shall be provided with a grounding-type attachment plug.
Substantiation: The provision should apply to fixed equipment and include lampholders such as for floodlights and spotlights. Flexible wiring methods other than cords should be included. Cords should be identified for the purpose, e.g., wet locations, sunlight resistance, etc. All hard usage and extra hard usage cords are not suitable such as electric vehicle cables. Physical damage is covered by 400.8(7) as are other wiring methods.
Panel Meeting Action: Reject
Panel Statement: Stating that something "should" be done does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.
Certain other flexible wiring methods are acceptable for connection of adjustable luminaries, but they should not be included in 410.62(B) since the title of the section is "Cord-Connected Lampholders and Luminaires". Lampholders are covered in 410.62(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-133 Log #2308 NEC-P18 **Final Action: Accept in Part**
(410.62(C))

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.62(C) Revise heading to
Electric-Discharge and LED Type Luminaires.
Substantiation: The rules written for a fluorescent type "shop lights" would also be appropriate for the same luminaire type, but which employs LED lamp technology.
Panel Meeting Action: Accept in Part
Article 410.62(C) Revise heading to read as follows:
Electric-Discharge and LED Luminaires.
Panel Statement: CMP-18 removed "type" from the submitter's proposal for consistency.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-134 Log #4625 NEC-P18 **Final Action: Reject**
(410.62(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Editorially revise this material as follows:
(C) Electric-Discharge Luminaires. Electric discharge luminaires shall comply with (1) unless either (2) or (3) specifically apply to the application.
(1) Cord-Connected Installations. Luminaires in compliance with any of the conditions in (a) through (c) shall be permitted to be cord connected provided the luminaire is located directly below the outlet or busway and the cord is not be subject to strain or physical damage.
(a) Plug-Connected. A luminaire shall be permitted to be connected with a cord terminating in a grounding-type attachment plug or busway plug.
(b) Strain Relief and Canopy Provided. A luminaire assembly equipped with a strain relief and canopy shall be permitted to use a cord connection between the luminaire assembly and the canopy. The canopy shall be permitted to include a section of raceway not over 150 mm (6 in.) in length and intended to facilitate the connection to an outlet box mounted above a suspended ceiling.
(c) Manufactured Wiring Systems. Listed assemblies incorporating manufactured wiring system connectors in accordance with 604.6(C), shall be permitted to be cord connected.
[No changes to (2) or (3).]
Substantiation: This proposal begins by setting a relationship between (1), and (2) and (3) which necessary because all three numbered items address cord-connected luminaires. The first topic is restructured to put the requirements that apply to the entire number (1) in the parent text and then listing the three remaining conditions in a rule rather than a list format. This allows for parallel construction and the use of complete sentences. The overall effect is to break up a 62-word run-on sentence that is almost impossible to read. The soft conversion on the length of the nipple is converted to a hard conversion in accordance with 90.9(B).
Panel Meeting Action: Reject
Panel Statement: The submitter in his rewording of 410.62(C) left out several key components of the existing section. For instance, he did not include the requirement of cord visibility and the requirements that the luminaire be directly below the outlet or busway.
The submitter does not understand the relationship of (1), (2), and (3) of 410.62(C). An installation must comply with (1) even if it complies with (2), or (3).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-135 Log #2579 NEC-P18 **Final Action: Reject**
(410.62(C)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
Receptacles. Cord connectors, flanged surface devices, and attachment plugs shall be permitted to be of a lower ampere rating than the branch circuit but not less than 125 percent of the luminaire or lampholder ~~full-load~~ rated current and not less than specified in 406.2(B).
Substantiation: Edit. The provision should include cord connectors and flanged surface devices and a minimum rating specified in 406.2(B) for correlation.
Panel Meeting Action: Reject
Panel Statement: Flanged surface devices and cord connectors are covered in 410.62(C)(3). The submitter has given no substantiation as to why they should be moved into 410.62(C)(2).
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-136 Log #1328 NEC-P18 **Final Action: Reject**
(410.62(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Electric discharge luminaires equipped with a flanged surface inlet shall ~~be permitted to~~ be supplied by flexible cord pendants equipped with a cord connector.
Substantiation: Edit. "Permitted" per 90.5(B) does not impose any requirement for a cord or connector.
Panel Meeting Action: Reject
Panel Statement: The flanged surface inlet may be also supplied by a metallic raceway. The submitter has given no substantiation for removal of other wiring methods from this section. See 3.1.2 of the NEC Style Manual for permissive rules.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-136a Log #CP1803 NEC-P18 **Final Action: Accept**
(410.64)

Submitter: Code-Making Panel 18,
Recommendation: Revise 410.64 to read as follows:
410.64 Luminaires as Raceways. Luminaires shall not be used as a raceway for circuit conductors unless they comply with 410.64(A), 410.64(B), or 410.64(C).
(A) Listed. Luminaires listed and marked for use as a raceway shall be permitted to be used as a raceway.
(B) Through-Wiring. Luminaires identified for through-wiring, as permitted by 410.21, shall be permitted to be used as a raceway.
(C) Luminaires Connected Together. Luminaires designed for end-to-end connection to form a continuous assembly, or luminaires connected together by recognized wiring methods, shall be permitted to contain the conductors of a 2-wire branch circuit, or one multiwire branch circuit, supplying the connected luminaires and need not be listed as a raceway. One additional 2-wire branch circuit separately supplying one or more of the connected luminaires shall also be permitted.
FPN: See Article 100 for the definition of Multiwire Branch Circuit.
Delete 410.65 and its FPN.
In 410.21, change the FPN to read as follows:
FPN: See 410.64(C) for wiring supplying power to fixtures connected together.
Substantiation: To address the concerns expressed by the submitters of proposals 18-138 and 18-139, 410.64 was rewritten to include the requirements of 410.65. Additionally, a reference to 410.21 was added for clarity. This rewrite improves the usability of the code; it does not make any changes to the requirements.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-137 Log #877 NEC-P18 **Final Action: Reject**
(410.64)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Luminaires shall not be used as a raceway for circuit conductors or junction point for conductors supplying other equipment unless listed and ~~marked~~ identified for such use ~~as a raceway~~ except as permitted in 410.65.
Substantiation: Electric — discharge luminaires should not be used as junction boxes. 410.65 doesn't require listing as a raceway.
Panel Meeting Action: Reject
Panel Statement: The submitter has given no substantiation for this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Without a junction point, there is no way an installer could make electrical connections to the ballast.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-138 Log #1416 NEC-P18 **Final Action: Accept in Principle**
(410.64)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
"Except as permitted in 410.65 luminaires shall not be used as a raceway..." (remainder unchanged)
Substantiation: Present requirement conflicts with 410.65.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-136a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-139 Log #3654 NEC-P18 **Final Action: Accept in Principle**
(410.64 and 410.65)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Delete 410.65 and make that deleted wording an exception to 410.64.
Substantiation: This is an example of where the policy of writing everything in positive text is not user friendly and actually makes the coder harder, not easier to use. If you are installing luminaires and are thinking about running the circuit(s) through the luminaire, you would go to the code book and find your answer in section 410.64. At this point, because there are no exceptions to 410.64 the user has no reason to read additional code sections. If the text that is now found in 410.65 were to be an exception, then the user would have reason to read that text and find out that there are, in fact, cases where you are permitted to use the luminaire as a raceway.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-136a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-140 Log #876 NEC-P18 **Final Action: Reject**
(410.65)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Luminaires not listed and marked for use as a raceway and ~~designed~~ identified as suitable for end-to-end connections to form a continuous assembly, or luminaires connected together by ~~recognized~~ approved wiring methods, shall be permitted to contain the conductors of a 2-wire branch circuit or one multiwire branch circuit supplying the connected luminaires ~~and need not be marked as a raceway~~.
Substantiation: "Recognized" is not defined; many wiring methods recognized by the Code may not be suitable. "Need not be listed" doesn't prohibit listing and if listed this section doesn't correlate with 410.64.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
See panel action and statement on Proposal 18-136a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-141 Log #1415 NEC-P18 **Final Action: Reject**
(410.65)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "recognized" to "identified".
Substantiation: Edit. All wiring methods in this Code are "recognized" but not necessarily suitable for use (identified).
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects for the substantiation does not contain a statement of the problem.
The proposed change is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-142 Log #1414 NEC-P18 **Final Action: Reject**
(410.68)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Feeder and branch circuit conductors within 75 mm (3 in.) of a ballast shall have an insulation temperature rating not lower than 90°C (194°F) ~~unless supplying a luminaire marked as suitable for a different insulation temperature rating~~ and not less than the insulation temperature rating marked on the luminaire or ballast.
Substantiation: Edit. Present wording permits 90°C rating if the luminaire is marked with a "different" rating, which includes one with a higher than 90°C. A luminaire or ballast marked for lower than 90°C conductors may be replaced with one not so marked. The 90°C rating should be a minimum.
Panel Meeting Action: Reject
Panel Statement: The proposed revision is not considered editorial.
The submitter has provided no substantiation of a problem to support this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Ballasts are not required to be marked with a temperature rating.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-143 Log #1925 NEC-P18 **Final Action: Reject**
(410.68)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: ~~BRANCH CIRCUIT~~ CONDUCTORS and BALLASTS. ~~Branch circuit~~ Insulated conductors within 75 mm (3 in.) of a ballast shall have an insulation temperature rating not less than 90°C (194°F) unless supplying a luminaire (fixture) ~~marked as suitable for a different temperature~~ and not lower than the temperature marked on the ballast or luminaire.
Substantiation: Conductors other than branch circuit conductors (if insulated) should be included; 410.64 permits feeder conductors in fixtures used as raceways. The 90°C rating should be the minimum since a ballast with a lower marked rating may be replaced. The phrase "suitable for a different insulation temperature" includes a lower than 90°C rating which permits a 60°C or 75°C conductor insulation. "Different" doesn't necessarily mean higher.
Panel Meeting Action: Reject
Panel Statement: Stating that something "should" be done does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.
The submitter has provided no substantiation of a problem to support this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Ballasts are not required to be marked with their temperature rating.
It appears that the wording in the proposal is not the text in the 2008 NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-144 Log #2307 NEC-P18 **Final Action: Accept in Principle in Part**
(410.68)

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.68 Revise to
"Feeder and branch-circuit ~~conductors~~ wires within 75 mm (3 inch) of a ballast or LED driver shall have an insulation temperature rating not lower than 90 °C …".
Substantiation: LED drivers that UL lists (even the Class 2 output type) are limited to either 75 °C or 90 °C, depending on which standard was used to evaluate the device. In many ways, the installation rules established for discharge lighting ballasts over years will carry over to LED drivers. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.
Also "wire" rather than "conductor" would be more appropriate here since the context is about the spacing of an insulated wire, not the spacing to the internal conductor.
Panel Meeting Action: Accept in Principle in Part
Revise recommended text to read as follows:
410.68 Feeder and branch-circuit conductors within 75 mm (3 in.) of a ballast, LED driver, power supply, or transformer shall have an insulation temperature rating not lower than 90°C (194°F) unless supplying a luminaire marked as suitable for a different insulation temperature.
Panel Statement: CMP-18 does not accept the change from conductors to wires. The term "conductors" is used throughout this code.
Power supplies and transformers were added to create a more inclusive list.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-145 Log #986 NEC-P18 **Final Action: Reject**
(410.74(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
The electrical rating shall include the type of current, ac or dc, or both, voltage, and frequency, and shall indicate...". (remainder unchanged)
Substantiation: Edit. A rating for ac or dc should be required.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-146 Log #2306 NEC-P18 **Final Action: Accept in Principle**
(410.74(B))

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.74(B) Revise to
"The electrical rating shall include the voltage and frequency and shall indicate the current rating of the unit, including the LED driver, ballast, transformer, or autotransformer."
Substantiation: LED driver is another component load that would be referred to by its current. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.
Panel Meeting Action: Accept in Principle
410.74(B) to read as follows:
The electrical rating shall include the voltage and frequency and shall indicate the current rating of the unit, including the ballast, transformer, LED driver, power supply, or autotransformer.
Panel Statement: CMP-18 added power supply to create a more inclusive list.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-147 Log #1302 NEC-P18 **Final Action: Reject**
(410.76)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "suitable" to "identified".
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter provides no information to substantiate the requirement for listing. This would suggest that materials such as wood need to be listed.
See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-148 Log #2734 NEC-P18 **Final Action: Accept**
(410.76)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.76 Design and Material.~~
~~Luminaires shall be constructed of metal, wood, or other material suitable for the application and shall be designed and assembled so as to secure requisite mechanical strength and rigidity. Wiring compartments, including their entrances, shall be designed and constructed to permit conductors to be drawn in and withdrawn without physical damage.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.76 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-149 Log #2158 NEC-P18 **Final Action: Accept**
(410.77)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:
~~410.77 Nonmetallic Luminaires.~~
~~When luminaire wiring compartments are constructed from combustible material, armored or lead-covered conductors with suitable fittings shall be used or the wiring compartment shall be lined with metal.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.77 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-150 Log #2736 NEC-P18 **Final Action: Accept**
(410.77)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.77 Nonmetallic Luminaires.~~
~~When luminaire wiring compartments are constructed from combustible material, armored or lead-covered conductors with suitable fittings shall be used or the wiring compartment shall be lined with metal.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.77 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-151 Log #2159 NEC-P18 **Final Action: Accept**
(410.78)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:
~~410.78 Mechanical Strength.~~
~~(A) Tubing for Arms. Tubing used for arms and stems where provided with cut threads shall not be less than 1.02 mm (0.040 in.) in thickness and, where provided with rolled (pressed) threads, shall not be less than 0.64 mm (0.025 in.) in thickness. Arms and other parts shall be fastened to prevent turning.~~
~~(B) Metal Canopies. Metal canopies supporting lampholders, shades, and so forth exceeding 4 kg (8 lb), or incorporating attachment plug receptacles, shall not be less than 0.51 mm (0.020 in.) in thickness. Other canopies shall not be less than 0.41 mm (0.016 in.) if made of steel and not less than 0.51 mm (0.020 in.) if of other metals.~~
~~(C) Canopy Switches. Pull type canopy switches shall not be inserted in the rims of metal canopies that are less than 0.64 mm (0.025 in.) in thickness, unless the rims are reinforced by the turning of a bead or the equivalent. Pull type canopy switches whether mounted in the rims or elsewhere in sheet metal canopies, shall not be located more than 90 mm 31/2 in.) from the center of the canopy. Double set screws, double canopy rings, a screw ring, or equal method shall be used where the canopy supports a pull type switch or pendant receptacle.~~
~~The thickness requirements in the preceding paragraph shall apply to measurements made on finished (formed) canopies.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.78 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-152 Log #2737 NEC-P18 **Final Action: Accept**
(410.78)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.78 Mechanical Strength.~~
~~(A) Tubing for Arms. Tubing used for arms and stems where provided with cut threads shall not be less than 1.02 mm (0.040 in.) in thickness and, where provided with rolled (pressed) threads, shall not be less than 0.64 mm (0.025 in.) in thickness. Arms and other parts shall be fastened to prevent turning.~~
~~(B) Metal Canopies. Metal canopies supporting lampholders, shades, and so forth exceeding 4 kg (8 lb), or incorporating attachment-plug receptacles, shall not be less than 0.51 mm (0.020 in.) in thickness. Other canopies shall not be less than 0.41 mm (0.016 in.) if made of steel and not less than 0.51 mm (0.020 in.) if of other metals.~~
~~(C) Canopy Switches. Pull-type canopy switches shall not be inserted in the rims of metal canopies that are less than 0.64 mm (0.025 in.) in thickness, unless the rims are reinforced by the turning of a bead or the equivalent. Pull-type canopy switches, whether mounted in the rims or elsewhere in sheet metal canopies, shall not be located more than 90 mm (31/2 in.) from the center of the canopy. Double set screws, double canopy rings, a screw ring, or equal method shall be used where the canopy supports a pull-type switch or pendant receptacle.~~
~~The thickness requirements in the preceding paragraph shall apply to measurements made on finished (formed) canopies.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.78 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-153 Log #2160 NEC-P18 **Final Action: Accept**
(410.79)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:
~~410.79 Wiring Space.~~
~~Bodies of luminaires, including portable luminaires, shall provide ample space for splices and taps and for the installation of devices, if any. Splice compartments shall be of nonabsorbent, noncombustible material.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.79 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-154 Log #2738 NEC-P18 **Final Action: Accept**
(410.79)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.79 Wiring Space.~~
~~Bodies of luminaires, including portable luminaires, shall provide ample space for splices and taps and for the installation of devices, if any. Splice compartments shall be of nonabsorbent, noncombustible material.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.79 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-155 Log #980 NEC-P18 **Final Action: Reject**
(410.82(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Where used with Edison base lampholders the grounded conductor shall be ~~identified and~~ attached to the screw shell and the ~~identified blade~~ grounded conductor terminal of the attachment plug.
Substantiation: Edit. Grounded conductors are already required to be identified. Some plugs may have prongs. “Identified blade” is not specific; ungrounded blades and grounding blades are also identified.
Panel Meeting Action: Reject
Panel Statement: The submitter failed to provide sufficient substantiation for the removal of the requirement for identification of the grounded conductor. He also failed to provide sufficient substantiation for the change to grounded conductor terminal instead of identified blade.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-156 Log #2161 NEC-P18 **Final Action: Accept**
(410.85)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:
~~410.85 Tests.~~
~~All wiring shall be free from short circuits and ground faults as defined in 250.2 and shall be tested for these defects prior to being connected to the circuit.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.85 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-157 Log #2739 NEC-P18 **Final Action: Accept**
(410.85)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.85 Tests.~~
~~All wiring shall be free from short circuits and ground faults as defined in 250.2 and shall be tested for these defects prior to being connected to the circuit.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.85 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-158 Log #1385 NEC-P18 **Final Action: Reject**
(410.86)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
~~Exposed~~ Live parts within porcelain luminaires shall be ~~suitably~~ recessed ~~and located so as to make it improbable that wires can come in contact with them~~.
Substantiation: Edit. Listed luminaires (410.6) are unlikely to have exposed (see definition) live parts. Live parts (terminals) must have live wires in contact with them or they cannot be energized. “Suitable” is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter failed to submit sufficient substantiation for this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
See panel action and statement on Proposal 18-159.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-159 Log #1775 NEC-P18 **Final Action: Accept in Part**
(410.86)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete, or substitute: Live terminals within luminaires shall be insulated, recessed, or located to provide a spacing not less than 13 mm (1/2 in.) between live parts and the mounting plane of the luminaire or lampholder and between live terminals and noncurrent-carrying metal parts of the luminaire or lampholder.
Substantiation: It is not clear whether this provision is intended for a porcelain or plastic lampholder intended for mounting on an outlet box. Live parts of luminairies and lampholders necessarily have to be in contact with wires in order to be “live”. This provision appears superfluous since listing is required and not likely to include exposed live parts. If retained, it should apply whether the material is porcelain, plastic, or metal.
Panel Meeting Action: Accept in Part
Delete 410.86.
Panel Statement: CMP-18 chose to delete this section but not to substitute text.
CMP-18 is baffled by the submitter’s statement that “It is not clear whether this provision is intended for a porcelain or plastic lampholder intended for mounting on an outlet box” since the requirement specifically addresses “Exposed live parts within porcelain luminaires”. The proposal would expand the requirement to all luminaires and lampholders. The submitter has provided no substantiation for expanding the requirement to all luminaires and lampholders.
The submitter has failed to submit sufficient substantiation for this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
However, CMP-18 concludes that these are product standard requirements and no longer needed since the inclusion of 410.6 of the 2008 NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-160 Log #2642 NEC-P18 **Final Action: Accept in Part**
(410.86)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise as follows: ~~Exposed~~ Uninsulated live parts within porcelain luminaries and lampholders shall be ~~suitable~~ recessed ~~so as to make it improbable that wires come into contact with them~~ with a spacing of ~~at least~~ not less than 13 mm (1/2 in.) between uninsulated live parts and grounded metal parts and the mounting plane of the luminaire or lampholder.
Substantiation: This section can be deleted as 410.6 requires listing whereby such provisions, if applicable, would be addressed. It is unlikely that listed luminaires and lampholders have exposed live parts. (see definition). Parts within fixtures cannot be live unless in contact with a wire. it appears this rule may have been originally intended to apply to porcelain lampholders designed for installation on an outlet box. If within a fixture, live parts are not exposed, per definition.
Panel Meeting Action: Accept in Part
Panel Statement: See panel action and statement on Proposal 18-159.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-161 Log #1384 NEC-P18 **Final Action: Reject**
(410.96)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Lampholders installed in wet or damp locations shall be ~~of the weatherproof~~ identified for the location.
Substantiation: Porcelain and plastic lampholders are commonly installed in basements, crawl spaces, etc., which may be considered damp at times. Boxes on which they are mounted are not required to be weatherproof nor is the NM cable by which they are commonly wired (normally dry locations).
Panel Meeting Action: Reject
Panel Statement: The substantiation notes that NM cable may be used to wire these boxes, yet the code in section 334.12(B)(4) specifically prohibits the use of NM cable in wet or damp locations. The section specifically references wet or damp locations.
The submitter has failed to provide sufficient substantiation to support his proposal. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Installations that are in violation to the current requirement are insufficient substantiation for changing the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-162 Log #2162 NEC-P18 **Final Action: Accept**
(410.100)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:
~~410.100 Insulation.~~
~~The outer metal shall and the cap shall be lined with insulating material that prevents the shell and cap from becoming a part of the circuit. The lining shall not extend beyond the metal shell more than 3 mm (1/8 in.) but shall prevent any current carrying part of the lamp base from being exposed when a lamp is in the lampholding device.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.100 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-163 Log #2740 NEC-P18 **Final Action: Accept**
(410.100)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.100 Insulation.~~
~~The outer metal shell and the cap shall be lined with insulating material that prevents the shell and cap from becoming a part of the circuit. The lining shall not extend beyond the metal shell more than 3 mm (1/8 in.) but shall prevent any current-carrying part of the lamp base from being exposed when a lamp is in the lampholding device.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.100 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-164 Log #2163 NEC-P18 **Final Action: Accept**
(410.102)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:
~~410.102 Switched Lampholders.~~
~~Switched lampholders shall be of such construction that the switching mechanism interrupts the electrical connection to the center contact. The switching mechanism shall also be permitted to interrupt the electrical connection to the screw shell if the connection to the center contact is simultaneously interrupted.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.102 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-165 Log #2741 NEC-P18 **Final Action: Accept**
(410.102)

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Delete text as follows:
~~410.102 Switched Lampholders.~~
~~Switched lampholders shall be of such construction that the switching mechanism interrupts the electrical connection to the center contact. The switching mechanism shall also be permitted to interrupt the electrical connection to the screw shell if the connection to the center contact is simultaneously interrupted.~~
Substantiation: The addition of 410.6 in the 2008 NEC requiring that all luminaires must be listed brings in all of the construction and safety requirements of the appropriate standards for safety. 410.102 is material that is better covered by the appropriate standard for safety and, therefore, should be deleted from the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-166 Log #3000 NEC-P18 **Final Action: Accept**
(410.110)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
410.110 General.
Luminaires installed in recessed cavities in walls or ceilings, including suspended ceilings, shall comply with 410.115 through 410.122.
Substantiation: This proposal is made in an effort to assist the panel in complying with section 6.6 of the regulations governing committee projects. There has been a long standing formal interpretation addressing this issue, and this proposal eliminates the need for it.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-167 Log #3273 NEC-P18 **Final Action: Accept in Principle**
(410.116(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence:
The points of support and the trim finish ~~off the opening in the ceiling or wall surface~~ shall be permitted to be in contact with combustible materials.
Substantiation: Editorial. The proposed deletion is unnecessary for application of this section Recessed luminaries may be installed in other than ceilings or walls, e.g., in bottoms of cabinets.
Panel Meeting Action: Accept in Principle
Change 410.116(A)(1) to read as follows:
The points of support and the trim finishing off the openings in the ceiling, wall, or other finished surface shall be permitted to be in contact with combustible materials.
Panel Statement: The change to the second sentence accomplishes the intent of the submitter.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-168 Log #2305 NEC-P18 **Final Action: Accept in Principle**
(410.116(B))

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.116(B) Revise to
Thermal insulation shall not be installed above a recessed luminaire or within 75 mm (3 inch) of the recessed luminaire's enclosure, wiring compartment, ~~or~~ ballast, or LED driver, unless ~~it~~ the luminaire is identified "Type IC", for insulation contact. ~~for contact with insulation, Type IC.~~
Substantiation: LED drivers could also be applicable here. This article is in regard to recessed installations, compared to Article 410.136, which is in regard to surface mounted installations, or Article 410.137(B), which is in regard to remotely mounted installations. Articles 410.136 and 410.137(B) are companion proposals. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ.
Also, clarification by of what "it" is and "Type IC" which is defined in UL 1598, Standard for Luminaires.
Panel Meeting Action: Accept in Principle
410.116(B) to read as follows:
(B) Installation. Thermal insulation shall not be installed above a recessed luminaire or within 75 mm (3 in.) of the recessed luminaire's enclosure, wiring compartment, ballast, transformer, LED driver, or power supply unless the luminaire is identified "Type IC," for insulation contact.
Panel Statement: CMP-18 added transformer and power supply to create a more inclusive list.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-169 Log #2578 NEC-P18 **Final Action: Reject**
(410.117(A), (B) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
(A) Conductors that have insulation ~~suitable~~ identified for the temperature encountered shall be used.
Delete (B).
Revise (C): Where the branch circuit conductors are not identified for the temperature encountered, tap conductors ~~suitable~~ identified for the temperature shall be ~~permitted to~~ run from the luminaire or lampholder terminal connections to an outlet box or conduit body placed ~~at least~~ not less than 300 mm (1 ft)) from the luminaire or lampholder. (remainder unchanged).
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. (B) is already covered by (A). Lampholders and conduit bodies should be included in (C). "Permitted to be run" does not impose a requirement per 90.5.
Panel Meeting Action: Reject
Panel Statement: CMP-18 does not accept that (B) should be deleted. (B) is not covered by (A) as the submitter suggests. (B) specifically permits branch-circuit conductors to enter the luminaire that (A) does not address. The submitter mistakenly believes that the purpose of tap conductors is to address temperature limitations of branch circuit conductors. This is not the intent, so CMP-18 rejects the proposed changes to (C).
The submitter has provided no substantiation for adding conduit bodies and lampholders.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-170 Log #3318 NEC-P18 **Final Action: Accept in Principle**
(410.121)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “box” to “enclosure” or “housing”.
Substantiation: Edit. It is unclear if “box” is intended to apply to the fixture housing or a terminal connection box that may be a part of the fixture.
Panel Meeting Action: Accept in Principle
In 410.121, change the word “box” to “recessed housing”.
Panel Statement: “Recessed housing” is the proper term as defined in the product standard, UL 1598.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-171 Log #1774 NEC-P18 **Final Action: Accept in Part**
(410.122)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete, or revise last sentence: Where used, cements shall be of the high heat type identified for the use.
Substantiation: Edit. This provision seems unnecessary since listing protocols include evaluation of cements, if used. The AHJ cannot reasonably determine quality of cements, whether high heat (?) or heat resistant types.
Panel Meeting Action: Accept in Part
410.122 to read as follows:
Lampholders of the screw shell type shall be of porcelain or other suitable insulating materials.
Panel Statement: CMP-18 chose to delete the last sentence but not to substitute text.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-172 Log #3324 NEC-P18 **Final Action: Accept in Part**
(410.122)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence or revise:
Where used, cements and other adhesives shall be ~~of the high heat type~~ <u>identified for the temperature encountered</u>.
Substantiation: Edit. This seems to be a requirement better covered by product standards. “High heat type” is not defined.
Panel Meeting Action: Accept in Part
Panel Statement: See panel action and statement on Proposal 18-171.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-173 Log #2690 NEC-P18 **Final Action: Reject**
(410.130(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text :
Thermal protection shall not be required in a recessed high-intensity discharge luminaire (fixture) identified for the use ~~installed~~ <u>encased</u> in poured concrete, <u>brick, or masonry or tile construction units</u>.
Substantiation: The provision should apply where installation is in other noncombustible construction.
Panel Meeting Action: Reject
Panel Statement: Thermal protection is required in brick, masonry, and tile construction units. The submitter did not provide any substantiation for why thermal protection should not be required in brick, masonry, or tile construction units. CMP-18 notes that this proposal is similar in content to two proposals submitted by the same submitter in the 2008 code cycle (2008 ROP proposals 18-89 and 18-90). CMP-18 rejected those proposals because no substantiation was provided. CMP-18 requests that the submitter refrain from wasting its time by repeatedly submitting the same proposal without substantiation. CMP-18 welcomes proposals with substantiation.
Also, the submitter references the incorrect section, and the wording is not consistent with present code language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-174 Log #3323 NEC-P18 **Final Action: Reject**
(410.130(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: This “definition” is at variance with the Article 100 definition of “energized” which does not specify a voltage level.
Panel Meeting Action: Reject
Panel Statement: Delete what?
The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-174a Log #CP1802 NEC-P18 **Final Action: Accept**
(410.130(E)(3) and 410.21 FPN)

Submitter: Code-Making Panel 18,
Recommendation: Change 410.130(E)(3) title from “Exit Fixtures” to “Exit Luminaires.”
410.21 FPN to read as follows:
FPN: See 410.65 for wiring supplying power to luminaires connected together.
Substantiation: This change is to correct an oversight in the previous code cycle.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-175 Log #12 NEC-P18 **Final Action: Accept in Principle in Part**
(410.130(G))

NOTE: This proposal appeared as Comment 18-90 on Proposal 18-90b in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 18-90b was:
Modify Section 410.73(G) to read as follows:
(G) Disconnecting Means. In indoor locations, other than dwellings and assorted accessory structures, fluorescent luminaires that utilize double ended lamps and contain ballast that can be serviced in place, shall have a disconnecting means either internal or external to each luminaire. When connected to multiwire branch circuits, the disconnect shall simultaneously break all the supply conductors of the ballast, including the grounded conductor. The line side terminals of the disconnecting means shall be guarded. The disconnecting means shall be located so as to be accessible to qualified persons before servicing or maintaining the ballast. Where the disconnecting means is external to the luminaire it shall be a single device, located in sight of the luminaire.
The existing five exceptions are to remain as written in the 2005 NEC.
Submitter: Gregory J. Steinman, Thomas & Betts Corporation
Recommendation: Revise as follows:
(G) Disconnecting Means. In indoor locations, other than dwellings and associated accessory structures, fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place shall have a disconnecting means either internal or external to each luminaire. <u>For existing installed luminaires without disconnecting means, at the time a ballast is replaced, a disconnecting means shall be installed</u>. When connected to multiwire branch circuits, the disconnect shall simultaneously break all the supply conductors of the ballast, including the grounded conductor. The line side terminals of the disconnecting means shall be guarded. The disconnecting means shall be located so as to be accessible to qualified persons before servicing or maintaining the ballast. Where the disconnecting means is external to the luminaire, it shall be a single device, ~~located in sight of~~ <u>adjacent to</u> the luminaire.
Substantiation: Disconnecting means provide a safe working environment for the electrician. It can be added easily at the time a ballast is replaced and will provide a safer installation of the next ballast replacement. There are several ballast disconnecting components available that can be easily installed during ballast replacement. Per Article 100, the words “in sight of” mean within 50 feet. This is too far for a safe replacement. The disconnecting means shall be easily accessible to the electrician.
Panel Meeting Action: Accept in Principle in Part
410.130(G) to read as follows:
(G) Disconnecting Means.
(1) General. In indoor locations other than dwellings and associated accessory structures, fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place shall have a disconnecting means either internal or external to each luminaire. For existing installed luminaires without disconnecting means, at the time a ballast is replaced a disconnecting means shall be installed. The line side terminals of the disconnecting means shall be guarded.
Remainder of 410.130(G) unchanged.
Panel Statement: The submitter’s language has been modified to comply with the current code.
CMP-18 accepts the proposal but not changing “location in sight of” with “adjacent to.”
Insufficient substantiation is given for replacing “location in sight of” with “adjacent to”.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-176 Log #303 NEC-P18 **Final Action: Reject**
(410.130(G))

Submitter: Mark Ptashkin, City of Glendale
Recommendation: Revise 410.130(G) by adding a new Exception 3, revising Exception 6 and renumbering the remaining exceptions and providing new text for Subsection 3:
(G) Disconnecting Means
(1) General. In indoor locations other than dwellings and associated accessory structures, fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place shall have a disconnecting means either internal or external to each luminaire. The line side terminals of the disconnecting means shall be guarded.
Exception No. 1: A disconnecting means shall not be required for luminaires installed in hazardous (classified) location(s).
Exception No. 2: A disconnecting means shall not be required for emergency illumination required in 700.16.
Exception No. 3: A disconnecting means shall not be required for legally required illumination as required in 701.11.
Exception No. ~~(3)~~4: For cord-and-plug connected luminaires, an accessible separable connector or an accessible plug and receptacle shall be permitted to serve as the disconnecting means.
Exception No. ~~(4)~~5: A disconnecting means shall not be required in industrial establishments with restricted public access where conditions of maintenance and supervision ensure that only qualified persons service the installation by written procedures.
Exception No. ~~(5)~~6: Where more than one luminaire installed and supplied by other than a multiwire branch circuit, a disconnecting means shall not be required for every luminaire when the design of the installation includes disconnecting means, such that the illuminate space cannot be left in total darkness while the building is occupied.
(2) Multiwire Branch Circuits. When connected to multiwire branch circuits, the disconnecting means shall simultaneously break all the supply conductors to the ballast, including the grounded conductor.
~~**(3) Location.** The disconnecting means shall be located so as to be accessible to qualified persons before servicing or maintaining the ballast. Where the disconnecting means is external to the luminaire, it shall be a single device, and shall be attached to the luminaire or the luminaries shall be located with sight of the disconnecting means.~~
(3) Within Sight or Locked Type. The switch or circuit breaker shall be located within sight from the luminaires or lamps, or it shall be permitted elsewhere if it is provided with a means for locking in the open position. The provisions for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted. Where multiwire branch circuits are used, a multi-pole disconnect or circuit breaker shall be used as the disconnecting means.
Substantiation: New Exception 3. Legally required standby systems, for the purposes of this article, should omit the disconnecting means for the same reasons they are omitted from the emergency systems. Failure of the lighting systems in these areas could create a life safety hazard. Thus, the requirement for the additional stand-by system for lighting units in at least one model building code.
Revised Exception 6. The requirement for maintaining the areas illumination should only be required while the building is open for business or as defined by the building codes as occupied. Egress lighting is only required while a building is open for business. The current requirement appears to require the additional level of lighting anytime equipment is serviced. This appears to place an unnecessary and potentially costly requirement that would require this lighting for not only service work but work done after hours or even remodeling or renovation. This would also have the effect of eliminating this disconnecting means for “temporary” lighting used on construction sites or shell buildings that are not legally able to be occupied.
Revised Subsection 3. This is, for the most part, the same verbiage used in 410.141(B) with the additional sentence addressing multiwire circuits. That section allows the use of a remote lockable disconnect for voltages of over 1000 volts while this section, under 1000 volts, does not. It would seem that the higher voltage would be a more hazardous installation to service and yet it is permissible to utilize a remote disconnect when it can be locked in the open position. By providing a remote lockable disconnect for systems under 1000 volts, this section would still retain the desired ability to de-energize equipment combined with the new ability to lock it out, thus, increasing the safety to the public. Additionally, other articles of the NEC allow the use of a remote lockable disconnecting means. By revising this section, it would more closely resemble other sections of the Code.
Panel Meeting Action: Reject
Panel Statement: CMP-18 does not agree with the submitter’s substantiation that a disconnect should not be required for legally required illumination.
The use of a lock on a circuit breaker is not allowed because then the entire circuit would have to be off instead of just the individual luminaire.
CMP-18 does not agree with the necessity of whether the building is occupied or not.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-177 Log #1284 NEC-P18 **Final Action: Reject**
(410.130(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(1) In indoor locations other than dwellings and associated accessory structures, fluorescent luminaires that utilize double-ended lamps and contain ballasts that can be serviced in place shall have ~~a~~ an accessible disconnecting means either internal or immediately adjacent to each luminaire. The line side terminals of the disconnecting means shall be guarded.
Exception No. 1: ~~A~~ The disconnecting means specified in (1) SHALL NOT BE REQUIRED FOR LUMINAIRES INSTALLED IN HAZARDOUS (CLASSIFIED) LOCATIONS.
EXCEPTION No. 2: ~~a~~ THE DISCONNECTING MEanS SPECIFIED in (1) shall not be required for emergency illumination covered ~~required~~ in 700.16.
Exception No. 3: For cord-and-plug connected luminaires an accessible separable connector and flanged surface inlet or an accessible attachment plug ~~and receptacle~~ shall be permitted to serve as the disconnecting means.
Exception No. 4: The disconnecting means specified in (1) shall not be required in ~~industrial~~ establishments with restricted pubic access where conditions of maintenance and supervision ensure that only qualified persons service the installation by written procedures.
Exception No. 5: Where more than one luminaire is installed and supplied by *~~other than~~ a ~~multiwire~~ 2-wire circuit ~~a~~ the disconnecting means specified in (1) shall not be required for every luminaire when the ~~design of the~~ installation includes disconnecting means for the luminaires whereby no single disconnecting means in the branch circuit(s) other than the branch circuit disconnecting means can deenergize all the luminaires. ~~Such that the illuminated space cannot be left in total darkness.~~*
In (G)(2), change “break” to “open”.
Substantiation: The disconnecting means should be accessible, and if external, adjacent to the luminaire. Present wording does not specify location if external. Exceptions should clearly indicate they apply to disconnecting means of the rule. Section 700.16, covers but does not require emergency illumination. In exception No. 3, superfluous wording is eliminated; proposal requires the disconnecting means to be accessible; present wording does not include attachment plug and lighting busway. In exception No. 5, design cannot ensure spaces will not be in darkness if there is a power failure or an overcurrent device operates.
Panel Meeting Action: Reject
Panel Statement: Direction as to the location of an external disconnect is provided in 410.130(G)(3). The changes in verbiage are superfluous and not sufficiently substantiated to necessitate such a change. The flanged surface inlet is covered in “accessible separable connector.”
Since the disconnecting means can be internal to the luminaire, the Article 100 definition of “accessible” would not apply in all cases. It is intuitively obvious that an exception to 410.130(G)(1) applies to 410.130(G)(1), so stating this explicitly is not necessary. The location for an external disconnect is specified in 410.130(G)(3), so the panel rejects the proposal to add the words “immediately adjacent” to 410.130(G)(1). The submitter is reminded that “immediately adjacent” is vague terminology that should be avoided in accordance with the NEC Style Manual.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-178 Log #2240 NEC-P18 **Final Action: Accept in Principle**
(410.130(G))

Submitter: Gregory J. Steinman, Thomas & Betts Corporation
Recommendation: Revise text to read as follows:
(G) Disconnecting Means.
(1) General. In indoor locations other than dwellings and associated accessory structures, fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place shall have a disconnecting means either internal or external to each luminaire. If not already present, a disconnecting means shall be installed during ballast replacement. The line side terminals of the disconnecting means shall be guarded.
(remainder of article unchanged).
Substantiation: The disconnecting means provides a safety function for the electrician. There are millions of luminaires presently installed that will never have the level of safety provided with new installations. This is an easy method to improve the safety of the existing installed products. As new luminaires are installed using a disconnecting means, electricians will expect that disconnect to be available.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-175.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-179 Log #4814 NEC-P18 **Final Action: Reject**
(410.130(G))

Submitter: Charles M. Williams, Stealth Electric
Recommendation: A sentence should be added to the general paragraph: Existing luminaires in which ballast replacements, or retrofitting take place shall be provided this capability at the time of service or retrofit. This applies to these luminaries without external means of disconnect.
Substantiation: Existing luminaires will require replacement of ballast to include incorporation of electron ballasts at the time of ballast replacement. Also, there is an increasing retrofit effort on behalf of energy conservation. The existing circuits will not be upgraded, and old circuits are usually left in place. In the case of retrofits, these usually occur in very old installations.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
See panel action and statement on Proposal 18-175.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-180 Log #2542 NEC-P18 **Final Action: Reject**
(410.130(G)(1))

Submitter: Brian J. Coll, Tri-State Safety Inspections
Recommendation: Add new text as follows:
Effective January 1st, 2014, in all outdoor locations other than one and two family dwelling units and associated accessory structures, high-intensity discharge luminaires that contain ballast(s) that can be serviced in place shall have a disconnecting means either internal or external to each luminaire. All ungrounded terminals of the disconnecting means shall be guarded to prevent accidental contact. The disconnecting means shall simultaneously disconnect all of the supply conductors to the ballast, including the grounded conductor. The disconnecting means shall be located before any fuses integral to the luminaire.
Exception No. 1: Where high-intensity discharge luminaires are installed grouped on lighting standards or other structures, a single disconnecting means shall be permitted. The disconnecting means must be installed within sight of the luminaires which it serves. The disconnecting means must have provisions for being locked in the open position permanently installed. The disconnecting means shall be permitted to open only the ungrounded conductors and only the line side terminals shall be required to be guarded.
Exception No. 2: High-intensity discharge luminaires which contain an integral twist-lock type photocell or shorting cap which opens all ungrounded conductors when removed shall be accepted as meeting the disconnecting requirement of this section.
Substantiation: HID luminaires are commonly used for site lighting on the outside of buildings, both wall mounted and pole mounted. They are often automatically controlled by lighting controls and contactors from inside the building far from the luminaires location. The larger the site, the harder it becomes to locate and properly lock-out the disconnecting means. The luminaires are also commonly supplied by up to 480 volts nominal.
When servicing site lighting, it is common to have the power turned on to the luminaires so the nonworking luminaires can be identified. Due to the long restrike time of the HID luminaires it is impractical to have the power turned off and on during servicing, especially on large sites.
Since the controller and disconnecting means can be difficult to locate and is often far away from the luminaire being serviced, it is common to disconnect the power supply conductors within the luminaire while the circuit is energized in order to replace ballasts and other internal components. Having a mandatory safe means within or near the luminaire to disconnect all supply power would eliminate shock and arc flash hazards. Hazards include injury or deaths caused directly by an electrical shock or arc flash or by a resulting fall as these luminaires are almost always serviced from ladders, scaffolding, aerial work platforms and bucket trucks.
Many manufactures currently include such disconnecting means within the luminaires which they make. This would simply make the feature mandatory while also providing options to meet most installation situations.
Including this requirement in the 2011 NEC and setting an effective date of January 1st 2014, will provide manufactures enough time to modify their products to meet the new disconnecting requirements.
Panel Meeting Action: Reject
Panel Statement: The submitter's conclusion that the disconnecting means that he describes would eliminate shock or arc flash hazards is incorrect. The fluorescent luminaires that are currently covered by 410.130(G)(1) contain insulated components within their electrical enclosures. Unlike those fluorescent luminaires, outdoor HID luminaires are constructed using numerous components that have accessible live parts within the luminaire's electrical enclosure. The HID ballasts used in most outdoor luminaires have open coils. Many of these ballasts also have accessible live spade terminals. In addition to the ballast, oil filled capacitors, photoelectric receptacles, quartz standby relays, dual-level dimming relays, fuseholders, and dimming system surge coils can all contain accessible live terminals or open coils. This proposal would allow the opening of electrical enclosures that contain live components to access a disconnecting means; however, once the electrical enclosure is opened, contact with hazardous voltages could occur before the disconnect device is located and disconnected. Therefore, the panel concludes that accepting the proposal could result in exposing workers to greater risk.
The connectors that the submitter references in existing outdoor HID luminaires are not listed or rated for making and breaking under load. These connectors are supplied as a matter of convenience by some manufacturers for ease of installation and maintenance, but they should never be connected or disconnected while the circuit is energized.
When servicing outdoor HID luminaires the circuit should be disconnected at the panel and locked-out, and the appropriate personal protective equipment should be used.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-181 Log #4709 NEC-P18 **Final Action: Reject**
(410.130(G)(1))

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Add the following text as the last sentence of paragraph 410.130(G)(1): "Lighting retrofit jobs must adhere to 410.130(G)(1), (2) and (3)".
Substantiation: This is the purpose of this requirement so it will be safe when servicing these luminaires. What better time could there be to install the service disconnecting means.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
See panel action and statement on Proposal 18-175.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-182 Log #619 NEC-P18 **Final Action: Reject**
(410.130(H))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
<u>The ballasts of fluorescent luminaires and high intensity discharge luminaires shall be protected against fault currents in accordance with their limited short-circuit withstand ratings.</u>
Substantiation: These ballasts have a limited short-circuit withstand rating, typically 200 amperes, when tested on a 20 amp circuit. Supplementary overcurrent protection may often be necessary due to higher fault currents available on these circuits. Equipment withstand ratings are basically addressed in 110.10, but specifically should be addressed here as well.
Panel Meeting Action: Reject
Panel Statement: The submitter has failed to provide sufficient substantiation to support this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
The requirements contained in 110.10 are sufficient.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-183 Log #4626 NEC-P18 **Final Action: Reject**
(410.135)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this section.
Substantiation: This rule, limiting luminaires in dwelling occupancies with open circuit voltages above 300 unless special construction features are in place, appears to be obsolete. The only dwelling-unit location limitation markings in the current UL Luminaire Marking Guide are those that prohibit open circuit voltages over 1000 [and thereby enforce 410.140(B)] and those that prohibit luminaires marked for supply wiring rated over 90°C
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
The statement that the product type appears to be obsolete indicates that uncertainty exists regarding the submitter's substantiation. Equipment that meets these requirements may still be listed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-184 Log #2304 NEC-P18 **Final Action: Accept in Principle**
(410.136(A) and (B))

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.136(A) Revise to
Luminaires that have exposed ballasts, ~~or~~ transformers, or LED drivers, shall be installed such that ballasts, ~~or~~ transformers, or LED drivers, shall not be in contact with combustible material.
Article 410.136(B) Revise to
Where a surface-mounted luminaire containing a ballast or LED driver is to be installed on combustible low-density cellulose fiberboard…
Substantiation: LED drivers could also be applicable here. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ. See companion proposal to 410.116(B).
Panel Meeting Action: Accept in Principle
410.136 (A) and (B) to read as follows:
(A) Exposed Components. Luminaires that have exposed ballasts, transformers, LED drivers or power supplies shall be installed such that ballasts, transformers, LED drivers, or power supplies shall not be in contact with combustible material unless listed for this condition.
(B) Combustible Low-Density Cellulose Fiberboard. Where a surface-mounted luminaire containing a ballast, transformer, LED driver, or power supply is to be installed on combustible low-density cellulose fiberboard, it shall be marked for this condition or shall be spaced not less than 38 mm (1 1/2 in.) from the surface of the fiberboard.
Retain the FPN.
Panel Statement: CMP-18 added LED driver and power supply to create a more inclusive list.
The heading of (A) was changed to be more inclusive.
(A) was edited to consider Type IC luminaires.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-185 Log #4627 NEC-P18 **Final Action: Reject**
(410.136(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows:
(B) Combustible Surfaces. Luminaires marked by their manufacturer as for mounting on noncombustible surfaces only shall not be mounted within 38 mm (1½ in.) of a combustible surface.
Delete the last sentence of the rule and delete the fine print note.
Substantiation: The relevant UL marking category for these luminaires, "Fluorescent Surface-Mounted Luminaires, (IUEZ)," deleted the specific references to this condition as of the 2001 edition of the *Green and White Books*. In its place (presumably) is a generic permission for all ceiling and wall-mounted luminaires in the IUEZ category to be mounted in either of those locations and even with thermal insulation behind the ceiling or wall surface. This permission is subject to two exceptions, the second of which presumably corresponds to this topic. The first exception is a mandatory orientation exception and, based on the reading of the general permission as allowing ceiling luminaires to be mounted on walls and vice-versa, disallows luminaires that are "obviously not designed for ceiling use or if marked WALL MOUNT ONLY" from being mounted on ceilings. This topic is not relevant to this discussion, but the conditions mentioned are enforceable per 110.3(B).
The second exception effectively prohibits luminaires marked "NONCOMBUSTIBLE SURFACE ONLY" from being mounted on noncombustible surfaces. From all this it would appear that unless so marked, any fluorescent luminaire can be mounted on combustible surfaces, including low-density cellulose fiberboard, even with thermal insulation behind it. And from the current language of 410.136(B) it would appear that a 38 mm (1½ in.) spacing is sufficient to address a noncombustible mounting limitation if one appears on a luminaire, unless some other dimension is in the installation directions.
Therefore this proposal updates this section so it applies to combustible surfaces and limits the mounting of luminaires with a combustible surface limitation from being mounted within the traditional 1½ in. spacing unless a listing restriction requires a greater distance. CMP 18 may have additional information to fine-tune this update, but it is clear that the existing wording, essentially unchanged for over 50 years, is functionally obsolete in terms of its specific information. The last sentence was removed because all recessed luminaires must necessarily comply with Part XI of the article, so it added nothing.
Panel Meeting Action: Reject
Panel Statement: No definitive substantiation has been provided to show that there is a problem with the present text.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-186 Log #2303 NEC-P18 **Final Action: Accept in Principle**
(410.137(B))

Submitter: John Marshall, Underwriters Laboratories Inc.
Recommendation: Article 410.137(B) Revise to
Separately mounted, or independent, ballasts or LED drivers that are intended for direct connection to a wiring system shall not be required to be additionally ~~separately~~ enclosed.
Substantiation: LED drivers could so be applicable here. "LED driver" is a common industry term referring to the power supply for the LED. Drivers for Light-emitting Diode (LED) Arrays, Modules, and Controllers are covered under UL CCN: FKSZ. See companion proposal to 410.116(B).
There is growing usage of the term "independent ballast" to mean a ballast that can be remotely located from the luminaire.
"Additionally" rather than "separately" would be better here because the context is in regard to the need of an additional enclosure (although that would not be needed since the enclosure for an independent ballast is already sufficient).
Panel Meeting Action: Accept in Principle
410.137(B) to read as follows:
(B) Separate Mounting. Separately mounted ballasts, transformers, LED drivers, or power supplies that are listed for direct connection to a wiring system shall not be required to be additionally enclosed.
Panel Statement: CMP-18 added transformer, LED driver, and power supply to create a more inclusive list.
CMP-18 removed "or independent" as it is redundant.
The term "listed" was added to ensure that the equipment is listed or provided with an enclosure.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-187 Log #2380 NEC-P18 **Final Action: Reject**
(410.140(A))

Submitter: Jimmie Evanisko, National Cathode Corporation / Rep. UL Listed "IFAY" Manufacturers
Recommendation: Revise text to read as follows:
(A) Listing. Electric-discharge lighting systems with an open-circuit voltage exceeding 1000 volts shall be listed and installed in conformance with ~~that~~ their IFAY listing.
Substantiation: It is to my understanding that there is a proposal to insert the verbiage "cold cathode" into "eight " locations into Article 600 of the NEC for the 2011 edition. And I do not understand how it relates to any safety and installation issues with regards to Article 410.
What do I understand is that presently there are "9" independent cold cathode manufacturers listed under UL IFAY that comply with Article 410, they also comply with UL DUEC2 and DUEC8 for General Illumination that do not require secondary-circuit ground fault protection.
On the other hand there is another listing that pertains to "Field Installed Neon Outline Lighting Systems" govern under UL UYAM, UL DUEC and UL DUEC7 with only "1" manufacturer listed that does require SGFP.
Looking at UL UXYT and UL UZBL there are over 2,500 manufacturer that must comply with Article 600 that requires SGFP.
Adding the verbiage of cold cathode to NEC Article 600 will only cause more confusion to the AHJ's, has absolutely no relevance to any safety issues and will cause a huge burden on the "9" IFAY manufacturers with regards to the AHJ's queries.
Other than the items stated above, the UL General Information for Electrical Equipment Directory clearly states under "IFAY" provides "general illumination " in accordance with Article 410 of the NEC and absolutely no relationship in categories UXYT, UZBL, UYAM or UXYT in the neon industry and UL 2161 #20 SGFP exception No. 5: A cold cathode supply marked in accordance with 42.5 is not required to be provided with secondary ground fault production.
While speaking to Diana Pappas Jordan at UL Northbrook, we agreed that any gas filled lamp (CCFL, cold cathode, fluorescent, neon and others) with electrodes/filaments are the same but the main difference is the "application".
During the STP meeting at UL Northbrook in 2006 which I attended, a member suggested that luminaires listed under UL IFAY should be covered by the scope of the standard for luminaires, UL 1598 rather UL 48 and the straw poll of the voting members voted ten to two to add it directly into UL 1598. I also remember the AHJ's at the STP meeting from Phoenix (Lanny McMahill) stating that he understood luminaires for general illumination and saw no problem with a transformer less SGFP. I believe that instead of forcing ground fault devices to be included in our "General Illumination Systems" that the proposal should be addressing and clarifying it within the scope of NEC 410 XIV or moving it to UL 1598 as per our last UL 48 meeting.
Ironically, today I contacted C.S.A. to concur which CSA Standard National Cathode Corporation is listed under and they stated C22.2 NO255 and 250.0-04 which is the equivalent to UL 1598.
Basically, trying to fix something that isn't broken with regards to safety does not apply to the IFAY industry.
I have spoken to dozens of listed members in UL UXYT and very rarely do they use power sources exceeding 120MA because they have no need to.

If there are other reasons that I am not aware of other than safety issues to insert the verbiage of "cold cathode" into NEC Article 600 due to politics or our present economy then it is only appropriate to insert "<u>their</u> <u>IFAY</u>" into Article 410 per my proposal.

Panel Meeting Action: Reject

Panel Statement: CMP-18 refers the submitter to 110.3(B).

This addition would be redundant; this requirement already addresses products listed under the UL category IFAY. Other NRTLs may have different terms for this category.

4.2 of the NEC Style Manual prohibits references to other standards. 3.2.1 of the Style Manual prohibits vague references.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-188 Log #1773 NEC-P18 **Final Action: Reject**
(410.140(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete.

Substantiation: Literal wording requires the terminal of a lamp to be considered a live part whether in the shipping container, removed from a luminaire, or disconnected from the circuit. Other rules and regulations of management, OSHA, and 490.22 should be sufficient.

Panel Meeting Action: Reject

Panel Statement: Delete what?

The proposal does not comply with 4.3.3(c) of the NFPA Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-189 Log #4628 NEC-P18 **Final Action: Reject**
(410.140(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Change "as a live part" to "as an uninsulated live part".

Substantiation: See Article 100. Any energized part is live; presumably this sentence is classifying the lamp terminals as uninsulated and live, which would be useful information.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-190 Log #1561 NEC-P18 **Final Action: Accept in Part**
(410.141(B))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by Code-Making Panel 18 based upon the action of Code-Making Panel 1 taken on Proposal 1-63.

This action will be considered by the panel as a public comment.

Submitter: Stanley J. Folz, Henderson, NV

Recommendation: Revise text to read as follows:

(B) Within Sight or Locked Type. The switch or circuit breaker shall be located within sight from the luminaires or lamps, or it shall be permitted elsewhere if it is provided with a <u>**lockable disconnecting means.**</u> ~~for locking in the open position. The provisions for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Accept in Part

410.141(B) to read as follows:

(B) Within Sight or Locked Type. The switch or circuit breaker shall be located within sight from the luminaires or lamps, or it shall be permitted elsewhere if it is provided with a <u>lockable disconnecting means</u>. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.

Panel Statement: CMP-18 choose to retain the last sentence of 410.141(B). Leaving the last sentence in does not detract from the submitter's proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

CARPENTER, F.: Since the proposal (1-63) which would have added an Article 100 definition for "Disconnecting Means, Lockable" was rejected by CMP-1, this terminology should not be used in this section of the code.

18-191 Log #2577 NEC-P18 **Final Action: Reject**
(410.141(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete second sentence and substitute:

The provisions for locking shall be an identified permanent integral component of the disconnecting means.

Substantiation: Edit. The locking means should be identified for the use. Proposal eliminates makeshift methods.

Panel Meeting Action: Reject

Panel Statement: See panel action on Proposal 18-190.

The submitter failed to consider that sometimes makeshift means are just as effective and a lot safer than a lockable permanent component.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-192 Log #1924 NEC-P18 **Final Action: Reject**
(410.145)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: Lamps shall not be located where ~~normally exposed~~ <u>likely to be subject</u> to physical damage.

Substantiation: Edit. "Normally" is subjective and a term to be avoided. "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections.

Panel Meeting Action: Reject

Panel Statement: The submitter proposes a term that will not add additional clarity.

The proposed revision is not considered editorial.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-193 Log #3321 NEC-P18 **Final Action: Reject**
(410.145)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Lamps shall not be located <u>where likely</u> to be exposed to physical damage.

Substantiation: Edit. The rule should apply where exposure to damage is likely whether a normal condition or not. "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections.

Panel Meeting Action: Reject

Panel Statement: The submitter proposes a term that will not add additional clarity.

The proposed revision is not considered editorial.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-194 Log #1293 NEC-P18 **Final Action: Reject**
(410.147)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete.

Substantiation: Edit. Already covered by 404.4.

Panel Meeting Action: Reject

Panel Statement: Delete what?

The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.

The proposed revision is not considered editorial.

It may already be covered in another section but CMP-18 intends for it to be referenced here.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 411 — LIGHTING SYSTEMS OPERATING AT 30 VOLTS OR LESS

18-195 Log #3685 NEC-P18 **Final Action: Reject**
(411.4(B))

Submitter: Richard F. VanWert, Middle Department Inspection Agency

Recommendation: Relocate 411.4(B) to 680.22(C)(6).

This proposal has also been sent to CMP-17 as it references 680.22(C)(6).

Substantiation: This practical and useful information should be included in Article 680.

Panel Meeting Action: Reject

Panel Statement: CMP-18 requests the TCC forward this proposal to CMP-17.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-196 Log #1195 NEC-P18 **Final Action: Reject**
(411.5(C)(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “finished floor” to “standing surface”.
Substantiation: Edit. If installed outside or over earth there is no “floor”.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-94.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 422 — APPLIANCES

17-3 Log #2572 NEC-P17 **Final Action: Accept in Principle in Part**
(422.2.Cord-and-Plug Connected Vending Machines (New))

Submitter: Charles Palmieri, Palmieri Assoc.
Recommendation: Create a new section <u>422.2 Definitions</u> and include the following:
<u>Cord-and-Plug-Connected Vending Machines. For the purpose of this section, the term vending machine shall means any self-service device that dispenses products or merchandise without the necessity of replenishing the device between each vending operation and is designed to require insertion of a coin, paper currency, token, card, key, or receipt of payment by other means.</u>
Substantiation: This is the second sentence, which appears in 422.51. Please see my proposal to that section which if accepted will delete the apparent definition and place it in a new section 422.2 Definitions. Paragraphs 2.2.2.1 and 2.2.2.2 definitions of the style manual, indicate that definitions should either be in Article 100 or paragraph 2 of the article that applies.
Panel Meeting Action: Accept in Principle in Part
Create a new section 422.2 Definitions and include the following:
Vending Machine. Any self-service device that dispenses products or merchandise without the necessity of replenishing the device between each vending operation and is designed to require insertion of coin, paper currency, token, card, key, or receipt of payment by other means.
Panel Statement: CMP-17 changes the title to “Vending” Machine.
CMP-17 does not accept the submitter’s language relative to “For the purpose of this section.”
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-4 Log #4265 NEC-P17 **Final Action: Reject**
(422.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 422.5 in Part I.
<u>422.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-5 Log #4266 NEC-P17 **Final Action: Reject**
(422.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 422.5 in Part I.
<u>422.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>
<u>(1) Equipment listing or labeling</u>
<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>
<u>(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 already states that electrical equipment or conductors required or permitted by the NEC must be approved, so repeating this text in this section is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use “listing” as a means of accepting electrical equipment. Where electrical equipment is not listed at the time of installation, Sections 90.4 and 90.7 permit field equipment evaluation.
Any proposed additional requirements should be addressed by a change to Section 110.2.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13
Comment on Affirmative:
CRIVELL, P.: The proposed requirement for listing or labeling of equipment for acceptance and approval by the Authority Having Jurisdiction is not limited to electrical distribution equipment with established standards to which it is to be tested to compared to or used to or evaluated by a Nationally Recognized Testing Laboratory (e.g., a machine used to package Microsoft software or a machine used to control the manufacture of carbon fiber for the Boeing 787 airplane). Requiring that evidence from a “qualified testing laboratory” or “inspection agency” would necessitate that the code define “qualified testing laboratory”, “inspection agency”, and “owner’s engineers judgment”. Otherwise, the Authority Having Jurisdiction would have no basis for their approval and acceptance of the qualifications of the “qualified testing laboratory”, the appropriateness of the training and certification of the “inspection agency” inspector, or the owner and the soundness of their “engineering judgment”. There will be electrical distribution equipment and utilization equipment which will be installed, which will not be listed, but which the Authority Having Jurisdiction or local ordinances may require be labeling to be acceptable to them and ultimately approved by them. In summary, the role of the Authority Having Jurisdiction is to use their authority, professional judgment, and local ordinances, including the National Electrical Code, to make the decision on what is acceptable, what is not acceptable, and what is needed in the way of labeling or documentation from a manufacturer, engineer, or other professional to obtain their acceptance and approval.

17-6 Log #4267 NEC-P17 **Final Action: Reject**
(422.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 422.5 in Part I.
<u>422.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>
<u>(1) Equipment listing or labeling</u>
<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV’s, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-7 Log #4268 NEC-P17 **Final Action: Reject**
(422.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 422.5 in Part I.

422.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:

(1) Equipment listing or labeling

(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation

(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment

Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-8 Log #4269 NEC-P17 **Final Action: Reject**
(422.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 422.5 in Part I.
422.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-9 Log #2700 NEC-P17 **Final Action: Reject**
(422.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

A fixed storage type water heater that has a capacity of 450 L (120 gal) or less shall be considered a continuous load for the purpose of sizing branch circuits, feeders, and service conductors.

Substantiation: While wording after the word "load" may be superfluous since it is covered by 210.20(A), the rule should include feeder and service conductors since the reason for the 125 percent requirement is valid for feeder and service conductor connections and overcurrent devices. Continuous load is applied to feeders and service conductors in Examples D(3)and D(3)(a).
Panel Meeting Action: Reject
Panel Statement: The requirement of 422.13 specifies a continuous load is to be used to size the branch circuit only. If storage-type water heaters are to be considered a continuous load when calculating feeders and services, substantiation needs to be submitted to show that the current method used to size feeders and services is not adequate. For example, feeders and services are calculated under Article 220.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-10 Log #3907 NEC-P17 **Final Action: Reject**
(422.13(A) (New))

Submitter: Eugene F. Swisher, City of Tampa / Rep. IBEW Local 915
Recommendation: Insert the following new text:

Instantaneous or tankless type water heaters shall be considered a continuous load for the purposes of sizing branch circuit conductors.

Substantiation: Tankless water heaters are not currently addressed in the Code. This results in difficulty properly sizing branch circuit conductors.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate substantiation for considering all instantaneous or tankless water heaters as continuous loads.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13
Comment on Affirmative:

BLEWITT, T.: The submitter has not provided adequate substantiation that all instantaneous (tankless) water heaters shall be considered as continuous loads. There are many such water heaters that are intended for point of use hot water dispensing and which are used only for short periods of time.

17-11 Log #1559 NEC-P17 **Final Action: Accept in Principle**
(422.15(C) (New))

Submitter: Ralph C. Guinn, Canplas Industries Ltd.
Recommendation: Add new text as follows:

(C) An equipment grounding conductor shall be used where the central vacuum outlet assembly has accessible noncurrent-carrying metal parts, likely to be energized.

Substantiation: Confusion during revisions to UL standard 1017 resulted in the UL/CSA joint committee requesting a revision to section 422.15C to add clarity.
Panel Meeting Action: Accept in Principle

Revise 422.15(C) to read as follows:

(C) Accessible non–current-carrying metal parts of the central vacuum outlet assembly shall be grounded in accordance with 250.110.
Panel Statement: CMP-17 edited the submitter's text,and the change meets the submitter's intent.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 9 Negative: 4
Explanation of Negative:

BLEWITT, T.: The Panel sought to leverage existing Code content rather than add criteria that could be deemed vague ("likely to become energized"). In doing so, the prepared text did not provide inspectors with clarity on whether the small parts of the vacuum outlet assemblies required grounding. What the Panel was essentially trying to do is to say a few isolated fasteners, springs and (other?) non-electrical parts do not need to be grounded because the insulation (air / plastic) interposed between them and current-carrying parts suffices. Suggested language will be provided during the Comment phase.

MORRIS, W.: CMP-17 made a change to the original proposal. The AHAM Central Vacuum Cleaner member companies do not believe that this change will correct the issue at-hand. The Central Vacuum outlet cover is composed of a plastic cover, a metal spring assembly, and two metal screws which affix the cover to a plastic backing plate. Per NEC 2008, some local inspectors have viewed the requirements of 422.15 (c) as requiring the metal screws and spring to be grounded. We suggest instead, "C. Grounding, if needed, shall be in compliance with 250.110" which uses the term, "...likely to be energized."

PANNOCK, J.: After review of the comments, I agree that the language needs to be further clarified and as such, the proposal in it's current form is not acceptable.

SCHAPP, R.: The phrase"likely to become energized" is a common phrase used throughout the code. It is desirable to avoid its use but the panel is attempting to micromanage a situation that is practically impossible to do with code language. Another option is to change the panel statement to "in accordance with 250" and drop the reference to.110. When the inspection is made, Installation and Operating Instructions will be available, and the AHJ can make a decision based on installed components and applicable sections of Article 250.

Comment on Affirmative:

CRIVELL, P.: The word "grounded", as in "…shall be grounded in accordance with…" should be replaced with the words "connected to the equipment grounding conductor" to comply with the correct language as used in 250-10. This vote was directed by IEEE.

17-12 Log #2867 NEC-P17 **Final Action: Reject**
(422.16(A))

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:

422.16 Flexible Cords.

(A) General. Flexible cord shall be permitted to facilitate all of the following:

(1) for the connection of appliances to facilitate their frequent interchange or to prevent the transmission of noise or vibration ~~or~~

(2) the removal or disconnection of appliances that are fastened in place

(3) ~~where~~ the fastening means and mechanical connections are specifically designed to permit ready removal for maintenance or repair ~~and~~

(4) the appliance is intended or identified for flexible cord connection.

Substantiation: Reorganize the section "A" to better follow the NEC style manual and clarify the intent of this section by making this a list as the rest of section 422.16.

Panel Meeting Action: Reject

Panel Statement: This revision not only reorganizes the text of this section, but with this reorganization, the requirements of the current section would be substantially changed without providing substantiation.

Number Eligible to Vote: 13

Ballot Results: Affirmative: 13

17-13 Log #4832 NEC-P17 **Final Action: Reject**
(422.16(B)(1))

Submitter: Bachir Karam, Las Vegas, NV
Recommendation: Add text to read as follows:

(5) The switch operating the disposer receptacle may not be installed adjacent to the switch operating the kitchen sink light.

Exception: The switch operating the sink light is readily identifiable with a pilot light.

Substantiation: It is common practice in our city to install both the disposer receptacle switch and the kitchen sink light switch in the same double gang box, with no way to identify which is which. It happened to me a few times in both my house and my parents house. Even though there were no dishes in the sink, the fact that you get the disposer running when you are intending on turning the light can be quite startling. I believe it can be quite dangerous when you reach in the dark to turn the light on, but accidentally start the sink disposer, which may have metal utensils with glass dishes around them.

Thank you for considering my request to add a section (5) to 422.16(B)(1).

Panel Meeting Action: Reject

Panel Statement: The panel rejects the substantiation as inadequate to require a revision to the NEC to add this requirement. No reports of injury or loss has been provided to justify this revision.

The NEC is not a design specification; see 90.1(C).

Number Eligible to Vote: 13

Ballot Results: Affirmative: 13

17-14 Log #1194 NEC-P17 **Final Action: Reject**
(422.16(B)(3)(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

(3): The cord is not likely to be subject to physical damage~~Receptacles are located to avoid physical damage to the flexible cord.~~

~~(5) The receptacle is supplied by an individual branch circuit.~~

Substantiation: Location of the receptacle cannot avoid damage to the length of the cord. The individual circuit requirement is apparently based on the assumption of a future replacement or expansion of future electrical use which is not the purpose of the Code per 90.1(B). If direct-connected (hard wired) an individual circuit is not required even though such equipment can also be replaced, so there is no consistency. Dishwashers, waste disposers and trash compactors may be replaced but are not required to be cord-connected. The definition of Branch Circuit, Appliance does not limit the circuit to one appliance.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.

This proposal is not for 422.16(B)(3)(5), it is probably for 422.16(B)(4)(5). The proposed wording to item #3 does not add clarity to this requirement. 422.16(B)(1)(3) and 422.16(B)(2)(3) have the same wording as the current wording of 422.16(B)(4)(3) and has had no problem with interpretation. The proposal for requiring an individual branch circuit was because of the fact that homeowners are replacing their range hoods with microwaves and are not rewiring the circuit to the correct size to feed these appliances. If they are hardwired, then a permit will be required to install the unit or receptacle and this will allow for the inspector to verify the circuit size for the new microwave.

Number Eligible to Vote: 13

Ballot Results: Affirmative: 13

17-15 Log #251 NEC-P17 **Final Action: Reject**
(422.16(B)(4)(5))

Submitter: Dennis J. Cox, Elkhart County Building Dept. / Rep. IAEI
Recommendation: Revise text to read as follows:

422.16(B)(4)(5) The receptacle is supplied by a individual (20 ampere) branch circuit.

Substantiation: Today's microwave/vent hoods are higher wattage units. Say for example you have a unit rated at 1,850 watts, this will overload a 15 ampere circuit. Simple math clearly states 120V ÷ 1,850W = 15.41666 ampere. Rounded up this is .42 ampere over the maximum overcurrent device rating. Other sections in the code also state 210.52(B)(1) small appliances (in short) states 20 ampere small appliance branch circuits required by 210.11(C)(1) shall serve all wall and floor receptacle outlets covered by 210.52(A), all counter top outlets covered by 210.52(C) and receptacle outlets for refrigeration equipment.

Panel Meeting Action: Reject

Panel Statement: CMP-17 does not agree with the submitter's substantiation as equipment is required to be installed per 110.3(B).

422.16(B)(4)(5) mandates ONE receptacle on an INDIVIDUAL branch circuit in accordance with 210.21(B)(1).

Since an individual branch circuit is inherently limited to ONE receptacle, the mandated plug-and-cord-connected derating for two or more receptacles per 210.21(B)(2) does not apply. The receptacle and plug may be used at their full ratings per 406.2(A) and 406.6, respectively. Per 422.33(C), the receptacle shall not be rated less than the connected load.

The highest rated microwave oven bearing a 15-ampere, 120-volt plug is rated 1800W. 1800W ÷ 120V = 15.0A. Most microwave residential ovens, built-in or portable, are rated significantly below 1800W; many tend to be 900W to 1100W.

Number Eligible to Vote: 13

Ballot Results: Affirmative: 13

Comment on Affirmative:

BLEWITT, T.: Microwave ovens for over-the-range installation with convection or halogen heating are typically rated 1600 - 1800 watts. Their supply cords are mostly fitted with a 15 A attachment plug, although at least one manufacturer specifies a 20 A attachment plug for models rated 1800 watts. There are models rated greater than 1800 watts that are rated 208 or 240 V and fitted with 30 A attachment plugs. Ovens rated 120 V and greater-than-1800 watts are required by the product standard to be fitted with a 20 A (or larger) attachment plug.

17-16 Log #3001 NEC-P17 **Final Action: Reject**
(422.16(B)(4)(5))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as the proposal does comply with the NFPA Regulations Governing Committee Projects.

This action will be considered by the panel as a public comment.

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

(4) Range Hoods. Range hoods shall be permitted to be cord-and-plug-connected with a flexible cord identified as suitable for use on range hoods in the installation instructions of the appliance manufacturer, where all of the following conditions are met:

(1) The flexible cord is terminated with a grounding-type attachment plug.

Exception to (1): A listed range hood distinctly marked to identify it as protected by a system of double insulation, or its equivalent, shall not be required to be terminated with a grounding-type attachment plug.

(2) The length of the cord is not less than 450 mm (18 in.) and not over 900 mm (36 in.).

(3) Receptacles are located to avoid physical damage to the flexible cord.

(4) The receptacle is accessible.

(5) The receptacle is supplied by an individual branch circuit.

Exception to (5):

Receptacles installed to provide power for supplemental equipment and lighting on gas-fired ranges, ovens, or counter-mounted cooking units shall be permitted to be on the same circuit as the range hood.

Substantiation: It is very common for electricians to install the igniter on the same circuit as the range hood. Considering the incredibly low amount of power consumed by this, it should not be a violation. The language of the proposal is the same language found in 210.52(B)(2) Ex No. 2.

Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
CMP-17 refers the submitter to 210.52(B)(2) Exception No. 2.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-17 Log #2699 NEC-P17 **Final Action: Reject**
(422.16(B)(4) and (5))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as the proposal does comply with the NFPA Regulations Governing Committee Projects.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (5) The receptacle is supplied by an individual branch circuit.
Substantiation: Range hoods that are permanently connected "hard wired" are not required to be on an individual circuit. The definition of branch circuit, appliance, permits more than one appliance. A cord/plug in itself does not warrant an individual circuit. Possible replacement by a different type hood can also apply to permanently connected hoods. This provision is not in harmony with 90.1(B) re: future expansion.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
CMP-17 cannot establish the reference the submitter intends to delete.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12 Negative: 1
Explanation of Negative:
HIRSCH, B.: CMP 17 received many proposals with confusing pointers during this cycle. This one, however, is obviously a proposal to eliminate the "future build" requirement in 422.16(B)(5). The substantiation submitted is correct in that the Code specifically stated in 90.1(B) that the provisions of the Code are not necessarily adequate for good service or the future expansion of electrical use. To require "future build" on every installation puts an unnecessary burden on most of the customers affected by the requirement and does not improve the safety of the installation.

17-18 Log #4866 NEC-P17 **Final Action: Reject**
(422.18)

Submitter: John Steinke, Amish Electric
Recommendation: Add a fine print note:
FPN: This section is not intended to require the use of specially made products, in lieu of traditional methods, such as the mounting of a steel box and mud ring assembly directly to a structural support.
Substantiation: A piece of dimensional lumber, secured to a pair of ceiling joists, and in turn supporting a "four square" steel box and mud ring is a traditional mounting method, that has proven itself more than adequate. Yet, the code, as worded, would seem to prohibit this practice.
This is ironic, as the fancy new boxes were compared to the traditional methods at the time of their evaluation. They were designed to match the traditional methods, and, perhaps, provide the installer with some more flexibility in fan location. (For example, a 1/2 in. "pancake" box is a listed fan box, but provides little wiring space. The new designs attempt to address this issue). In a like manner, it is unlikely that any 'turn and twist" bracket can be more secure than a piece of lumber screwed directly to the framing members.
Panel Meeting Action: Reject
Panel Statement: The code does not require or imply that specially made products are required to support suspended ceiling fans (paddle).
The NEC is not a design specification or installation manual; see 90.1(C).
Also, the submitter provides unenforceable language.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-19 Log #1830 NEC-P17 **Final Action: Reject**
(422.21 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: XX INSTALLATION REQUIREMENTS. Where a range, clothes dryer, dishwasher, trash compactor, or other appliance is directly connected by a cable or flexible conduit, an unsupported length of not less than 900 mm (3 ft) but not longer than necessary shall be provided to permit access to terminations. The cable or conduit shall be secured at the point where the unsupported length begins. Nonmetallic sheathed cable, Type SE, Type UF, Type MI cable, flexible metallic tubing, and electrical nonmetallic tubing shall not be used for this purpose.
Substantiation: A provision similar to 550.15(E) seems warranted.
Panel Meeting Action: Reject
Panel Statement: There is no technical substantiation for this change.
Additional methods of securing conduits or cables other than flexible cords as allowed under 422.16 need to comply with their specific requirements for the particular wiring methods to be used. The term proposed in the first sentence of the proposal "but not longer than necessary" is ambiguous and subjective. There are specific limitations for securing cords and cables within their specific code sections.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-20 Log #1825 NEC-P17 **Final Action: Accept in Part**
(422.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: ~~A means~~ An identified means shall be provided to simultaneously disconnect all ungrounded conductors of each branch circuit supplying an appliance in accordance with the following sections of Part III.
Substantiation: The disconnecting means should be suitable for the purpose and simultaneously disconnect all ungrounded conductors of the branch circuit.
Panel Meeting Action: Accept in Part
422.30 to read as follows:
422.30 General. A means shall be provided to simultaneously disconnect each appliance from all ungrounded conductors in accordance with the following sections of Part III. If an appliance is supplied by more than one source, the disconnecting means shall be grouped and identified.
Panel Statement: CMP-17 accepts the submitter's addition of the word "simultaneously."
CMP-17 does not accept the remainder of the submitter's proposal. No substantiation has been provided to show the current wording is inadequate.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-21 Log #463 NEC-P17 **Final Action: Accept**
(422.31 and 422.32)

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Add, revise, and delete text to read as follows:
422.31 Disconnection of Permanently Connected Appliances.
(A) Rated at Not over 300 Volt-Amperes or $^{1}/_{8}$ Horsepower. For permanently connected appliances rated at not over 300 voltamperes or $^{1}/_{8}$ hp, the branch-circuit overcurrent device shall be permitted to serve as the disconnecting means.
(B) Appliances Rated over 300 Volt-Amperes ~~or 1/8 Horsepower~~. For permanently connected appliances rated over 300 volt-amperes ~~or 1/8 hp~~, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance or is capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.
FPN: For appliances employing unit switches, see 422.34.
(C) Appliances Rated over $^{1}/_{8}$ Horsepower. For permanently connected appliances rated over $^{1}/_{8}$ hp, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance. The disconnecting means shall comply with Sections 430.109 and 430.110.
~~422.32 Disconnecting Means for Motor-Driven Appliance. If a switch or circuit breaker serves as the connecting means for a permanently connected motor-driven appliance of more than 1/8 hp, it shall be located within sight from the motor controller and shall comply with Part IX of Article 430.~~
Exception: If an ~~motor-driven~~ appliance of more than 1/8 hp is provided with a unit switch that complies with 422.34(A), (B), (C), or (D), the switch or circuit breaker serving as the other disconnecting means shall be permitted to be out of sight from the ~~motor controller~~ appliance.
Substantiation: This change is intended to clarify the requirements of these sections. As presently worded, there is conflict and confusion with the requirements of Section 422.31(B) and those of section 422.32. Section 422.31(B) allows the branch-circuit switch or circuit breaker disconnecting means for an appliance rated over $^{1}/_{8}$ horsepower to be locked in the open position. However, section 422.32 requires that for a motor driven appliance the disconnecting means must be within sight from the motor controller. As such, this section prohibits the "capable of being locked in the open position." To clarify the intent, the over $^{1}/_{8}$ Horsepower has been removed from section 422.31(B) and a new section 422.31(C) has been created to addresses appliances rated over $^{1}/_{8}$ horsepower. This should make it easier for users of the NEC to understand that for appliances with a motor rated over $^{1}/_{8}$ horsepower, the disconnecting means requirements are more restrictive (as presently worded in section 422.32). Incorporating the requirements of section 422.32 into new section 422.31(C) makes sense. With this change, existing section 422.32 can be deleted. Since the code requirements reference an appliances horsepower rating, a motor driven appliance is implied; therefore, there is no need to reference motor driven appliance. The reference to motor controller is unnecessary too, as the controller is part of the appliance. If not, then the equipment should be subject to the installation requirements of Article 430. The Exception was modified by deleting the reference to "motor driven" and "motor controller" to correlate with new section 422.31(C). Again, the intent of this change is to remove the conflicting and confusing code language!

Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 11 Negative: 2
Explanation of Negative:

MORRIS, W.: 1. Motor size should not be a limiting factor for a more restrictive disconnect means on appliances. Apparent power seems like a more applicable criteria and is already covered in Section 422.31 (B) which allows the circuit breaker to serve as the disconnect.

2. having a circuit box in sight of every appliance is impractical in most cases

3. a circuit switch (wall switch) for the appliance creates confusion since occupants do not understand its purpose and it does provide complete disconnection at the unit since only one conductor is being switched

4. a circuit breaker should be adequate disconnect means and protection to the service person whether the appliance is over 300VA or the appliance contains a motor rated higher than 1/8hp since it eliminates the 115V potential to the unit.

5. 300 Volt-ampere and 1/8 horsepower were originally intended to refer to the same appliance with two different units. Hence, they should not be separated and treated as different appliances as the intend would be altered.

PANNOCK, J.: The change eliminates the ability to lock out the disconnect means if it is not within sight of the appliance for appliances rated over 1/8 horsepower.

According to the way we read this proposal, if you add the new "(C)" it causes confusion. A 1/8 HP appliance would be about 100 VA. Thus, if you say in (B) that anything over 300 VA the branch circuit breaker can serve as the disconnecting means if it is within sight of the appliance or capable of being locked in open position. Then, if you add what is proposed in (C), for anything over 1/8 HP (which would be 100 VA), you allow that the circuit breaker can be used as the disconnecting means where the breaker is within sight. This does not seem to make sense. Why would you allow the breaker to serve as the disconnecting means if it could be locked in open position on a over 300VA appliance but not for a 100VA appliance? Isn't the real safety issue with the amount of power available in the circuit, not in the appliance?

The other problem that we have is that appliances are not rated in both VA and HP. HP is outdated and not used. It is also not an international unit of electrical power, and therefore appliances are rated in only Amps or VA or Watts on a nameplate. Motorized appliances are either rated in Amps or VA.

UL requirements for appliances typically state (dishwashers, MWO, but not washers and dryers): "The rating of an appliance having provision for permanent connection of the electrical supply and incorporating a motor load of more than 1/8 horsepower shall include either: a) The motor load of the largest motor in amperes and volts, and also the non-motor load in amperes and volts (or watts and volts); or b) The minimum supply circuit conductor ampacity and the maximum rating of the circuit overcurrent protective device in amperes."

Therefore, the appliances **<u>may not be marked</u>** with a horsepower rating. Horsepower is not an internationally recognized unit, but volt-amps and watts are. The requirements in 430 are clear for motor driven appliances, but 422 covers combination appliances so the different rule is appropriate. Dishwashers are the clearest example.

17-22 Log #1562 NEC-P17 **Final Action: Reject**
(422.31(B))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:

(B) Appliances Rated over 300 Volt-Amperes or Horsepower. For permanently connected appliances rated over 300 volt-amperes or hp, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance or **<u>the disconnecting means shall be lockable.</u>** ~~is capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.~~

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects this proposal because there is no definition for the term "disconnecting means, lockable" in Article 100 that meets the current requirements of this section.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-23 Log #1799 NEC-P17 **Final Action: Reject**
(422.31(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: For permanently connected appliances rated over 300 volt-amperes or 1/8 hp, the branch circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker <u>if</u> within sight from the appliance or ~~is capable of~~ h<u>as identified integral permanent provisions for</u> being locked in the open <u>(off)</u> position.

Delete remainder.

Substantiation: Proposal provides specific requirements for locking and prohibits makeshift methods. "Capable" is not specific as to means and doesn't specifically require actual means for locking.
Panel Meeting Action: Reject
Panel Statement: The current wording is the same wording used in many other sections throughout the code and requires provisions for locking to remain in place with or without the lock installed. There was no substantiation provided showing that the current wording is being misapplied or misunderstood.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-24 Log #1804 NEC-P17 **Final Action: Reject**
(422.31(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete present text and substitute:

For permanently connected appliances rated over 300 volt-amperes or 1/8 hp, the branch circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance or is provided with an identified integral and permanent means for locking in the open (off) position, capable of being locked in the open position.

Delete remainder.

Substantiation: Proposal provides specific requirements and prohibits makeshift methods.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 17-23.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-25 Log #1860 NEC-P17 **Final Action: Reject**
(422.31(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: For permanently connected appliances rated over 300 volt-amperes or 1/8 horsepower the branch circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the appliance <u>or has identified permanent integral means for being locked in the open (off) position</u>.

Delete the last sentence.

Substantiation: Edit. "Capable" is subjective and not specific, proposal does not allow for makeshift methods. "Open" should clearly mean "off" position, not the cover or enclosure of the disconnecting means.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 17-23.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-26 Log #3623 NEC-P17 **Final Action: Reject**
(422.31(B), FPN)

Submitter: David A. Williams, Delta Township
Recommendation: Delete the FPN for this Section 422.31(B).
Substantiation: This fine print note should be deleted since the UL product standard does not require an appliance unit switch to switch the ungrounded conductor. The manufacturer is permitted to switch the grounded conductor.
Panel Meeting Action: Reject
Panel Statement: Deleting the FPN will not change the requirements of 422.34 or 422.31(B). The FPN is only to remind code users that Section 422.34 exists and is applicable. The substantiation is technically incorrect and in conflict with 404.2(B).
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-27 Log #1800 NEC-P17 **Final Action: Reject**
(422.33(A) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence of (A): Where the separable cord connector, plug and receptacle or flanged surface device are not readily accessible, cord and plug connected appliances shall be provided with disconnecting means in accordance with 422.31.
Revise (C): The rating of an attachment plug, a receptacle, or a separable cord connector or flanged surface device shall not be less than the rating of any appliance connected thereto.
Substantiation: "Accessible" as used in (A) appears to apply to equipment. Receptacles are required to be accessible and the disconnecting means of 422.31 are required to be accessible.
(C) should include attachment plugs and flanged surface services.
Panel Meeting Action: Reject
Panel Statement: CMP-17 does not accept the changes to the wording as there is no improved clarity with respect to the word "accessible" applying to the separable connector, plug, and receptacle.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-28 Log #3624 NEC-P17 **Final Action: Reject**
(422.34)

Submitter: David A. Williams, Delta Township
Recommendation: Delete Section 422.34.
Substantiation: This section should be deleted since the UL product standard does not require an appliance unit switch to switch the ungrounded conductor. The manufacturer is permitted to switch the grounded conductor.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 17-26.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-29 Log #501 NEC-P17 **Final Action: Reject**
(422.49)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in the second sentence.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: CMP-17 notes that the proposal does not follow the NEC Style Manual, Annex B, Standard Terms.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-30 Log #4796 NEC-P17 **Final Action: Reject**
(422.49)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
High-Pressure Spray Washers.
(A) 120 Volt Systems. All single-phase cord-and-plug-connected high-pressure spray washing machines rated at 120 volts or less shall be provided with factory-installed power safe protector protection for personnel. The power safe protector shall be an integral part of the attachment plug or shall be located in the supply cord within 300 mm (12 in.) of the attachment.
(B) 240 Volt Systems. All single-phase cord-and-plug-connected high-pressure spray washing machines rated at 250 volts or less shall be provided with factory-installed ground-fault circuit-interrupter protection for personnel. The ground-fault circuit interrupter shall be an integral part of the attachment plug or shall be located in the supply cord within 300 mm (12 in.) of the attachment.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle is actively supplying power to an appliance, it provides traditional GFCI protection.
2. PSP receptacles monitor the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The use of a trademarked name is not allowed in code language. As far as we know, there has been no release of the patent.
There are no product safety requirements for this product.
CMP-17 does not agree that the submitter's technical substantiation demonstrates that the device mitigates the hazards described.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-31 Log #502 NEC-P17 **Final Action: Reject**
(422.51)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "circuit" and "interrupter" in the first sentence.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-32 Log #2571 NEC-P17 **Final Action: Accept**
(422.51)

Submitter: Charles Palmieri, Palmieri Assoc.
Recommendation: Delete the second sentence as indicated:
Cord-and-plug-connected vending machines manufactured or re-manufactured on or after January 1, 2005, shall include a ground-fault circuit interrupter as an integral part of the attachment plug or be located within 300 mm (12 in.) of the attachment plug. Older vending machines manufactured or remanufactured prior to January 1, 2005, shall be connected to a GFCI-protected outlet. ~~For the purpose of this section, the term vending machine means any self service device that dispenses products or merchandise without the necessity of replenishing the device between each vending operation and is designed to require insertion of a coin, paper currency, token, card, key, or receipt of payment by other means.~~
Substantiation: The second sentence appears to be a definition. In accordance with sections 2.2.2.1 and 2.2.2.2 Definitions of the style manual, it would appear that this language should either be re-located to Article 100, or a new section 422.2 should be created.
Panel Meeting Action: Accept
Panel Statement: See panel action and statement to Proposal 17-3.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-33 Log #2868 NEC-P17 **Final Action: Accept in Principle**
(422.51)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
422.51 Cord-and-Plug-Connected Vending Machines.
Cord-and-plug-connected vending machines manufactured or remanufactured on or after January 1, 2005, shall include a ground-fault circuit interrupter as an integral part of the attachment plug or be located within 300 mm (12 in.) of the attachment plug. Older vending machines manufactured or remanufactured prior to January 1, 2005, shall be connected to a GFCI-protected outlet~~. For the purpose of this section, the term vending machine means any self-service device that dispenses products or merchandise without the necessity of replenishing the device between each vending operation and is designed to require insertion of a coin, paper currency, token, card, key, or receipt of payment by other means~~.
Substantiation: As per the style manual, this is a definition and should be located at the beginning of the article, normally as a xxx.2 designation. Delete the above sentence and relocated to a new section 422.2 for the definition of a vending machine.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-32.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-34 Log #543 NEC-P17 **Final Action: Reject**
(422.52)

Submitter: Mark A. Ciarrocca, Cheatham & Associates, P.A.
Recommendation: Delete text as follows:
~~422.52 Electric Drinking Fountains~~
~~Electric drinking fountains shall be protected with ground fault circuit interrupter protection.~~
Substantiation: This proposal is submitted with a sister proposal to add the same text to 210.8(D). Inclusion of the text in 210.8 will serve to consolidate GFCI protection requirements in a common location.
Panel Meeting Action: Reject
Panel Statement: CMP-17 disagrees with the removal of this requirement as it would result in a reduction of safety.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

ARTICLE 424 — FIXED ELECTRIC SPACE-HEATING EQUIPMENT

17-35 Log #1609 NEC-P17 **Final Action: Reject**
(424.3)

Submitter: Adam Horsky, GR Noto Electrical Construction / Rep. IBEW Local 81
Recommendation: Revise text to read as follows:
424.3 Branch Circuits.
(A) Branch-Circuit Requirements. Individual branch circuits shall be permitted to supply any size fixed electric space-heating equipment.
(1) Branch circuits supplying two or more outlets. ~~For~~ Fixed electric space-heating equipment shall be rated 15, 20, 25, or 30 amperes.
(2) Branch circuits in nondwelling occupancies. Fixed infrared heating equipment shall be permitted to be supplied from branch circuits rated not over 50 amperes.
Substantiation: Section 424.3(A) in its current form creates confusion as to what is actually meant by the text. The division of 424.3(A) into 424.3(A)(1) and 424.3(A)(2) helps to alleviate much confusion by separating the two codes into their purpose.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the submitter's reorganization as it does not add clarity to the article. The submitter has provided no definitive substantiation to show that there has been confusion resulting from the existing text.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-36 Log #2695 NEC-P17 **Final Action: Accept**
(424.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Individual branch circuits shall be permitted to supply any ~~size~~ volt-ampere or wattage rating of fixed electric space heating equipment for which it is rated.
Substantiation: Edit. "Size" is apparently intended to apply to power rating; not physical size; the branch circuit should be specified to be rated for the load.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-37 Log #2164 NEC-P17 **Final Action: Accept**
(424.3(A))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
424.3 Branch Circuits.
(A) Branch-Circuit Requirements.
Individual branch circuits shall be permitted to supply any size fixed electric space-heating equipment.
Branch circuits supplying two or more outlets for fixed electric space-heating equipment shall be rated 15, 20, 25, or 30 amperes. In ~~nondwelling occupancies~~ other than a dwelling unit, fixed infrared heating equipment shall be permitted to be supplied from branch circuits rated not over 50 amperes.
Substantiation: The change is in keeping with the NEC Style Manual on the use of "nondwelling" terminology. The change will also provide better clarity for the user by plainly stating the correct usage of the rule.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 10 Negative: 3
Explanation of Negative:
ROCK, B.: The revision was substantiated by unreferenced citation of the NEC® Style Manual on the use of "nondwelling" terminology. However Annex B, "Standard Terms", of the NEC® Style Manual indicates on Page 28 explicitly indicates for "other than a dwelling unit" to avoid and to use "nondwelling" that is listed on the same page as being a sanctioned standard term. The existing wording is in fact in accordance with the NEC® Style Manual and the proposed wording is not.
SCHAPP, R.: I agree with the comments on vote submitted by Mr. Rock and Mr. Yasenchak.
YASENCHAK, R.: The term "other than a dwelling unit" does not meet the Style Manual requirements.

17-38 Log #2742 NEC-P17 **Final Action: Accept in Principle**
(424.3(A))

Submitter: Timothy S. Owens, City of Santa Clara
Recommendation: Revise text to read as follows:
424.3 Branch Circuits.
(A) Branch-Circuit Requirements.
Individual branch circuits shall be permitted to supply any size fixed electric space-heating equipment.
Branch circuits supplying two or more outlets for fixed electric space-heating equipment shall be rated 15, 20, 25, or 30 amperes. In ~~nondwelling occupancies~~ other than a dwelling unit, fixed infrared heating equipment shall be permitted to be supplied from branch circuits rated not over 50 amperes.
Substantiation: This change is in keeping with the NEC Style Manual on the use of "nondwelling" terminology. The change will also provide better clarity for the user by plainly stating the correct usage of the rule.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-37.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 10 Negative: 3
Explanation of Negative:
ROCK, B.: See my Explanation of Negative on Proposal 17-37 (Log #2164).
SCHAPP, R.: I agree with the comments on vote submitted by Mr. Rock and Mr. Yasenchak.
YASENCHAK, R.: The term "other than a dwelling unit" does not meet the Style Manual requirements.

17-39 Log #3610 NEC-P17 **Final Action: Accept in Part**
(424.3(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement of this proposal to identify what was not accepted and the reason it was not accepted.
This action will be considered by the panel as a public comment.
Submitter: Melvin K. Sanders, TECo., Inc.
Recommendation: Revise text to read as follows:
(B) Branch-Circuit Sizing. Fixed electric space heating equipment and motors shall be considered continuous load. This motor shall not be required to comply with Article 430 Part II.
Substantiation: When this Section was revised in 2002 NEC cycle, the clarification that fixed electric space heating blower motors were not required to be subject to Article 430 was removed. Questions have been raised whether a blower motor that may be fractional horsepower needed to follow Article 430, or realize the increased conductor sizing due to electric heating calculations would be sufficient. This will correlate with a revision made to 2008 NEC Section 424.19.
Panel Meeting Action: Accept in Part
Panel Statement: CMP-17 accepts "and motors."
CMP-17 does not accept the addition of the second sentence.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-40 Log #2694 NEC-P17 **Final Action: Reject**
(424.12(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Where likely to be subject to physical damage... (remainder unchanged)
Substantiation: Edit. 'Likely" is defined as such a nature or circumstance as to make something probable and provides a basis for judgment. It is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter's text does not meet the requirements of the NEC Style Manual, 3.2.1.
This phrase adds no clarity to the text.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-41 Log #1033 NEC-P17 **Final Action: Reject**
(424.19)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first paragraph and substitute:
DISCONNECTING MEANS. An identified switch or circuit breaker shall be provided to simultaneously disconnect each branch circuit supplying fixed electric space heating equipment. Where the heating equipment is supplied by more than one branch circuit the disconnecting means shall be grouped and each identified as to the equipment controlled by a permanently affixed and durable label. Each disconnecting means shall have an ampere rating not less than 125 percent of the total load it controls. An identified integral permanent means for locking in the open (off) position shall be provided for each disconnecting means.
Substantiation: The type of disconnecting means should be suitable for the use; the locking provision suggests it is a switch or circuit breaker. "All" ungrounded conductors includes feeder and service conductors. "Grouped and marked" does not specify what kind of marking nor durability or attachment. The proposal for locking is specific as to the portion of the disconnection means, not the cover or door, and prohibits makeshift methods.
Panel Meeting Action: Reject
Panel Statement: CMP-17 does not accept that the proposed revised wording is necessary or adds clarity to the existing code requirement.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-42 Log #1563 NEC-P17 **Final Action: Reject**
(424.19)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
424.19 Disconnecting Means.
Means shall be provided to simultaneously disconnect the heater, motor controller(s), and supplementary overcurrent protective device(s) of all fixed electric space-heating equipment from all ungrounded conductors. Where heating equipment is supplied by more than one source, the disconnecting means shall be grouped and marked. The disconnecting means specified in 424.19(A) and (B) shall have an ampere rating not less than 125 percent of the total load of the motors and the heaters **and be lockable.** ~~The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.~~
(A) Heating Equipment with Supplementary Overcurrent Protection. The disconnecting means for fixed electric space-heating equipment with supplementary overcurrent protection shall be within sight from the supplementary overcurrent protective device(s), on the supply side of these devices, if fuses, and, in addition, shall comply with either 424.19(A)(1) or (A)(2).
(1) Heater Containing No Motor Rated over Horsepower. The above disconnecting means or unit switches complying with 424.19(C) shall be permitted to serve as the required disconnecting means for both the motor controller(s) and heater under either of the following conditions:
(1) The disconnecting means provided is also within sight from the motor controller(s) and the heater.
(2) The disconnecting means **is lockable.** ~~provided is capable of being locked in the open position.~~
(2) Heater Containing a Motor(s) Rated over Horsepower. The above disconnecting means shall be permitted to serve as the required disconnecting means for both the motor controller(s) and heater **under the following conditions.** ~~by one of the following means:~~
(1) ~~Where~~ the disconnecting means **or unit switch compying with 424.19(C)** is ~~also~~ in sight from the motor controller(s) and the heater **or,**
(2) **The heater disconnecting means is lockable where not located within sight from the heater and,** ~~Where the disconnecting means is not within sight from the heater, a separate disconnecting means shall be installed, or the disconnecting means shall be capable of being locked in the open position, or unit switches complying with 424.19(C) shall be permitted.~~
(3) **The motor controller(s) disconnecting means complies with 430.102(A) and,** ~~Where the disconnecting means is not within sight from the motor controller location, a disconnecting means complying with 430.102 shall be provided.~~
(4) **The motor disconnect complies with 430.102(B).** ~~Where the motor is not in sight from the motor controller location, 430.102(B) shall apply.~~
(B) Heating Equipment Without Supplementary Overcurrent Protection.
(1) Without Motor or with Motor Not over Horsepower. For fixed electric space-heating equipment without a motor rated over hp, the branch-circuit switch or circuit breaker shall be permitted to serve as the disconnecting means where the switch or circuit breaker is within sight from the heater or **the disconnecting means is lockable.** ~~is capable of being locked in the open position.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 17-22.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-43 Log #2679 NEC-P17 **Final Action: Reject**
(424.19)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
An identified disconnecting means shall be provided to simultaneously disconnect all ungrounded conductors of each branch circuit supplying fixed electric space heating equipment. Where the equipment is supplied by more than one circuit the disconnecting means shall be grouped and durably marked to indicate the equipment controlled. The disconnecting means specified in 424.19(A) and (B) shall have an ampere rating not less than the total load of the motors and the heaters plus 25 percent of the motor or heater load, whichever is largest. An identified integral and permanent means shall be provided for locking the disconnecting means in the open (off) position.
Substantiation: Present wording literally requires simultaneous disconnection of ALL ungrounded conductors even where supplied by different disconnecting means. "More than one branch circuit" is proposed since more than one "source" may be deemed to mean service, power supply, or panelboard. An ampere rating for the disconnecting means of 125 percent of the largest motor or heater load will allow for temporary motor overcurrent and the heating effect of continuous load on terminals and overcurrent devices. There is no need to apply the factor to both motor and heating load. Proposal for locking is specific and doesn't allow makeshift methods. Present wording does not REQUIRE locking means.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-41.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-44 Log #2156 NEC-P17 **Final Action: Accept**
(424.19(A)(2))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Replace entire section 424,19(A)(2) to read as follows.
Heater Containing A Motor(s) Rated over 1/8 Horsepower. The above disconnecting means shall be permitted to serve as the required disconnecting means for both the motor controller(s) and the heater by one of the following means:
(1) Where the disconnecting means is in sight from the motor controller(s) and the heater, and complies with Part IX of Article 430.
(2) Where the motor(s) of more than 1/8 horsepower and the heater are provided with a single unit switch that complies with 422.34(A), (B), (C), or (D), the disconnecting means shall be permitted to be out of sight from the motor controller.
Substantiation: 422.32 requires that the disconnecting means comply with Part IX of Article 430. This same motor-driven appliance with an additional fixed space heater is not presently required to comply with Part IX of Article 430. There should be uniformity in the location requirement for a motor(s) over 1/8 horsepower, whether it is a motor-driven appliance or part of fixed space-heating equipment.
For example, a fan coil unit with no auxiliary heat would fall within the scope of 422.32. This same unit, with integral heat would fall within the scope of 424.19(A)(2). This change would provide uniformity for a motor(s) over 1/8 horsepower.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-45 Log #903 NEC-P17 **Final Action: Reject**
(424.19(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
"...or is ~~capable of being~~ has permanent integral identified provisions for being locked in the open (off) position.
Substantiation: "Capable of being locked" is not specific and does not exclude makeshift or temporary methods, and does not actually require locking provisions.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the need for this rewording, and there is no substantiation provided to show that the current section is inadequate or is being misinterpreted.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-46 Log #904 NEC-P17 **Final Action: Reject**
(424.19(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
"...or is ~~capable of being~~ has permanent integral identified provisions for being locked in the open (off) position.
Substantiation: "Capable of being locked" is not specific, does not actually require locking provisions and does not exclude makeshift methods.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-45.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-47 Log #2693 NEC-P17 **Final Action: Reject**
(424.21)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Switches and circuit breakers used as disconnecting means ~~shall be of the indicating type~~ shall be clearly and permanently marked to indicate the open (off) and closed (on) position. Exception; 3-way and 4-way snap switches.
Substantiation: "Indicating" is not defined or specific; a pilot light can be an indicator. Indication could be the normal up or down position of the operating handle as covered in Exception No. 1 for 404.7. This provision should track the wording of 404.7.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the use of the words "clearly and permanently marked" as there are other means besides marking that could serve as an indicator. 404.7 requires units to "clearly indicate," rather than be "clearly and permanently marked."
3-way and 4-way switches are not approved as disconnects as they are able to be operated at multiple locations.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12 Negative: 1
Explanation of Negative:
MALDONADO, J.: The Action should have been to Accept in Part. The use of the term "indicating type", which is not clearly defined in this Article or in Article 100, does not give clear direction as to what is expected of the installer and becomes a point of contention in the field. The proposed Exception should be rejected. There are disconnect switches being approved as part of Listed equipment that does not Clearly show the "off" or "on" position of a disconnect switch. Article 110.22(A) already addresses that the disconnect "indicate its purpose".
Recommendation: Switches and circuit breakers used as disconnecting means ~~shall be of the indicating type~~ shall be clearly and permanently marked to indicate the open (off) and closed (on) position.
Comment on Affirmative:
BLEWITT, T.: The submitter sought to have similar wording in 424.21 as appears in 404.7. However, the proposal would result in a marking that is not prescribed in 404.7 and would prohibit switches with integral lamps or other effective means of indication as currently permitted by both cited articles.

17-48 Log #2692 NEC-P17 **Final Action: Reject**
(424.22)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:
... shall be ~~permitted~~ considered to be protected against overcurrent where supplied by one of the branch circuits described in 210.3 and 210.23 that is rated for the load.
Substantiation: "One of the branch circuits in Article 210 is vague and not specific. and includes circuits over 600 volts.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-50.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-49 Log #1092 NEC-P17 **Final Action: Reject**
(424.22(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:...Shall be permitted to be protected against overcurrent by the branch circuit overcurrent protective device. ~~Where supplied by one of the branch circuits in Article 210.~~
Substantiation: "One of the branch circuits in Article 210" is not specific and covers many branch circuits including those over 600 volts. A branch circuit larger than 50 amperes (210.23(D)) may not provide protection for equipment rated 10 amperes.
Panel Meeting Action: Reject
Panel Statement: The proposed text does not add clarity to the code.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-50 Log #3353 NEC-P17 **Final Action: Reject**
(424.22(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:
... shall be permitted to be protected against overcurrent where supplied by one of the branch circuits covered in ~~Article 210~~ 210.3 and 210.23 provided the branch circuit does not exceed the maximum protective device rating marked on the equipment.
Substantiation: "One of the branch circuits in Article 210" is broad, includes circuits over 600 volts. The branch circuits should comply with any equipment marking.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the text that would limit the requirements to 210.3 and 210.23.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-51 Log #1091 NEC-P17 **Final Action: Accept in Principle**
(424.28(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence of second paragraph:
Electric space heating equipment intended for use on alternative current only. Or direct current only, or both shall be marked to so indicate such use.
Substantiation: Some heating elements may be suitable for use on ac and dc circuits.
Panel Meeting Action: Accept in Principle
Second paragraph of 424.28(A) to read as follows:
Electric space-heating equipment intended for use on alternating current only, ~~or~~ direct current only, or both, shall be marked to so indicate. The marking of equipment consisting of motors over 1/8 hp and other loads shall specify the rating of the motor in volts, amperes, and frequency, and the heating load in volts and watts or in volts and amperes.
Panel Statement: CMP-17 edited the submitter's text to clarify that "alternative current" was not the intended wording.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

(Note: Sequence 17-52 was not used)

17-53 Log #1090 NEC-P17 **Final Action: Accept**
(424.39)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
~~Sufficient area shall be provided to ensure that~~ No heating cable ~~is~~ shall be covered by any surface mounted ~~unit~~ equipment.
Substantiation: Edit. "Sufficient" is a term to be avoided per the Style Manual. "Unit" is not defined.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-54 Log #2691 NEC-P17 **Final Action: Reject**
(424.40)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Splices in embedded cables shall be ~~spliced only where necessary; and only~~ made by ~~approved~~ identified means,... (remainder unchanged)
Substantiation: Edit. It is normal practice to splice only where necessary. What constitutes necessary? "Approved" is not necessarily the same as "identified".
Panel Meeting Action: Reject
Panel Statement: No substantiation was provided to show that the current wording has caused a misapplication of the code.
The intent of the code is to require "approved" rather than "identified."
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-55 Log #2698 NEC-P17 **Final Action: Reject**
(424.43)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
Such installations shall be permitted to be ~~single~~ individual conductors in ~~approved~~ identified raceways, single or multiconductor Type UF, Type NMC or other ~~approved~~ identified conductors.
Substantiation: Edit. "Single" implies one conductor, as indicated by "single Type UF". "Approved" is not necessarily the same as "identified".
Panel Meeting Action: Reject
Panel Statement: CMP-17 assumes the submitter was referring to 424.43(A).
The intent of CMP-17 is to require "approved" rather than "identified" as "approved" is appropriate.
"Single conductors" is commonly used throughout the code.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-56 Log #2593 NEC-P17 **Final Action: Reject**
(424.43(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Free nonheating leads from cables shall be installed in accordance with ~~approved~~ identified wiring methods from t~~he junction~~ a box, thermostate, or control switch to a location within the ceiling. Such installations shall be ~~permitted to be~~ in ~~approved~~ raceways, ~~single or~~ multiconductor Type UF cable, Type NMC or other ~~approved~~ identified conductors or cables.
Substantiation: "Approved" is not necessarily the same as "identified". The leads may be installed from a switch or thermostat which may not be deemed a "junction" box. The present last sentence has no specific requirements; 90.5 states "shall be permitted" identifies actions allowed but not required. Type UF cable should be multiconductor type covered by rules of Article 334. Is single conductor Type UF to be installed per Article 394 or 398?
Panel Meeting Action: Reject
Panel Statement: The intent of CMP-17 is to require "approved" rather than "identified" as "approved" is appropriate.
"Single conductor Type UF" is an approved wiring method.
The addition of "thermostate, or control switch" does not add clarity to the code. Other items such as relays could also be used.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-57 Log #364 NEC-P17 **Final Action: Accept**
(424.44(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise title as shown:
(A) ~~Watts per Linear~~ Watts/Linear Meter (Foot).
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard. This revision will also provide consistency with the other text.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-58 Log #3670 NEC-P17 **Final Action: Accept**
(424.44(G))

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Revise text as follows:
424.44(G) Ground-Fault Circuit-Interrupter Protection. Ground-fault circuit interrupter protection for personnel shall be provided for cables installed in electrically heated floors of bathrooms, kitchens, and in hydromassage bathtub locations.
Substantiation: Including GFCI protection of electrical heating cables in kitchen masonry floors, would provide the same protection provided in bathrooms and hydromassage tub locations, for personnel while washing dishes or while in the vicinity of a wet floor in the instance of a plumbing leak at the dishwasher.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 11 Negative: 2
Explanation of Negative:
HIRSCH, B.: This proposal adds the requirement to provide GFCI protection for cables installed in electrically heated floors in kitchens to the existing requirement for GFCI protection on cables installed in electrically heated floors for bathrooms and hydro-massage bathtub locations. The submitter offered no substantiation that any incidents have ever occurred and based the proposal on the "possibility" that water could be on the floor of a kitchen if the dishwasher ever leaked.
MORRIS, W.: I do not accept the premise that kitchen floors should be automatically considered to be a wet surface location. The word, "kitchens" should not be used in this revision.

17-59 Log #1223 NEC-P17 **Final Action: Reject**
(424.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change first word "elevated" to "heated".
Substantiation: Edit. "Elevated" is not defined or quantified.
Panel Meeting Action: Reject
Panel Statement: CMP-17 chooses to retain the existing verbiage. "Elevated" is technically correct.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-60 Log #1089 NEC-P17 **Final Action: Reject**
(424.92(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Each unit shall be listed and identified as suitable for the installation.
Substantiation: Installers and AHJs generally do not have the wherewithall to evaluate the safety of such products such as nonheating leads. Many equipments are required to be listed which have much less potential for hazards. Manufacturers' instructions per 424.93(A)(1) may not be equal to provisions required by a NRTL. 424.93(A)(3) suggests some panels are listed.
Panel Meeting Action: Reject
Panel Statement: 424.6 already requires listing. Repeating the requirement here would be redundant.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

17-61 Log #1088 NEC-P17 **Final Action: Reject**
(424.94)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Wiring located above heated ceilings shall be spaced not less than 50 mm (2 in.) above the heated ceiling and shall be considered as operating in an ambient of 50°C (122°F) unless installed at least 300 mm (12 in.) above the heated ceiling.
Substantiation: Wiring installed far enough above the ceiling should be exempted. If this proposal has merit, the panel may establish the distance.
Panel Meeting Action: Reject
Panel Statement: No substantiation was provided to allow for this reduction. The submitter is requested to provide test data to show this reduction is justified in concealed non-ventilated spaces.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

ARTICLE 426 — FIXED OUTDOOR ELECTRIC DEICING AND SNOW-MELTING EQUIPMENT

17-62 Log #1087 NEC-P17 **Final Action: Accept**
(426.2.Impedance Heating System)

Submitter: Dan Leaf, Seneca, SC
Recommendation: IMPEDENCE HEATING SYSTEM. Change "dual winding" to "isolating".
Substantiation: Dual means two; there is no apparent reason not to permit transformers with multiple primary and secondary windings. Two winding transformers can be connected as autotransformers.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-63 Log #1224 NEC-P17 **Final Action: Reject**
(426.2, FPN)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In the FPN, change "dual-winding" to "multiple winding" an add after transformer "with the primary and secondary windings physically separated".
Substantiation: Edit. Dual-winding means two windings and does not prohibit autotransformer connections, and literally prohibits isolating type transformers with more than two windings.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-64.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-64 Log #3245 NEC-P17 **Final Action: Accept in Principle**
(426.2, FPN)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change:
dual winding: to “isolating” or “isolation type”.
Substantiation: “Dual” means two; many transformers have more than two windings. Dual doesn’t necessarily mean isolated windings; dual (two) windings can be connected as an autotransformer.
Panel Meeting Action: Accept in Principle
Change FPN for Skin-Effect Heating System to read as follows:
FPN: Typically, an electrically insulated conductor is routed through and connected to the envelope at the other end. The envelope and the electrically insulated conductor are connected to an ac voltage source from an isolating transformer.
Panel Statement: CMP-17 believes the submitter is referring to the second FPN.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-65 Log #4260 NEC-P17 **Final Action: Reject**
(426.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 426.5 in Part I.
426.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV’s, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of “other” options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be “approved”, it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-66 Log #4261 NEC-P17 **Final Action: Reject**
(426.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 426.5 in Part I.
426.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-67 Log #4262 NEC-P17 **Final Action: Reject**
(426.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 426.5 in Part I.
426.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-68 Log #4263 NEC-P17 **Final Action: Reject**
(426.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 426.5 in Part I.
426.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-69 Log #4264 NEC-P17 **Final Action: Reject**
(426.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 426.5 in Part I.

426.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:

(1) Equipment listing or labeling

(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation

Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-70 Log #3285 NEC-P17 **Final Action: Reject**
(426.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:

Fixed outdoor deicing and snow-melting equipment shall be protected by identified means where likely to be subject to physical damage.

Substantiation: Sections 426.10, 426.12, 426.13, 426.14 use the full description of the equipment covered by this article. Present wording literally requires protection whether or not there is a likelihood of damage. "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: There was no substantiation provided to show that the current wording has caused a misinterpretation or an unsafe installation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-71 Log #1086 NEC-P17 **Final Action: Reject**
(426.20(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:

Equipment that has been ~~specially investigated~~ listed for other forms of installation shall be installed only in the manner for which it has been listed ~~investigated~~.

Substantiation: Text does not indicate who is to investigate or what qualifications they have; is it the AHJ, installer or manufacturer?
Panel Meeting Action: Reject
Panel Statement: According to 110.3, instructions supplied with the equipment provide installation requirements.

CMP-17 has determined that "listed" is too restrictive. The submitter is requested to provide additional substantiation.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

MALDONADO, J.: The Panels action should have been "Accept". The current text uses an undefined term that is ambiguous. There are terms that could be used that are clearly identified, such as "Approved", "Identified", "Listed" or "Labeled". Since this term is being used as an exception to the general rule, the term "Listed" would be the most appropriate, since "special investigations" would be more closely related to the listing process.

Comment on Affirmative:

CRIVELL, P.: The proposal should be accepted in part and principle for the following reasons:

The word "investigated" is not defined and is therefore subjective and not enforceable. The purpose of 426 (C) (3) is to allow embedded deicing and snow-melting resistance heating elements to be installed with different cover than prescribed in 426(C)(1) and 426(C)(2). It is not too restrictive to require that the heating elements be listed and for the listing to identify alternate installation requirements if the installation does not comply with that prescribed in 426(C)(1) or 426(C)(2).

The heating elements are not necessarily "listed" for a manner of installation, but more accurately its listing cold "identify" a manner of installation other than that prescribed in 426(C)(1) or 426(C)(2).

The following panel statement could be used to Accept in Part and Principle:
The heating elements are not necessarily "listed" for a manner of installation, but more accurately its listing could "identify" a manner of installation other than that prescribed in 426(C)(1) or 426(C)(2).
426 (C) (3) revised as follows:
Equipment that has been ~~specially investigated~~ listed for other forms of installation shall be installed only in the manner for which it has been identified ~~investigated.~~

17-72 Log #1226 NEC-P17 **Final Action: Accept in Part**
(426.22(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement of this proposal to identify what was not accepted and the reason it was not accepted.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

All but 25 mm to 150 mm (1 in. to 6 in.) of nonheating leads of conductors ~~Type TW and other approved types~~ not having a grounded sheath shall be enclosed in a rigid metal conduit, electrical metallic tubing, intermediate metal conduit or other ~~approved~~ identified raceways...(remainder unchanged).

Substantiation: Edit. A reference to Type TW and other approved types is superfluous. "Rigid" conduit is assumed to be metal not PVC; "other raceways should be identified for the use, which is not the same as "approved".
Panel Meeting Action: Accept in Part

426.22(B) to read as follows:

(B) Raceways. All but 25 mm to 150 mm (1 in. to 6 in.) of nonheating leads ~~of Type TW and other approved types~~ not having a grounding sheath shall be enclosed in a rigid metal conduit, electrical metallic tubing, intermediate metal conduit, or other raceways within asphalt or masonry; and the distance from the factory splice to raceway shall not be less than 25 mm (1 in.) or more than 150 mm (6 in.).
Panel Statement: CMP-17 accepts "metal" and deletes "Type TW and other approved types."

CMP-17 does not accept the remainder of submitter's proposal.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-73 Log #1085 NEC-P17 **Final Action: Accept**
(426.23(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "suitable" to "identified".
Substantiation: Edit. Suitable is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

SCHAPP, R.: Replacing "suitable" with "identified" is inconsistent with panel action taken on proposal 17-72.Clarification is needed to avoid confusion between articles 426.22(B) and 426.23(A).

17-74 Log #1225 NEC-P17 **Final Action: Reject**
(426.23(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

Nonheating power supply leads shall be enclosed in a rigid metal conduit, intermediate metal conduit, electrical metallic tubing, or other identified raceways ~~approved means~~.

Substantiation: Edit. "Rigid" is assumed to be metal; "approved" is not the same as "identified".
Panel Meeting Action: Reject
Panel Statement: The existing code text provides for adequate mechanical protection. The wording "rigid conduit" does not exclude PVC or other similar adequate protection methods.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:

SCHAPP, R.: To be consistent with panel action on proposal 17-72, panel action should be APA so it reads "rigid metal conduit"

17-75 Log #729 NEC-P17 **Final Action: Accept**
(426.28)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise the title to read as follows:
426.28 Ground-Fault Protection of Equipment ~~Protection~~.
Ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment, except for equipment that employs mineral-insulated, metal-sheathed cable embedded in a noncombustible medium.
Substantiation: Revise Section title to match the subject content of the Section. This revision would be consistent with the definition in Article 100 and the title used for 230.95 for similar subject matter and would improve readability of the *Code*. The vague title "Equipment Protection" of 426.28 lead Code-Making Panel No 2 for the 2005 *NEC®* to accept a change of the reference in 210.8(A)(3) *Exception to (3)* (addressing GFCI Protection for Personnel) to 426.28 from Article 426 (in its entirety) in an effort to comply with 4.1.1 of the *NEC® Manual of Style*.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-76 Log #2732 NEC-P17 **Final Action: Accept**
(426.28)

Submitter: James S. Conrad, Tyco Thermal Controls
Recommendation: Revise text to read as follows:
426.28 Equipment Protection. Ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment~~, except for equipment that employs mineral-insulated, metal-sheathed cable embedded in a noncombustible medium~~.
Substantiation: Mineral insulated cables employ different types of metal sheaths, not all of which are suitable as ground fault returns. This revision would eliminate the only exception in the NEC to the requirement that all electrical heating cables be ground-fault protected. It would also harmonize with the Canadian Electrical Code which requires ground-fault protection, not only for embedded electric deicing and snow-melting cables in particular, but for all electric heating cables, regardless of their application.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-77 Log #3305 NEC-P17 **Final Action: Accept in Principle**
(426.31)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete present text and substitute: A transformer of the multiple winding type, with the primary and secondary windings physically separated, with a grounded shield between the primary and secondary windings, and ungrounded secondary, shall be used to supply the heating system.
Substantiation: "Dual" means "two" many transformers have more than two windings. The secondary should be specified as ungrounded to avoid ground fault currents. While intent may be perceived, "distribution system" literally includes all conductors supplying the system, including the service. Stating the purpose is unnecessary and not done for most Code rules.
Panel Meeting Action: Accept in Principle
426.31 to read as follows:
426.31 Isolation Transformer. An isolation transformer with a grounded shield between the primary and secondary windings shall be used to isolate the distribution system from the heating system.
Panel Statement: CMP-17 changes the term "dual-winding" to "isolation." The change satisfies the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-78 Log #3461 NEC-P17 **Final Action: Reject**
(426.32)

Submitter: Neal Fenster, Thermo Systems Technology, Inc.
Recommendation: Revise text to read as follows:
"Unless protected by ~~a ground fault circuit interrupter protection for personnel~~ ground fault protection the secondary winding of the isolation transformer connected to the impedance heating elements shall not have an output voltage greater than 30 volts ac.
Where ~~ground fault circuit interrupter protection for personnel~~ ground fault protection is provided, the voltage shall be permitted to be greater than 30 but not more than 80 volts.
Substantiation: 1) These metallic piping systems are thermally insulated and mechanically protected against physical damage.
2) The higher operating current levels of electrical impedance heating systems are not compatible with a Class A type protection system.
Panel Meeting Action: Reject
Panel Statement: Ground-fault protection is not equivalent to ground-fault-circuit interrupter protection for personnel. There was no substantiation provided to show why the operating current level is not compatible with a Class A type GFCI.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-79 Log #3230 NEC-P17 **Final Action: Reject**
(426.50(B))

Submitter: Ralph E. Russell, Jr., New Durham, NH
Recommendation: Revise text as follows:
The factory installed attachment plug of cord-and-plug-connected equipment rated 20 amperes or less and 150 volts or less to ground shall not serve as the disconnecting means. The disconnecting means described in 426.50(A) shall apply also for 426.50(B)
Substantiation: Receptacles for de-icing equipment are too often accessible only after removal of excess snow, ice build ups and are reached by ladder or long handled equipment. This disconnecting method compounded with environmental conditions warrants a safer, more practical method.
Panel Meeting Action: Reject
Panel Statement: CMP-17 believes the current text is appropriate. Subsection (B) is a permissive allowance for a cord and plug to be used as a disconnect.
No substantiation was provided to show that this is an unsafe installation allowance.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 427 — FIXED ELECTRIC HEATING EQUIPMENT

17-80 Log #4255 NEC-P17 **Final Action: Reject**
(427.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 427.5 in Part I.
427.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-81 Log #4256 NEC-P17 **Final Action: Reject**
(427.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 427.5 in Part I.
427.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-82 Log #4257 NEC-P17 **Final Action: Reject**
(427.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 427.5 in Part I.
427.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-83 Log #4258 NEC-P17 **Final Action: Reject**
(427.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 427.5 in Part I.
427.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-84 Log #4259 NEC-P17 **Final Action: Reject**
(427.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 427.5 in Part I.
427.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement to Proposal 17-5.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-85 Log #730 NEC-P17 **Final Action: Accept**
(427.22)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise the title to read as follows:
427.22 Ground-Fault Protection of Equipment ~~Protection~~.
Ground-fault protection of equipment shall be provided for electric heat tracing and heating panels. This requirement shall not apply in industrial establishments where there is alarm indication of ground faults and the following conditions apply:
(1) Conditions of maintenance and supervision ensure that only qualified persons service the installed system
(2) Continued circuit operation is necessary for safe operation of equipment or processes.
Substantiation: Revise Section title to match the subject content of the Section. This revision would be consistent with the definition in Article 100 and the title used for 230.95 for similar subject matter and would improve readability of the *Code*.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-86 Log #3462 NEC-P17 **Final Action: Reject**
(427.27)

Submitter: Neal Fenster, Thermo Systems Technology, Inc.
Recommendation: Revise text to read as follows:
"Unless protected by ~~a ground fault circuit interrupter protection for personnel~~ ground fault protection, the secondary winding of the isolation transformer connected to the pipeline or vessel being heated shall not have an output voltage greater than 30 volts ac.
Where ~~ground fault circuit interrupter protection for personnel~~ ground fault protection is provided, the voltage shall be permitted to be greater than 30 but not more than 80 volts.
Substantiation: 1) These metallic piping systems are thermally insulated and mechanically protected against physical damage.
2) The higher operating current levels of electrical impedance heating systems are not compatible with a Class A type protection system.
Panel Meeting Action: Reject
Panel Statement: Ground fault protection is not equivalent to ground fault circuit interrupter protection for personnel. There was no substantiation provided to show why the operating current level is not compatible with a Class A type GFCI.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-87 Log #1564 NEC-P17 **Final Action: Reject**
(427.56)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
427.56 Controls
(A) Temperature Control with ``Off'' Position**. Temperature controlled switching devices that indicate an ``off'' position and that interrupt line current shall open all ungrounded conductors when the control device is in this ``off'' position. These devices shall not be permitted to serve as the disconnecting means unless **the disconnecting means is lockable. ~~capable of being locked in the open position~~.
**(B) Temperature Control Without ``Off'' Position**. Temperature controlled switching devices that do not have an ``off'' position shall not be required to open all ungrounded conductors and shall not be permitted to serve as the disconnecting means.
(C) Remote Temperature Controller. Remote controlled temperature-actuated devices shall not be required to meet the requirements of 427.56(A) and 427.56(B). These devices shall not be permitted to serve as the disconnecting means.
(D) Combined Switching Devices. Switching devices consisting of combined temperature-actuated devices and manually controlled switches that serve both as the controllers and the disconnecting means shall comply with all the following conditions:
(1) Open all ungrounded conductors when manually placed in the ``off'' position.
(2) Be designed so that the circuit cannot be energized automatically if the device has been manually placed in the ``off'' position.
(3) Be **a lockable disconnecting means**. ~~capable of being locked in the open position.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 17-22.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-88 Log #1112 NEC-P17 **Final Action: Reject**
(427.56(C) and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (C): ~~Remote controlled~~ Temperature actuated control devices in remote-control circuits shall not be required to meet the requirements of...(remainder unchanged).
Revise (D)(3):
Be ~~capable of being locked~~ provided with an identified integral and permanent means for locking in the open (off) position.
Substantiation: Temperature control devices are not remotely controlled. Proposal for locking is specific and doesn't allow for makeshift methods.
Panel Meeting Action: Reject
Panel Statement: In regards to 427.56(C), the submitter's text does not add any clarity to the code.
In regards to 427.56(D)(3), the current wording is the same wording used in many other sections throughout the code. There was no substantiation provided showing that the current wording is being misapplied or misunderstood.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

17-89 Log #3306 NEC-P17 **Final Action: Reject**
(427.57)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: which does not exceed a maximum rating marked on the equipment.
Substantiation: Per 210.23(D), a 200 ampere branch circuit which supplies a 10 ampere load is considered suitable overcurrent protection.
Panel Meeting Action: Reject
Panel Statement: The circuit overcurrent protection device protects the branch circuit conductors, not the equipment.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 430 — MOTORS, MOTOR CIRCUITS, AND CONTROLLERS

11-24 Log #3783 NEC-P11 **Final Action: Reject**
(Figure 430.1)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Add new text to read as follows:
Motor Control Centers (Part VIII) and Adjustable Speed Drive Systems (Part X) are not represented in the motor feeder and branch circuit single line drawing illustrated in Figure 430.1.
Substantiation: Figure 430.1 is meant to illustrate Part I through Part X of the Motor Sections. Part VIII and Part X are not represented.
Panel Meeting Action: Reject
Panel Statement: Figure 430.1 is intended to allow the user of the code to more effectively interpret Article 430. Not every component or specific device is intended to be represented in the graphic. All parts of Article 430 are represented above the graphic for reference. Items in the proposal are included in the text above the graphic and therefore included in Figure 430.1.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

1-263 Log #13 NEC-P01 **Final Action: Reject**
(430.2.Engineering Supervision)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
NOTE: This proposal appeared as Comment 1-109 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 3,
Recommendation: CMP-3 recommends adding the proposed definition of "Engineering Supervision" to Article 100.
Substantiation: There are approximately 28 references to engineering supervision in various locations throughout the NEC. Although none of these references occur within Articles under the jurisdiction of CMP-3, this definition, inserted into Article 100 and placed under the jurisdiction of CMP-1 should be adequately defined, and placing it within Article 100 would provide a convenient location for this general definition.
This comment has been balloted through CMP-3 with the following results:
13 Eligible to Vote
9 Affirmative
3 Negative
1 Not Returned (J. sleights)
Mr. L. Easter voted negatively stating: "This proposal should be Rejected. The phrase "engineering supervision" is found 58 times in various articles of the NEC. As such, a definition does not belong in Article 430, where it would apply to only Article 430. If it were to be included as a definition in the NEC, it would more appropriately be placed in Article 100. However, the development of a definition of "Engineering Supervision" in Article 100 must consider the context and use of this term in each of the 58 locations of this term in the NEC."
Mr. D. Pace voted negatively stating: "A definition of the term "Engineering Supervision" should not be added to Article 100. the term needs to be defined specifically for the intended need. One definition cannot accurately cover all of the uses that are currently in the NEC. Also, the definition, as written, does not provide criteria for determining qualifications "supervision" and specifying an "Electrical Engineer" is too restrictive and is not feasible or necessary in some cases."

Mr. M. Sanders voted negatively stating: "The basis for Proposal 11-16a and Proposals 11-34 and 11-45 which did not receive the necessary consensus, and, therefore have been rejected by the Technical Correlating Committee. The negative comments on proposals by Mr. Hamer and Mr. Wright should have been taken into account, along with the comment of the Code-Making Panel 3 Task Group in Item 5.

The proposed text considered for inclusion into Article 100 is specific to Article 430 applications, and the apparent text has been adapted from the present 240.86(A), which is specific to field selected and installed series component overcurrent protection assemblies and is restricted to existing, not new, installations. The Code-Making Panel 3 Task Group states there are 28 instances where variations on this proposed text is employed. In order for this definition to be considered for inclusion into Article 100, each of those instances should be reviewed for the proposed text applicability.

This proposed text should be held for further review by all the affected Code-Making Panels and report back to the 2011 NEC cycle. This is too important to handle within the limited time of a Comment period."

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action Proposal 1-71.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 7 Negative: 5

Explanation of Negative:

FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).

HICKMAN, P.: We conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.

HITTINGER, D.: I do not agree with the Code Making Panel 3 recommendation to add a general definition in Article 100 that is too broad and unenforceable. I am not in agreement with the Panel 1 statement referencing their action on proposal 1-71.

See my comments on proposal 1-71.

MONIZ, G.: See NEMA's statement on Proposal 1-149.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

Comment on Affirmative:

LABRAKE, JR., N.: I am voting with the Panel Action to locate the definition in Article 100. However, I disagree with the use of the definition in Proposal 1-71. See my ballot statement on Proposal 1-69a.

1-264 Log #14 NEC-P01 **Final Action: Reject**
(430.2.Engineering Supervision)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

NOTE: This proposal appeared as Comment 1-110 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:

Add a new definition in 430.2 to read as follows:

Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.

Submitter: Code-Making Panel 14,

Recommendation: a) Not support Technical Correlating Committee action to include a general definition as the issue is not applicable to CMP-14 texts.

A) Delete the word "engineering" from sections 501.140 and 505.17.

B) CMP-14 does not support the inclusion of the proposed definition of "engineering supervision" in Article 100.

Substantiation: A) This action makes these sections consistent with terms used in some 13 other places within CMP-14 texts and ensures that any action taken by CMP-1 on Proposal 11-16a will not impact installations under the responsibility of CMP-14.

B) Adding the proposed definition of "engineering supervision" within Article 100 would be too restrictive. Some engineering functions within the responsibility of CMP-14 could be better accomplished by persons with chemical, mechanical, process engineering backgrounds. The responsibility to determine specific qualifications for specific functions required in various areas within the NEC should remain with the Code-Making Panel that includes those qualifications. A general term cannot adequately cover all applications.

This comment was balloted through CMP-14 with the following ballot results:

14 Eligible to Vote
13 Affirmative
1 Negative (J. Kuczka)

Mr. Kuczka voted negatively stating: "NEMA agrees with not including a definition of engineering supervision, but does not agree with sending a comment to CMP-1 to delete wording in articles outside their jurisdiction. Furthermore, the deletion of the word "engineering" in 501 and 505 would be considered new material."

Mr. D. Cook voted affirmatively stating: "While I agree the engineering judgment required for electrical installations in hazardous (classified) locations may, and in some cases should, be addressed by engineers with other than an electrical background, I believe a definition in Article 100 would be useful for the general requirements in the NEC, providing the proposed definition in Article 100 would require the Code-Making Panel's responsible for Chapters 5, 6, and 7 to review the use of the term and determine if those "special" occupancies, equipment, and conditions require the use of a different term. At this point in the 2008 NEC Cycle, that does not seem possible."

Mr. M. O'Meara voted affirmatively stating: "Adding a definition of "Engineering Supervision" clarifies the level of responsibility the phrase is intended to require and will be helpful throughout the code in determining the proper level of supervision necessary."

Panel Meeting Action: Reject

Panel Statement: The panel concludes that a definition for "Engineering Supervision" is needed in Article 100.

See the panel action on Proposal 1-71.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 7 Negative: 5

Explanation of Negative:

FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).

HICKMAN, P.: We agree with Panel 14 that an Article 100 definition of engineering supervision is not warranted.

HITTINGER, D.: I agree with the recommendation by Code Making Panel 14 that a general definition in Article 100 is not warranted. I am not in agreement with the Panel 1 statement that a general definition is needed in Article 100 or the reference to their action on proposal 1-71.

See my comments on proposal 1-71.

MONIZ, G.: See NEMA's statement on Proposal 1-71.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

Comment on Affirmative:

LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

1-265 Log #15 NEC-P01 **Final Action: Reject**
(430.2.Engineering Supervision)

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
NOTE: This proposal appeared as Comment 1-111 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 6,
Recommendation: This definition should not be incorporated in Article 100.
Substantiation: The application of specific formulas does not necessarily require the general expertise of an electrical engineer. For instance, a mathematical proof of conditions under application of 310.15(C) might be judged by the AHJ (who may be an electrical engineer doing plan checking) as acceptable although not done by an electrical engineer. Other engineers and other trained personnel may be fully qualified.
"Engineering supervision" alone provides a definition as clear as required.
This comment was balloted through CMP-6 with the following ballot results:
11 Eligible to Vote
11 Affirmative
Panel Meeting Action: Reject
Panel Statement: The panel concludes that a definition for "Engineering Supervision" is needed in Article 100.
See the panel action on Proposal 1-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 5
Explanation of Negative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We agree with Panel 6 that the proposed Article 100 definition of engineering supervision is not appropriate for inclusion in Article 100 and conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.
HITTINGER, D.: I agree with the recommendation by Code Making Panel 6 that a general definition in Article 100 is not warranted. I am not in agreement with the Panel 1 statement that a general definition is needed in Article 100 or the reference to their action on proposal 1-71.
See my comments on proposal 1-71.
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.
Comment on Affirmative:
LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

1-266 Log #16 NEC-P01 **Final Action: Accept**
(430.2.Engineering Supervision)

NOTE: This proposal appeared as Comment 1-112 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 2,
Recommendation: Reject the proposal.
Substantiation: The Task Group recommends to reject this proposal. The Task Group agrees that this definition is under the scope of CMP-1. The extent that "engineering supervision" is used throughout the code may have many different implications. The term given in the proposal of "electrical engineer" may conflict with other terms in the code using licensed professional engineers under engineering supervision. It appears that anytime the term "engineering supervision" or "maintenance and supervision" are used, they are always used in the connotation of relaxing the requirements of the code. The CMP-2 Task Group recommends that this be covered by a multi-panel Task Group during the next code cycle.
This comment was balloted through CMP-2 with the following ballot results:
12 Eligible to Vote
11 Affirmative
1 Not returned (B. Nenninger)
Mr. J. Pauley voted affirmatively stating: "For clarity, item 3 of the comment form should have the "deleted text" box checked and should state "CMP-2 recommends that CMP-1 Reject the proposal."
Panel Meeting Action: Accept
Panel Statement: See the panel action on Proposal 1-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We agree with Panel 2 that the proposed definition of engineering supervision recommended in proposal 11-16a for the 2008 NEC should not be located in 430.2.
HITTINGER, D.: I agree with Code Making Panel 2 that the proposed definition of engineering supervision recommended in proposal 11-16 for the 2008 Code should not be located in 430.2. I do not agree with the Panel 1 statement referring to their action on proposal 1-71.
See my comments on proposal 1-71.
LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

1-267 Log #17 NEC-P01 **Final Action: Accept**
(430.2.Engineering Supervision)

NOTE: This proposal appeared as Comment 1-113 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 10,
Recommendation: Reject this proposal.
Substantiation: This comment was developed by a Task Group comprised of the following members of CMP-10: James Dollard, Chair; Charles Blizzard; Dennis Darling; Charles Eldridge; Carl Fredericks; Clive Kimblin; John Kovacik; Frank Ladonne; George Ockuly; Gerald Williams; Alan Manche and Vince Saporita.
The phrase "engineering supervision" is found 58 times in various articles of the NEC. As such, it does not belong in Article 430, where it would apply to only Article 430. If it were to be included as a definition in the NEC, it would more appropriately be placed in Article 100. However, the development of a definition of "Engineering Supervision" in Article 100 must consider the context and use of this term in each of the 58 locations of this term in the NEC.
This comment was balloted through CMP-10 with the following ballot results:
12 Eligible to Vote
11 Affirmative
1 Not Returned (R. Sobel)
Panel Meeting Action: Accept
Panel Statement: See the panel action on Proposal 1-71.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We agree with Panel 10 that the proposed definition of engineering supervision recommended in proposal 11-16a for the 2008 NEC should not be located in 430.2.
HITTINGER, D.: I agree with Code Making Panel 10 that the proposed definition of engineering supervision recommended in proposal 11-16 for the 2008 Code should not be located in 430.2. I do not agree with the Panel 1 statement referring to their action on proposal 1-71.
See my comments on proposal 1-71.
LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

1-268 Log #59 NEC-P01 **Final Action: Accept**
(430.2.Engineering Supervision)

Note: This Proposal appeared as Comment 1-108 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: The Technical Correlating Committee Rejects the panel action to add a new definition for "Engineering Supervision" to Article 430. The term is used throughout the NEC and if a definition is needed it should be under the purview of Code-Making Panel 1. The Technical Correlating Committee directs that this proposal be sent to Code-Making Panel 1 for consideration of action in Article 100 during the comment phase. This action will be considered by Code-Making Panel 1 as a Public Comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
Panel Statement: The panel agrees with the Technical Correlating Committee that a new definition of "Engineering Supervision" is not to be added to 430.2.
See the panel action on Proposal 1-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We agree with Panel 1 that the proposed definition of engineering supervision recommended in proposal 11-16a for the 2008 NEC should not be located in 430.2.
HITTINGER, D.: I agree with the part of Code Making Panel 1 statement that the proposed definition of engineering supervision recommended in proposal 11-16 for the 2008 Code should not be located in 430.2. I do not agree with the part of the Panel 1 statement referring to their action on proposal 1-71.
See my comments on proposal 1-71.
LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

1-269 Log #60 NEC-P01 **Final Action: Reject**
(430.2.Engineering Supervision)

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Note: This Proposal appeared as Comment 1-109 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 3,
Recommendation: CMP-3 recommends adding the proposed definition of "Engineering Supervision" to Article 100.
Substantiation: There are approximately 28 references to engineering supervision in various locations throughout the NEC. Although none of these references occur within Articles under the jurisdiction of CMP-3, this definition, inserted into Article 100 and placed under the jurisdiction of CMP-1 should be adequately defined, and placing it within Article 100 would provide a convenient location for this general definition.
This comment has been balloted through CMP-3 with the following results:
13 Eligible to Vote
9 Affirmative
3 Negative
1 Not Returned (J. sleights)
Mr. L. Easter voted negatively stating: "This proposal should be Rejected. The phrase "engineering supervision" is found 58 times in various articles of the NEC. As such, a definition does not belong in Article 430, where it would apply to only Article 430. If it were to be included as a definition in the NEC, it would more appropriately be placed in Article 100. However, the development of a definition of "Engineering Supervision" in Article 100 must consider the context and use of this term in each of the 58 locations of this term in the NEC."
Mr. D. Pace voted negatively stating: "A definition of the term "Engineering Supervision" should not be added to Article 100. the term needs to be defined specifically for the intended need. One definition cannot accurately cover all of the uses that are currently in the NEC. Also, the definition, as written, does not provide criteria for determining qualifications "supervision" and specifying an "Electrical Engineer" is too restrictive and is not feasible or necessary in some cases."
Mr. M. Sanders voted negatively stating: "The basis for Proposal 11-16a and Proposals 11-34 and 11-45 which did not receive the necessary consensus, and, therefore have been rejected by the Technical Correlating Committee. The negative comments on proposals by Mr. Hamer and Mr. Wright should have been taken into account, along with the comment of the Code-Making Panel 3 Task Group in Item 5.
The proposed text considered for inclusion into Article 100 is specific to Article 430 applications, and the apparent text has been adapted from the present 240.86(A), which is specific to field selected and installed series component overcurrent protection assemblies and is restricted to existing, not new, installations. The Code-Making Panel 3 Task Group states there are 28 instances where variations on this proposed text is employed. In order for this definition to be considered for inclusion into Article 100, each of those instances should be reviewed for the proposed text applicability.
This proposed text should be held for further review by all the affected Code-Making Panels and report back to the 2011 NEC cycle. This is too important to handle within the limited time of a Comment period."
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action Proposal 1-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 5
Explanation of Negative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.
HITTINGER, D.: I do not agree with the Code Making Panel 3 recommendation to add a general definition in Article 100 that is too broad and unenforceable. I am not in agreement with the Panel 1 statement referencing their action on proposal 1-71.

See my comments on proposal 1-71.
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.
Comment on Affirmative:
LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

1-270 Log #61 NEC-P01 **Final Action: Reject**
(430.2.Engineering Supervision)

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Note: This Proposal appeared as Comment 1-110 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 14,
Recommendation: a) Not support Technical Correlating Committee action to include a general definition as the issue is not applicable to CMP-14 texts.
A) Delete the word "engineering" from sections 501.140 and 505.17.
B) CMP-14 does not support the inclusion of the proposed definition of "engineering supervision" in Article 100.
Substantiation: A) This action makes these sections consistent with terms used in some 13 other places within CMP-14 texts and ensures that any action taken by CMP-1 on Proposal 11-16a will not impact installations under the responsibility of CMP-14.
B) Adding the proposed definition of "engineering supervision" within Article 100 would be too restrictive. Some engineering functions within the responsibility of CMP-14 could be better accomplished by persons with chemical, mechanical, process engineering backgrounds. The responsibility to determine specific qualifications for specific functions required in various areas within the NEC should remain with the Code-Making Panel that includes those qualifications. A general term cannot adequately cover all applications.
This comment was balloted through CMP-14 with the following ballot results:
14 Eligible to Vote
13 Affirmative
1 Negative (J. Kuczka)
Mr. Kuczka voted negatively stating: "NEMA agrees with not including a definition of engineering supervision, but does not agree with sending a comment to CMP-1 to delete wording in articles outside their jurisdiction. Furthermore, the deletion of the word "engineering" in 501 and 505 would be considered new material."
Mr. D. Cook voted affirmatively stating: "While I agree the engineering judgment required for electrical installations in hazardous (classified) locations may, and in some cases should, be addressed by engineers with other than an electrical background, I believe a definition in Article 100 would be useful for the general requirements in the NEC, providing the proposed definition in Article 100 would require the Code-Making Panel's responsible for Chapters 5, 6, and 7 to review the use of the term and determine if those "special" occupancies, equipment, and conditions require the use of a different term. At this point in the 2008 NEC Cycle, that does not seem possible."
Mr. M. O'Meara voted affirmatively stating: "Adding a definition of "Engineering Supervision" clarifies the level of responsibility the phrase is intended to require and will be helpful throughout the code in determining the proper level of supervision necessary."
Panel Meeting Action: Reject
Panel Statement: The panel concludes that a definition for "Engineering Supervision" is needed in Article 100.
See the panel action on Proposal 1-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 5
Explanation of Negative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We agree with Panel 14 that an Article 100 definition of engineering supervision is not warranted.
HITTINGER, D.: I agree with the recommendation by Code Making Panel 14 that does not support a general definition in Article 100 as stated in their substantiation "a general term cannot adequately cover all applications". I do not agree with the Code Making Panel 1 statement that a definition is needed in Article 100 or the Panel action on proposal 1-71.
See my comments on proposal 1-71.
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.
Comment on Affirmative:
LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

1-271 Log #62 NEC-P01 **Final Action: Reject**
(430.2.Engineering Supervision)

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Note: This Proposal appeared as Comment 1-111 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:
Add a new definition in 430.2 to read as follows:
Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.
Submitter: Code-Making Panel 6,
Recommendation: This definition should not be incorporated in Article 100.
Substantiation: The application of specific formulas does not necessarily require the general expertise of an electrical engineer. For instance, a mathematical proof of conditions under application of 310.15(C) might be judged by the AHJ (who may be an electrical engineer doing plan checking) as acceptable although not done by an electrical engineer. Other engineers and other trained personnel may be fully qualified.
"Engineering supervision" alone provides a definition as clear as required.
This comment was balloted through CMP-6 with the following ballot results:
11 Eligible to Vote
11 Affirmative
Panel Meeting Action: Reject
Panel Statement: The panel concludes that a definition for "Engineering Supervision" is needed in Article 100.
See the panel action on Proposal 1-71.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 7 Negative: 5
Explanation of Negative:
FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).
HICKMAN, P.: We agree with Panel 6 that the proposed Article 100 definition of engineering supervision is not appropriate for inclusion in Article 100 and conclude that the recommendation is much too broad for Article 100 and is vague and unenforceable.
HITTINGER, D.: I agree with the recommendation by Code Making Panel 6 that does not support a general definition in Article 100. Panel 6 stated in their substantiation that the term "engineering supervision alone provides a definition as clear as required". I do not agree with the panel statement that a definition is needed in Article 100 or the reference to the Panel action on proposal 1-71.
See my comments on proposal 1-71.
MONIZ, G.: See NEMA's statement on Proposal 1-71.
SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of

the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

Comment on Affirmative:

LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

1-272 Log #63 NEC-P01 **Final Action: Accept**
(430.2.Engineering Supervision)

Note: This Proposal appeared as Comment 1-112 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:

Add a new definition in 430.2 to read as follows:

Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.

Submitter: Code-Making Panel 2,

Recommendation: Reject the proposal.

Substantiation: The Task Group recommends to reject this proposal. The Task Group agrees that this definition is under the scope of CMP-1. The extent that "engineering supervision" is used throughout the code may have many different implications. The term given in the proposal of "electrical engineer" may conflict with other terms in the code using licensed professional engineers under engineering supervision. It appears that anytime the term "engineering supervision" or "maintenance and supervision" are used, they are always used in the connotation of relaxing the requirements of the code. The CMP-2 Task Group recommends that this be covered by a multi-panel Task Group during the next code cycle.

This comment was balloted through CMP-2 with the following ballot results:

12 Eligible to Vote

11 Affirmative

1 Not returned (B. Nenninger)

Mr. J. Pauley voted affirmatively stating: "For clarity, item 3 of the comment form should have the "deleted text" box checked and should state "CMP-2 recommends that CMP-1 Reject the proposal."

Panel Meeting Action: Accept

Panel Statement: See the panel action on Proposal 1-71.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).

HICKMAN, P.: We agree with Panel 2 that the proposed definition of engineering supervision recommended in proposal 11-16a for the 2008 NEC should not be located in 430.2.

HITTINGER, D.: I agree with Code Making Panel 2 that the proposed definition of engineering supervision recommended in proposal 11-16 for the 2008 Code should not be located in 430.2. I do not agree with the Panel 1 statement referring to their action on proposal 1-71.

See my comments on proposal 1-71.

LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

MONIZ, G.: See NEMA's statement on Proposal 1-71.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

1-273 Log #64 NEC-P01 **Final Action: Accept**
(430.2.Engineering Supervision)

Note: This Proposal appeared as Comment 1-113 on Proposal 11-16a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11-16a was:

Add a new definition in 430.2 to read as follows:

Engineering Supervision. Direct supervision by an electrical engineer engaged primarily in the design or maintenance of electrical installations and who has skills and knowledge related to the construction and operation of the electrical equipment and installation.

Submitter: Code-Making Panel 10,

Recommendation: Reject this proposal.

Substantiation: This comment was developed by a Task Group comprised of the following members of CMP-10: James Dollard, Chair; Charles Blizzard; Dennis Darling; Charles Eldridge; Carl Fredericks; Clive Kimblin; John Kovacik; Frank Ladonne; George Ockuly; Gerald Williams; Alan Manche and Vince Saporita.

The phrase "engineering supervision" is found 58 times in various articles of the NEC. As such, it does not belong in Article 430, where it would apply to only Article 430. If it were to be included as a definition in the NEC, it would more appropriately be placed in Article 100. However, the development of a definition of "Engineering Supervision" in Article 100 must consider the context and use of this term in each of the 58 locations of this term in the NEC.

This comment was balloted through CMP-10 with the following ballot results:

12 Eligible to Vote

11 Affirmative

1 Not Returned (R. Sobel)

Panel Meeting Action: Accept

Panel Statement: See the panel action on Proposal 1-71.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

FISKE, W.: See my Explanation of Negative on Proposal 1-69a (Log #3443).

HICKMAN, P.: We agree with Panel 10 that the proposed definition of engineering supervision recommended in proposal 11-16a for the 2008 NEC should not be located in 430.2.

HITTINGER, D.: I agree with Code Making Panel 10 that the proposed definition of engineering supervision recommended in proposal 11-16 for the 2008 Code should not be located in 430.2. I do not agree with the Panel 1 statement referring to their action on proposal 1-71.

See my comments on proposal 1-71.

LABRAKE, JR., N.: See my Comment on Affirmative on Proposal 1-263 (Log #13).

MONIZ, G.: See NEMA's statement on Proposal 1-71.

SASSAMAN, H.: NECA generally supports the concept of defining the term "engineering supervision" to provide consistent and clear direction what constitutes engineering supervision where it appears in various provisions of the NEC. However, NECA does not support the definition text currently proposed. The proposed text for this new definition is related to an individual's qualifications or engineering firm's qualifications and therefore, requires judgment by the AHJ or other governing body as to the qualifications of an individual or firm. This will no doubt lead to more inconsistent enforcement and application of the rules where the term appears throughout the NEC. Engineering supervision is an action not a description of one's qualifications or capabilities. The term should be defines as an action or activity that includes certain measurable criteria or concepts that would demonstrate that the applicable installation or system is under specific and controlled conditions that warrant lessening the general rules when these conditions are met. What constitutes engineering supervision should be described as specific controls or conditions that are established and maintained continuously by qualified persons, which is already defined and fairly well understood.

11-25 Log #2082 NEC-P11 **Final Action: Reject**
(430.2.Valve Actuator Motor (VAM) Assemblies)

Submitter: Jeff Goldsmith, GE Water & Process Technologies
Recommendation: Revise text to read as follows:
Valve Actuator Motor (VAM) Assemblies. A manufactured assembly, used to operate a valve, consisting of an actuator motor and other components such as controllers, torque switches, limit switches, and overload protection. If the full load current is not more than 2 amperes and the supply is not more than 240 volts, VAMs shall be permitted to be classified as control circuit components that comply with Article 725 and not Article 430.
Substantiation: The Water & Wastewater industry uses many small motorized actuators (typically less than 2A at 120V) for valves up to about 10". There can be hundreds of these in a treatment facility. Paragraph 46.1.1(b) of UL standard 508A has always allowed these VAMs to be classified as control circuit loads. Accordingly, a common industry practice is to control these actuators using control relays and supplementary overcurrent protection in industrial control panels. Article 430 compliance is onerous and unnecessary for these VAMs.
The VAM definition that was new in the 2008 NEC valuably classifies 480V VAMs for large pipelines as motors to be covered by Article 430. This proposal fixes the unintended prohibition of a safe practice, by unambiguously permitting some VAMs to be covered by Article 725.
Almost all of the VAMs for this intended use will fall within the 2 ampere limit, which is the maximum current for 14 AWG wire to meet the requirements of 725.51(A) for no derating.
Panel Meeting Action: Reject
Panel Statement: A definition cannot contain a requirement per 2.2.2 of the NEC Style Manual. Article 725 does not apply to motor branch circuits. The reference to UL 508A to electrically operated valves is incorrect. VAMs are not classified as control circuit loads.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
GUIDRY, P.: While I agree with the panel action, I encourage the submitter to provide more information about the small motor operated valves mentioned in his proposal during the comment stage so the panel can have a better understanding about the equipment that was described. Manufacturer's cut sheets, data sheets, etc. would help our understanding of what the issue is.

11-26 Log #2216 NEC-P11 **Final Action: Accept in Principle**
(430.6)

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add reference to new part (D) in 430.6 main text to read:
430.6 Ampacity and Motor Rating Determination.
The size of conductors supplying equipment covered by Article 430 shall be selected from the allowable ampacity tables in accordance with 310.15(B) or shall be calculated in accordance with 310.15(C). Where flexible cord is used, the size of the conductor shall be selected in accordance with 400.5. The required ampacity and motor ratings shall be determined as specified in 430.6(A), (B), (C) and (D).
Add new part (D) to existing 430.6 to read:
430.6(D) Valve Actuator Motor Assemblies. For VAMs, the rated current shall be the full load current and this current shall be used to determine the maximum rating or setting of the motor branch-circuit short-circuit and ground-fault protective device and the ampacity of the conductors.
Substantiation: For VAMs, typically there is a rated current or full load current given in addition to the locked rotor current. Part B for torque motors uses the locked rotor current to determine wire sizes and fuse/breaker sizes. Since confusion still exists among Code users as to whether a VAM is a torque motor (which it is not), the addition of part (D) would help clarify what current rating should be used in determining the fuse/breaker and wire size.
Panel Meeting Action: Accept in Principle
Add new text to read as follows:
430.6(D) Valve Actuator Motor Assemblies. For VAMs, the rated current shall be the nameplate full load current, and this current shall be used to determine the maximum rating or setting of the motor branch-circuit short-circuit and ground-fault protective device and the ampacity of the conductors.
Panel Statement: The word "nameplate" clarifies that the tables are not to be used to determine the full load current.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-27 Log #2564 NEC-P11 **Final Action: Reject**
(430.6(A)(1))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Revise text as follows:
Table Values. Other than for motors built for low speeds (less than 1200 RPM) or high torques, and for multispeed motors, the values given in Table 430.247, Table 430.248, Table 430.249, and Table 430.250 shall be used to determine the required ampacity of conductors...
Substantiation: As written, the text is not as concise as it could be; conductor ampacities are determined in Article 310. The addition of the word "required" would be consistent with other code sections, such as 440.6.
Panel Meeting Action: Reject
Panel Statement: The word "required" does not add additional clarity when the whole sentence is taken into consideration.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-28 Log #3784 NEC-P11 **Final Action: Accept in Principle**
(430.6(A)(1) Exception No. 1)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Exception No. 1: Multispeed motors shall be in accordance with 430.22~~(A)~~ (B) and 430.52."
Substantiation: Article 430.22(B) addresses multispeed motors, not Article 430.22(A).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and substantiation on Proposal 11-48a.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-29 Log #3785 NEC-P11 **Final Action: Reject**
(430.7(A)(16))

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Add new text to read as follows:
(16) Rated power factor at full load.
Substantiation: European made motors include a power factor listed as: COSθ or COSΦ. Knowing the power factor of a motor at full load is helpful to engineers performing motor calculations and analysis.
Panel Meeting Action: Reject
Panel Statement: The proposal mandates design criteria that is not required for a safe and code-compliant installation. The manufacturers have the option to include power factor values on the nameplate if desired for design criteria; engineers may also consult with motor manufacturers to obtain this information. NEMA standard MG1 does not require power factor values as a nameplate marking.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-30 Log #3786 NEC-P11 **Final Action: Reject**
(430.7(A)(17))

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Add new text to read as follows:
(17) Rated efficiency at full load.
Substantiation: European made motors are rated in KW instead of Horsepower. In order for an engineer to convert Horsepower to KW, the motor efficiency at full load must be known.

$$\text{Motor KW Rating} = \frac{(\text{Horsepower Rating})\,(0.746\,\frac{\text{KW}}{\text{HP}})}{[\%\ \text{Efficiency}/100\%]}$$

Panel Meeting Action: Reject
Panel Statement: 430.7(A)(7) requires motors to be rated and marked with the horsepower rating. The proposed language is not necessary as the rated efficiency markings are a design criteria and an option for the manufacturer. NEMA standard MG1 does not require efficiency ratings as a nameplate marking.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-31 Log #365 NEC-P11 **Final Action: Accept**
(430.7(B))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action with reference to (kilovolt-amperes (kVA)/horsepower, since this would result in the kVA divided by the horsepower rather than multiplied.

This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In seven places in (1) through (5) revise from "…kilovolt-ampere (kVA) per horsepower…" to "…kilovolt-amperes (kVA)/horsepower…".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-32 Log #434 NEC-P11 **Final Action: Accept**
(Table 430.7(B))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action with reference to (kilovolt-amperes (kVA)/horsepower, since this would result in the kVA divided by the horsepower rather than multiplied.

This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Revise column heading from "Kilovolt-Amperes per Horsepower…" to "Kilovolt-Amperes/Horsepower…".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-33 Log #242 NEC-P11 **Final Action: Reject**
(430.7(B) and Table 430.7(B), FPN (New))

Submitter: Paul Schwartz, FLUOR
Recommendation: Add a FPN below Table 430.7(B) as follows:
To convert the Table 430.7(B) values to the ratio of locked rotor amps to full load amps (LRA/FLA), multiply the Code Letter values (kVA per HP with locked rotor) by (Rated Power Factor x Rated Efficiency/0.746).
Substantiation: NEMA MG-1 and the NEC require all induction motors to have a locked rotor code Letter stamped on the motor nameplate. This Code Letter provides a range of values for kVA_{LR} per HP from which the starting current under locked rotor condition can be calculated for a given motor. Some power system analysis programs use this Code Letter as input data for motor models for motor starting and short circuit calculations. However, other programs use LRA and FLA as input data. The purpose of this FPN addition to Table 430.7(B) is to clarify the relationship between the Code Letter value and the ratio of LRA/FLA.
CONVERSION OF THE MOTOR CODE LETTER VALUE TO THE RATIO OF LRA/FLA
Motor HP = kVA_R * PF_R * EFF_R/0.746, where the subscript R stands for the rated)
The Motor code Letter = kVA_{LR}/HP = kVA_{LR}/(kVA_R*PF_R*EFF_R/0.746)
The Motor Starting Current in per unit of full load current = kVA_{LR}/ kVA_R = = (sqrt 3 * V_R*LRA)/(sqrt 3*V_R * FLA) = LRA/FLA
The Motor Code Letter = kVA_{LR}/HP = (LRA/FLA) * (0.746/PF_R * EFF_R)
Therefore, the ratio of LRA/FLA = (kVA_{LR}/HP) * (PF_R * EFF_R /0.746)
(Note when PF_R * EFF_R = 0.746, the Code Letter Value equals the ratio of LRA/FLA)
MEDIUM VOLTAGE INDUCTION MOTOR EXAMPLE
HP = 13,500 HP
kV_R = 13,200 V
PF_R = 89%
EFF_R = 96.5%
FLA = 512.9 A
LRA = 2718.4 A
The LRA/FLA = 2718/512.9 = 5.3
The kVA_{LR}/HP = (LRA/FLA) * (0.746/PF_R * EFF_R) = (5.3 * 0.746)/(0.89*0.965) = 4.6
(Note the 530% motor inrush current is much greater than the 460% motor kVA_{LR}/HP.)
CODE LETTER APPLICATION SUMMARY
It can be seen from the above that there can be a significant difference in the numerical per unit values of kVA_{LR}/HP and LRA/FLA for a given motor. Thus, in modeling motors in a computer program, it is important to determine exactly what the program needs and to validate that the program uses the required data (either kVA_{LR}/HP or LRA/FLA) correctly to get the correct motor model in terms of 1 /LRA or the motor per unit subtransient reactance.
Note that not all of the US motor standards require the Code Letter to be included on the motor nameplate. For example, API-541-2004 and API-546-1997 require the locked rotor amps to be included on the motor nameplate. NEMA C50.41-2000 requires the locked rotor amps to be included on the motor nameplate but notes that, when agreed to between the user and the manufacturer, the locked rotor Code letter may be used.
Based on the above, it is recommended that the above FPN be added below Table 430.7(B).
Panel Meeting Action: Reject
Panel Statement: The NEC is not to be used as a design manual. All of the submitter's FPN information can be found in many engineering manuals.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-34 Log #3682 NEC-P11 **Final Action: Reject**
(430.9(C))

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Revise text as follows:
A minimum of ~~(7 lb-in.)~~ (7 in.-lb)
Substantiation: The correct term should be in.-lb similar to the term ft-lb.
Panel Meeting Action: Reject
Panel Statement: The existing units are technically correct as stated.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-35 Log #435 NEC-P11 **Final Action: Accept**
(Table 430.10(B))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action with reference to "Wires/Terminal*", since this would result in a division of the wires by the number of terminals.

This action will be considered by the panel as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Revise column heading from "Wires per Terminal*" to "Wires/Terminal*"
In Note following the Table, change "wires per terminal" to "wires to be connected to a terminal"
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-36 Log #1106 NEC-P11 **Final Action: Reject**
(430.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "is likely to".
Substantiation: May is a term to be avoided per the Style Manual and includes installations where it is possible, but unlikely that dripping or spraying of oil, water, or other liquid will occur. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: Both "may" and "likely to" have a probability of occurring associated with them. According to the NEC Style Manual the word "likely" should be avoided. A definition of "likely" means a high probability, which in this case is not the same as "may". "May" as used in this context is correct and meets the requirements of 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-37 Log #1104 NEC-P11 **Final Action: Accept**
(430.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "nonburning" to "noncombustible".
Substantiation: Edit. Nonburning is not the same as noncombustible; it can apply to combustible material which is not presently burning.
Panel Meeting Action: Accept
Panel Statement: The panel notes that this change will be in the exception to 430.12(A).
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-38 Log #436 NEC-P11 **Final Action: Accept**
(Table 430.12(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the second and third paragraph of the footnotes to the Table, change “per” to “for each”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-39 Log #437 NEC-P11 **Final Action: Accept**
(Table 430.12(C)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Revise the column heading from “per” to “for Each” so it reads “Minimum Usable Volume for Each Power Supply Conductor”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-40 Log #1882 NEC-P11 **Final Action: Reject**
(430.12(E) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Where a motor is installed as part of factory-wired equipment and effectively bonded to the equipment which is grounded in accordance with this Code, a separate equipment grounding conductor shall not be required to be run to the motor.
Substantiation: Edit. If the equipment itself is grounded, the grounding means should clearly comply with requirements that are based on the overcurrent devices for the equipment and motor.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation for the revised wording. The present exception accurately addresses when an equipment grounding conductor is not required.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-41 Log #1105 NEC-P11 **Final Action: Reject**
(430.14(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Open motors that have commutators or collector rings shall be located or protected so that sparks <u>are not likely to</u> reach ~~adjacent~~ combustible material.
Substantiation: Adjacent is not defined and is a term to be avoided per the Style Manual. Sparks from a motor mounted 10 ft over combustible material could ignite such material. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: Section 3.2.1 of the NEC Style Manual lists both terms as ones to be avoided. The proposed text does not improve the clarity of this exception. The submitter has provided no substantiation that this section is unclear or causing problems in the field.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-42 Log #1107 NEC-P11 **Final Action: Reject**
(430.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “suitable” to “identified”.
Substantiation: Edit. Suitable is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The term “identified” is defined in Article 100 and relates to listings by testing agencies. The term “suitable” is not unenforceable or vague as used in this context.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-43 Log #3333 NEC-P11 **Final Action: Reject**
(430.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
In locations or flying material is <u>likely to be</u> collected on <u>or in</u> a motor<u>(s)</u> in such quantities as to ~~seriously~~ interfere with the ventilation or cooling of the motor<u>(s)</u> and cause <u>elevated</u> ~~dangerous~~ temperatures <u>for which the motor(s) not rated</u>, ~~suitable~~ <u>an identified type of enclosed motor(s) that does not overheat under the prevailing conditions shall be used or an identified</u> enclosure for the motor<u>(s)</u> shall be <u>provided which minimizes the entrance of dust and flying material and does not cause elevated motor temperatures</u>.
Substantiation: Motors identified as suitable for the use should not require other enclosures. If other enclosures are provided they should be identified for the use and not in themselves cause elevated temperatures. “Seriously” and “dangerous” are subjective and not defined. “Suitable” is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any substantiation to indicate that the section is unclear or is causing problems in the field. “Seriously” and “dangerous” are defined in Webster’s 11th Collegiate Dictionary, the official dictionary for NFPA.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-44 Log #4250 NEC-P11 **Final Action: Reject**
(430.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 430.19 in Part I.
<u>430.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>
<u>(1) Equipment listing or labeling</u>
<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>
<u>(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV’s, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of “other” options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be “approved”, it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-46.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-45 Log #4251 NEC-P11 **Final Action: Reject**
(430.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 430.19 in Part I.
430.19 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-46.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-46 Log #4252 NEC-P11 **Final Action: Reject**
(430.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 430.19 in Part I.
430.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: The proposal limits the ability of installing and constructing electrical equipment. The authority having jurisdiction already has the authority to require listing of electrical equipment through NEC Sections 90.4, 90.7, and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
FAHEY, R.: The action on this proposal requiring motors to be listed should have been accept. The acceptance of this proposal would improve electrical safety and assure motors are manufactured properly and safely. As of this date, the majority of motors utilized in residential, commercial and industrial applications are listed. The concern was regarding larger specialty motors used in large industrial applications. Although present Code sections 90.7, 110.2 and 110.3(A) do allow the AHJ to require a product be listed, the proposed language would directly allow and greatly enhance the ability of the AHJ to require these products to be listed. Panel members had a concern with larger motors where the motors are specifically manufactured for a particular application process; these motors are typically installed in large industrial facilities where the product could be field evaluated by a recognized testing agency for these special and limited situations. Overall, the proposal will add safety to the electrical system and assure the AHJ, the end user and the manufacturers of motors, that all motors manufactured worldwide, would comply with the same standard of safety.

11-47 Log #4253 NEC-P11 **Final Action: Reject**
(430.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add a new section 430.19 in Part I.
430.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-46.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-48 Log #4254 NEC-P11 **Final Action: Reject**
(430.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 430.19 in Part I.
430.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-46.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-48a Log #CP1100 NEC-P11 **Final Action: Accept**
(430.22)

Submitter: Code-Making Panel 11,
Recommendation: Delete 430.22 in its entirety and replace with:
430.22 Single Motor.
Conductors that supply a single motor used in a continuous duty application shall have an ampacity of not less than 125 percent of the motor full load current rating as determined by 430.6(A)(1), or not less than the following:
(A) DC Motors-Rectifier Supplied. For dc motors operating from a rectified power supply, the conductor ampacity on the input of the rectifier shall not be less than 125 percent of the rated input current to the rectifier. For dc motors operating from a rectified single-phase power supply, the conductors between the field wiring output terminals of the rectifier and the motor shall have an ampacity of not less than the following percentage of the motor full-load current rating:
(a) Where a rectifier bridge of the single-phase half-wave type is used, 190 percent.
(b) Where a rectifier bridge of the single-phase full-wave type is used, 150 percent.
(B) Multispeed Motor. For a multispeed motor, the selection of branch-circuit conductors on the line side of the controller shall be based on the highest of the full-load current ratings shown on the motor nameplate. The ampacity of the branch-circuit conductors between the controller and the motor shall not be less than 125 percent of the current rating of the winding(s) that the conductors

energize.

(C) Wye-Start, Delta-Run Motor. For a wye-start, delta-run connected motor, the ampacity of the branch-circuit conductors on the line side of the controller shall not be less than 125 percent of the motor full-load current as determined by 430.6(A)(1). The ampacity of the conductors between the controller and the motor shall not be less than 72 percent of the motor full-load current rating as determined by 430.6(A)(1).

FPN: The individual motor circuit conductors of a wye-start, delta-run connected motor carry 58 percent of the rated load current. The multiplier of 72 percent is obtained by multiplying 58 percent by 1.25.

(D) Part-Winding Motor. For a part-winding connected motor, the ampacity of the branch-circuit conductors on the line side of the controller shall not be less than 125 percent of the motor full-load current as determined by 430.6(A)(1). The ampacity of the conductors between the controller and the motor shall not be less than 62.5 percent of the motor full-load current rating as determined by 430.6(A)(1).

FPN: The multiplier of 62.5 percent is obtained by multiplying 50 percent by 1.25.

(E) Other Than Continuous Duty. Conductors for a motor used in a short-time, intermittent, periodic, or varying duty application shall have an ampacity of not less than the percentage of the motor nameplate current rating shown in Table 430.22(E), unless the authority having jurisdiction grants special permission for conductors of lower ampacity.

****Insert Table 430.22(E) Duty-Cycle Service (Existing Not Shown)***

Note: Any motor application shall be considered as continuous duty unless the nature of the apparatus it drives is such that the motor will not operate continuously with load under any condition of use.

(F) Separate Terminal Enclosure. The conductors between a stationary motor rated 1 hp or less and the separate terminal enclosure permitted in 430.245(B) shall be permitted to be smaller than 14 AWG but not smaller than 18 AWG, provided they have an ampacity as specified in 430.22.

Substantiation: The panel has rewritten the section to provide more clarity, to correlate the wye-start, delta-run motors with other sections and to provide some additional information for dc motors.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-49 Log #2311 NEC-P11 **Final Action: Accept in Principle**

(430.22(C))

TCC Action: The Technical Correlating Committee understands that the proposal referenced in the panel statement should be 11-48a.

Submitter: John Clay, North Idaho College

Recommendation: Change last sentence of 430.22(C) to say 72% in lieu of 58%.

Substantiation: 440.32 clearly definite conductor sizing between a controller & motor; vis a vis 430.22(C) does not. A revision for – to clarify reduced voltage starting conductor sizing is needed.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and substantiation on Proposal 11-107a.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

DESJARLAIS, J.: Panel statement should read: "See panel action and substantiation on proposal 11-48a."

It currently refers to proposal 107a which does not address 430.22.

11-50 Log #4794 NEC-P11 **Final Action: Accept**

(430.22(G))

Submitter: David Drennan, Thyssen Krupp Krause, Inc.

Recommendation: Add a new 430.22(G)

(G) Conductors for Small Motors. Conductors for small motors shall not be smaller than 14 AWG unless otherwise permitted in 430.22(G)(1) or 430.22(G)(2).

(1) 18 AWG Copper. 18 AWG Copper shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord, or individual conductors used in a cabinet or enclosure, under the following conditions:

(a) Motor circuits with a full-load ampacity of 5 amperes or less provided all the following conditions are met:

(i) Circuit is protected in accordance with 430.52.

(ii) Circuit is provided with Class 10 overload protection in accordance with 430.32.

(iii) Overcurrent protection is provided in accordance with 240.4(D)(1)(2)

(b) Motor circuits with a full-load ampacity of 3.5 amperes or less provided all the following are met:

(i) Circuit is protected in accordance with 430.52.

(ii) Circuit is provided with Class 20 overload protection in accordance with 430.32.

(iii) Overcurrent protection is provided in accordance with 240.4(D)(1)(2).

(2) 16 AWG Copper. 16 AWG Copper shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord, or individual conductors used in a cabinet or enclosure, under the following conditions:

(a) Motor circuits with a full-load ampacity of 8 amperes or less provided all the following conditions are met:

(i) Circuit is protected in accordance with 430.52.

(ii) Circuit is provided with Class 10 overload protection in accordance with 430.32.

(iii) Overcurrent protection is provided in accordance with 240.4(D)(2)(2).

(b) Motor circuits with a full-load ampacity of 5.5 amperes or less provided all the following are met:

(i) Circuit is protected in accordance with 430.52.

(ii) Circuit is provided with Class 20 overload protection in accordance with 430.32.

(iii) Overcurrent protection is provided in accordance with 240.4(D)(2)(2).

Substantiation: This proposal correlates the detailed requirements for applying small motor circuit conductors in Article 430 with those found in NFPA 79. It specifically limits the type of conductors that can be utilized or limits their location to a "protected" area such as a cabinet or enclosure. It then specifies the classes of overload relays and the sizes of overcurrent protective devices, based upon the motor full load amperes. The changes were introduced into NFPA 79 in order to help US machinery manufacturers compete in the international market, where the allowable minimum IEC motor circuit conductors are smaller than the minimum 14 AWG conductors allowed in NFPA 79 and the NEC®.

Panel Meeting Action: Accept

Add a new 430.22(G)

(G) Conductors for Small Motors. Conductors for small motors shall not be smaller than 14 AWG unless otherwise permitted in 430.22(G)(1) or 430.22(G)(2).

(1) 18 AWG Copper. [18 AWG Copper shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord or individual conductors used in a cabinet or enclosure, under the following conditions:]

(1) Motor circuits with a full-load ampacity of 5 amperes or less provided all the following conditions are met:

(a) Circuit is protected in accordance with 430.52

(b) Circuit is provided with Class 10 overload protection in accordance with 430.32

(c) Overcurrent protection is provided in accordance with 240.4(D)(1)(2).

(2) Motor circuits with a full-load ampacity of 3.5 amperes or less provided all the following are met:

(a) Circuit is protected in accordance with 430.52

(b) Circuit is provided with Class 20 overload protection in accordance with 430.32

(c) Overcurrent protection is provided in accordance with 240.4(D)(1)(2).

(2) 16 AWG Copper. 16 AWG copper shall be permitted if part of a jacketed multiconductor cable assembly or flexible cord, or individual conductors used in a cabinet or enclosure, under the following conditions:]

(1) Motor circuits with a full-load ampacity of 8 amperes or less provided all the following conditions are met:

(a) Circuit is protected in accordance with 430.52

(b) Circuit is provided with Class 10 overload protection in accordance with 430.32

(c) Overcurrent protection is provided in accordance with 240.4(D)(2)(2).

(2) Motor circuits with a full-load ampacity of 5.5 amperes or less provided all the following are met:

(a) Circuit is protected in accordance with 430.52

(b) Circuit is provided with Class 20 overload protection in accordance with 430.32

(c) Overcurrent protection is provided in accordance with 240.4(D)(2)(2).

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

DESJARLAIS, J.: An exception should be made for certified motor operated equipment employing wires sizes smaller than specified in this proposal. The following should be added after (G) and before (1):

Exception - Smaller wire sizes may be employed where part of a listed motor operated equipment.

11-50a Log #CP1101 NEC-P11 **Final Action: Accept**

(430.24)

Submitter: Code-Making Panel 11,

Recommendation: Delete section 430.24 in its entirety and replace with the following:

430.24 Several Motors or a Motor(s) and Other Load(s). Conductors supplying several motors, or a motor(s) and other load(s), shall have an ampacity not less than the sum of each of the following:

1. 125 percent of the full-load current rating of the highest rated motor as determined by 430.6(A)
2. the sum of the full-load current ratings of all the other motors in the group, as determined by 430.6(A)
3. 100 percent of the non-continuous non-motor load
4. 125 percent of the continuous non-motor load.

The FPN and the exceptions remain unchanged.

Substantiation: The modified text clarifies the meaning of "required for the other loads".
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
DESJARLAIS, J.: Add to item 2. 100 percent of the sum of the full-load......
Revise item 4. 100 percent of the continuous non-motor load
Substantiation: Revise item 2 as shown to clarify the percent of additional motor load for calculation. Revise item 4 as shown. The remaining non-motor loads should be calculated in a manner no different than the remaining motor-loads. Motor loads are more apt to incur running overloads than non-motor loads. Clause 430.53(C)(4) sizes loads for branch circuit protection similarly.

11-51 Log #1084 NEC-P11 **Final Action: Reject**
(430.24 Exception No. 3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Where the circuitry is interlocked so as to prevent simultaneous operation of selected motors or other loads ~~at the same time~~, the conductor ampacity shall be permitted to be based on the summation of 125 percent of the largest motor or continuous load, whichever is larger, and the currents of the other motors and other loads to be operated simultaneously ~~at the same time~~ that results in the highest current.
Substantiation: Edit. Proposal clarifies that the 125 percent factor is to be applied.
Panel Meeting Action: Reject
Panel Statement: It is the panel's intent to require 125 percent of the largest motor, plus 125 percent of the continuous load for those loads operating simultaneously. No technical substantiation has been provided to the panel for only requiring 125 percent for the largest of the motor or the continuous load. See panel action and statement on 11-48a.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
BUNCH, R.: This proposal deals with exception 3 in 430.34. Panel action 11-48a only reworded 430.22 rules for a single motor. This is several motors and other loads, not a single motor so the panel action for 11-48a does not apply. The exception cited is still allowed in 430.24. This proposal was only to clarify for circuit with interlocks and should be accepted.
Comment on Affirmative:
FAHEY, R.: The panel statement referring to proposal 11-48a was incorrectly referenced; the correct panel action and statement should have been 11-50a.
SAUNDERS, L.: Panel statement improperly refers to "see panel action and comment on 11-~~48a~~" and should refer to 11-50a.

11-52 Log #1083 NEC-P11 **Final Action: Reject**
(430.26)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part...provided the conductor have ~~sufficient~~ an ampacity ~~for~~ not less than the maximum load determined in accordance with...(remainder unchanged).
Substantiation: Edit. "Sufficient" is subjective, undefined, and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The use of the word "sufficient" is a quantitative term that can be enforceable because it is a calculated load. If a word is enforceable, 3.2.1 of the NEC Style Manual, allows its use.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-53 Log #3452 NEC-P11 **Final Action: Reject**
(430.26)

Submitter: James G. Lally, IBEW/NECA Technical Institute
Recommendation: 430.26 add new paragraph:
For feeder or service calculations for single family dwellings omit the additional 25 percent for the largest motor.
Substantiation: 220.50 refers us to 430.24.
The amount of VA that it adds in determining the size of the conductors is insignificant.
Panel Meeting Action: Reject
Panel Statement: The panel rejects this proposal, as the submitter has not provided technical substantiation to support the omission of the 25 percent for the largest motor. Many larger homes have large equipment such as mechanical equipment.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-54 Log #255 NEC-P11 **Final Action: Reject**
(430.28(1))

Submitter: Timothy Trewyn, Garrison Engineering Services
Recommendation: Revise text to read as follows:
(1)...shall not exceed 100 ~~1000~~ percent of the tap conductor ampacity
Substantiation: Selection of overcurrent device at 1000 percent of the ampacity of a conductor protected by the device is unsafe. This appears to be a typographical error.
Panel Meeting Action: Reject
Panel Statement: This is not a typographical error. The panel rejects this proposal as the present 1000 percent language is correct for the 10 ft tap rule. If the multiplier was changed to 100 percent, the tap conductor would be required to be the same size as the conductor that it is tapped from; therefore, it would not be defined as a tap conductor. The substantiation does not indicate how the existing requirement is unsafe.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-55 Log #3713 NEC-P11 **Final Action: Reject**
(430.28(1))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add additional text to 430.28 (1) as follows:
430.28 Feeder Taps. Feeder tap conductors shall have an ampacity not less than that required by Part II, shall terminate
in a branch-circuit protective device, and, in addition, shall meet one of the following requirements:
(1) Be enclosed either by an enclosed controller or by a raceway, be not more than 3.0 m (10 ft) in length, and,
for field installation, be protected by an overcurrent device on the line side of the tap conductor, the rating
or setting of which shall not exceed 1000 percent of the tap conductor ampacity. Feeder tap conductors shall be permitted to terminate in multiple branch-circuit protective devices that have a common line side connection either by:
a) Use of bus-bar wiring accessories identified for such use, or
b) Use of conductors to interconnect between terminals where the total length of the tap and all interconnecting conductors to any of the branch-circuit protective devices does not exceed 3m (10 ft).
Substantiation: The current language states that a tap conductor must terminate in a branch-protective device, and is not clear in its permission of termination onto multiple branch circuit devices in parallel. This proposal clarifies the use of readily available bus bar wiring accessories or daisy chaining using conductors when the motor branch-circuit short-circuit protective device terminals are designed for such use.
Panel Meeting Action: Reject
Panel Statement: The present code language provides clear indication a single overcurrent device is required. The proposed text allows an installation with an unlimited number of overcurrent protective devices. This new language allows the possibility of overloading the tap conductors. The proposal also adds language as to the method of connecting the tap conductors, which is ambiguous and difficult for the AHJ to enforce.
For purposes of arc-flash reduction, if an arc-flash were to occur on the line side of one of the multiple branch-circuit protective devices, it is better to have a single overcurrent protective device, rated at the ampacity of the feeder tap, at the end of the tap. This proposal would eliminate the single device at the end of the tap, meaning that the arc-flash would be determined by the feeder overcurrent device, which could be 10 times the rating of the device that is now required.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
DESJARLAIS, J.: The same requirements applicable to branch circuit conductors should be applicable to tap conductors as the hazards are the same. The present requirements in clauses 430.53 and 430.53 are sufficient for determining the size, type and number of branch circuit protection requirements.
WRIGHT, J.: The wording of the Panel statement "it is better to have a single overcurrent protective device, rated at the ampacity of the feeder tap, at the end of the tap" is incorrect, as related to Article 430. The present rules for feeder taps in Section 430.28 require that the tap end in a branch circuit protective device; the rating of that branch circuit protective device is not specified, relative to the tap conductor. Instead, overcurrent protection for the feeder tap is provided by the overload protection provided in accordance with Part III of Article 430.
The rating of the branch-circuit protective device at the end of the feeder tap is determined by the load, in accordance with Section 430.52 or 430.53. This results in the branch-circuit protective device at the end of the feeder tap having a rating considerably higher than the ampacity of the feeder tap conductor; that is necessary in order to get motors started.

The Panel statement that the proposed change allows the possibility of overloading tap conductors is also incorrect. Section 430.24 contains specific requirements for sizing the tap conductors supplying multiple loads. The total of all loads connected to the multiple branch-circuit protective devices attached to the bus-bar wiring system of proposed 430.28(1)(a) or interconnected as in proposed 430.28(1)(b) would be used to calculate the required ampacity of the tap conductor to these connections.

The Panel statement regarding arc-flash reduction is also incorrect, in that, as noted above, the feeder tap is not required to terminate in a branch-circuit protective device rated at the ampacity of the feeder tap. Under the proposed wording, the maximum rating of any branch-circuit protective device connected to the bus-bar system or interconnected system would be no higher than that currently permitted by the Code.

Making connections at the line-side of one of the multiple branch-circuit protective devices would be no different than making connections at the line-side of a single branch-circuit protective device. In both cases, the fault would be limited by the feeder overcurrent device. For circumstances involving multiple loads on a feeder circuit, the present wording of the Code requires the use of multiple feeder taps, which presents multiple opportunities for wiring errors.

11-56 Log #1082 NEC-P11 **Final Action: Reject**
(430.31)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second paragraph:

These provisions shall not be interpreted as requiring overload protection where ~~it might introduce~~ <u>opening of the overload device(s)</u> introduces possible additional or increased hazard(s), as in the case of fire pumps.

Substantiation: Edit. “Might” is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any technical substantiation that there are problems with this section as written. The term “might” is appropriate in the context of this section and is in accordance with section 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:

COLE, T.: Table 3.2.1 in the Style Manual lists the word “might” as a word that is possibly unenforceable. The use of the word “might” in this context is a perfect example of this. While the author is correct in saying the word “might is a confusing word he then interjects another word “possible” which would have the same affect. Substituting the word “if” in place of the words “it might introduce” and eliminating the word “possible” would eliminate any vague wording and add clarity. The proposal should have been accepted in principal.

11-57 Log #1272 NEC-P11 **Final Action: Reject**
(430.32(A)(1))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:

430.32(A)(1) Continuous-Duty Motors.

(1) Separate Overload Device. A separate overload device that is responsive to motor current. <u>This device is permitted to be a Dual Element (Time-Delay) fuse, sized in accordance with Part III of Article 430.</u> This device shall be selected to trip or shall be rated at no more than the following percent of the motor nameplate full-load current rating:

Substantiation: Many questions and comments have come up concerning whether a fuse can be used for overload protection, in our classroom and phone calls to James R. Weimer. I believe that this simple change would clarify this. Reviewing 430.36 implies that a fuse is acceptable.
Panel Meeting Action: Reject
Panel Statement: Dual element (time-delay) fuses are presently permitted in 430.36 to be utilized for overload protection when sized in accordance with Part III of Article 430. The proposed language would be redundant.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-58 Log #2352 NEC-P11 **Final Action: Reject**
(430.32(A)(1))

Submitter: Kevin M. Weigman, Northeast Wisconsin Technical College
Recommendation: Revise text to read as follows:

Separate Overload Device. A separate overload device that is responsive to motor current. This device shall be selected to trip or shall be rated at no more than the following percent of motor nameplate full-load ~~current~~ <u>ampere</u> rating.

Substantiation: The nameplate of a motor lists the current for said motor in Full Load Amperes whereas the Code lists it as Full Load Current from the tables. Changing the language will serve to clarify the intent of the code section that the nameplate value is the desired value.
Panel Meeting Action: Reject
Panel Statement: The NEC Style Manual lists “full load current” as a standard term. The panel does not agree using the term “amperes” will add clarity.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-59 Log #625 NEC-P11 **Final Action: Reject**
(430.32(A)(1), FPN No. 2)

Submitter: Gregory P. Bierals, Samaritan’s Purse World Medical Mission
Recommendation: Add new text to read as follows:

FPN No. 2: Using the actual measured running current of the motor, increased to no more than the percentages identified in this section, instead of using the motor nameplate full-load current rating, may provide better overload protection.

Substantiation: Where the actual running current of the motor, under normal conditions, is less than the motor nameplate current rating, the use of this lower value would be a prudent choice.
Panel Meeting Action: Reject
Panel Statement: In accordance with Section 3.1.3 of the NEC Style Manual the proposed new FPN does not contain explanatory information only. Furthermore, a FPN should not contain recommendations.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-60 Log #438 NEC-P11 **Final Action: Accept**
(Table 430.37)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

In the seventh and eight rows of the Table, change “per” to “for each”.

In the seventh row of the Table, change “con- ductors” to “conductors”.

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.

The correction for conductors is editorial.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

(Note: Sequence 11-61 was not used)

11-62 Log #731 NEC-P11 **Final Action: Reject**
(430.42(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Delete text to read as follows:
430.42 Motors on General-Purpose Branch Circuits.
Overload protection for motors used on general-purpose branch circuits as permitted in Article 210 shall be provided as specified in 430.42(A), (B), (C), or (D).
(C) Cord-and-Plug-Connected. Where a motor is connected to a branch circuit by means of an attachment plug and receptacle and individual overload protection is omitted as provided in 430.42(A), the rating of the attachment plug and receptacle shall not exceed 15 amperes at 125 volts or 250 volts. Where individual overload protection is required as provided in 430.42(B) for a motor or motor-operated appliance that is attached to the branch circuit through an attachment plug and receptacle, the overload device shall be an integral part of the motor or of the appliance. The rating of the ~~attachment plug and~~ receptacle shall determine the rating of the circuit to which the motor may be connected, as provided in Article 210.
[remainder of 430.42 unchanged by this Proposal]
Substantiation: NOTE: This proposal is separate from another proposal I submitted for 430.42(C) involving cord pendants.

The rating of the circuit should be based on the rating of the receptacle alone, not on EITHER the receptacle OR the attachment plug. Some receptacle configurations accept either an attachment plug of the same current rating or of a lower current rating. 406.3(F) mandates noninterchangeability based on different voltages, frequencies, or services (ac versus dc) on the same premises, but NOT based on amperage or horsepower current rating. The most common examples are that non-locking-type 20-ampere, 125-volt (NEMA 5—20R) and 250-volt (NEMA 6—20R) receptacles will accept either non-locking-type 15- or 20-ampere, 125-volt (NEMA 5—15P or NEMA 5—20P) and 250-volt (NEMA 6—15P or NEMA 6—20P), respectively.

Also as a matter of enforcement by the AHJ at the time of inspection, the receptacle as part of the permanent wiring is there, but the attachment plug (and equipment) may not be.

Panel Meeting Action: Reject
Panel Statement: The present language requires the installer to size the branch circuit based on both the attachment plug and the receptacle for the load to be served; this is consistent with 210.21(B). See panel action and statement on Proposal 11-63.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-63 Log #732 NEC-P11 **Final Action: Accept in Part**
(430.42(C))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text and add a new Fine Print Note to read as follows:
430.42 Motors on General-Purpose Branch Circuits.
Overload protection for motors used on general-purpose branch circuits as permitted in Article 210 shall be provided as specified in 430.42(A), (B), (C), or (D).
(C) Cord-and-Plug-Connected. Where a motor is connected to a branch circuit by means of an attachment plug and a receptacle or a cord connector that is supplied by a permanently connected cord pendant and individual overload protection is omitted as provided in 430.42(A), the rating of the attachment plug and receptacle shall not exceed 15 amperes at 125 volts or 250 volts. Where individual overload protection is required as provided in 430.42(B) for a motor or motor-operated appliance that is attached to the branch circuit through an attachment plug and a receptacle or a cord connector that is supplied by a permanently connected cord pendant, the overload device shall be an integral part of the motor or of the appliance. The rating of the ~~attachment plug and~~ receptacle or the cord connector shall determine the rating of the circuit to which the motor may be connected, as provided in Article 210.
FPN: See 210.50(A) and 400.7(A)(1) for equivalency to a receptacle outlet of a cord connector that is supplied by a permanently connected cord pendant.
[remainder of 430.42 unchanged by this Proposal]
Substantiation: NOTE: This proposal is separate from another proposal I submitted for 430.42(C) NOT involving addition of cord pendants.
Regarding the deletion of "attachment plug or" in the last sentence of 430.42(C), the rating of the circuit should be based on the rating of the receptacle alone, not on EITHER the receptacle OR the attachment plug. Some receptacle configurations accept either an attachment plug of the same current rating or of a lower current rating. 406.3(F) mandates noninterchangeability based on different voltages, frequencies, or services (ac versus dc) on the same premises, but NOT based on amperage or horsepower current rating. The most common examples are that non-locking-type 20-ampere, 125-volt (NEMA 5—20R) and 250-volt (NEMA 6—20R) receptacles will accept either non-locking-type 15- or 20-ampere, 125-volt (NEMA 5—15P or NEMA 5—20P) and 250-volt (NEMA 6—15P or NEMA 6—20P), respectively.
Also as a matter of enforcement by the AHJ at the time of inspection, the receptacle as part of the permanent wiring is there, but the attachment plug (and equipment) may not be.
The added wording and Fine Print Note for cord pendants and cord connectors are provided for correlation to 210.50(A) and 400.7(A)(1) and the practices they already permit, commonly employed in commercial and industrial applications.
Panel Meeting Action: Accept in Part
Revise text of **430.42(C)** to read as follows:
(C) Cord-and-Plug-Connected. Where a motor is connected to a branch circuit by means of an attachment plug and a receptacle or a cord connector and individual overload protection is omitted as provided in 430.42(A), the rating of the attachment plug and receptacle shall not exceed 15 amperes at 125 volts or 250 volts. Where individual overload protection is required as provided in 430.42(B) for a motor or motor-operated appliance that is attached to the branch circuit through an attachment plug and a receptacle or a cord connector the overload device shall be an integral part of the motor or of the appliance. The rating of the attachment plug and receptacle or the cord connector shall determine the rating of the circuit to which the motor may be connected, as provided in Article 210.
[remainder of 430.42 unchanged by this Proposal]
Add a new fine print note to read as follows:
FPN: See 210.50(A) and 400.7(A)(1) for equivalency to a receptacle outlet of a cord connector that is supplied by a permanently connected cord pendant.
Panel Statement: The panel accepts the additional language as related to cord connectors and the FPN. The panel rejects the remainder of the proposal. The present language requires the installer to size the branch circuit based on both the attachment plug and the receptacle for the load to be served. This is consistent with 210.21(B).
The additional code language related to permanently connected cord pendants is not necessary because they are presently permitted in 210.50(A) and 400.7(A)(1), therefore the additional language is redundant.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
DESJARLAIS, J.: Re-word the 5th line of the proposal to state: "...circuit through an attachment plug and a receptacle or a cord connector, the overload device shall..." Add a comma after "cord connector".

11-64 Log #1081 NEC-P11 **Final Action: Accept**
(430.42(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"or cord connector" after "receptacle" in four places.
Substantiation: Edit. Cord connectors should be included; they are required if a motor has a flanged surface inlet.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-65 Log #1080 NEC-P11 **Final Action: Reject**
(430.43)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
A motor overload device that can restart a motor automatically shall not be installed if automatic restarting of the motor ~~can~~ is likely to result in injury to persons.
Substantiation: Edit. Any automatic (or manual) restarting of a motor can result in injury, dependent on circumstances. "Likely" is defined as a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: 3.2.1 of the NEC Style Manual lists "likely" as a possible unenforceable term. The present text uses the term "can" as a verb and denotes possibility. The present text contains clear language and is more specific than the proposed language. The definition of "can" is "capable of".
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-66 Log #1108 NEC-P11 **Final Action: Reject**
(430.44)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
If immediate automatic shut-down of a motor by a motor overload protective device(s) ~~would~~ is likely to introduce addition or increased hazard(s)... (remainder unchanged).
Substantiation: It can be difficult to determine with certainty if an increased hazard will result due to variable conditions and circumstances. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The true definition of likely is "a high probability". The use of the word "would" indicates that something "will" take place. The use of "likely" interjects some uncertainty and changes the intent of the text.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-67 Log #2215 NEC-P11 **Final Action: Accept in Principle**
(430.52(C)(7))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new FPN to existing 430.52(C)(7) to read:
FPN: A Motor Short-Circuit Protector as used in this Section is a fused device and is not a motor circuit protector (MCP) instantaneous circuit breaker.
Substantiation: There remains much confusion in the industry as to what a Motor Short-Circuit Protector is. This FPN will clarify that a Motor Short-Circuit Protector is not the same as an MCP circuit breaker.
Panel Meeting Action: Accept in Principle
Add new FPN to existing 430.52(C)(7) to read:
FPN: A motor short-circuit protector as used in this section is a fused device and is not an instantaneous trip circuit breaker.
Panel Statement: The panel accepts the concept and changed wording to use the proper term, which is "instantaneous trip circuit breaker".
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-68 Log #3714 NEC-P11 **Final Action: Accept**
(430.53)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Modify 430.53, with the following added wording:
430.53 Several Motors or Loads on One Branch Circuit. Two or more motors or one or more motors and other loads shall be permitted to be connected to the same branch circuit under conditions specified in 430.53(D) and in 430.53(A), (B), or (C). The branch circuit protective device shall be fuses or inverse time circuit breakers.
Substantiation: This clarifies that inverse time circuit breakers and fuses are the only permitted means for providing group motor branch short-circuit and ground fault protection.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-69 Log #3715 NEC-P11 **Final Action: Accept**
(430.53(C)(1) and (2))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Change the text under (C)(1) as follows:
(1) Each motor overload device is either (a) listed for group installation with a specified maximum rating of fuse, circuit breaker, or both, or (b) selected such that the ampere rating of the motor branch short-circuit and ground fault protective device does not exceed that allowed by 430.52 for that individual motor overload device and corresponding motor load.
Change the text under (C)(2) as follows:
(1) Each motor controller is either (a) listed for group installation with a specified maximum rating of fuse, circuit breaker, or both, or (b) selected such that the ampere rating of the motor branch short-circuit and ground fault protective device does not exceed that allowed by 430.52 for that individual controller and corresponding motor load.
Substantiation: The language in 430.53(C)(1) and (2) requires all motor controllers and overloads devices to be listed for group installation. Any motor controller or overload device applied within a group installation where the branch circuit protection for the group is sized within what would be permitted for a single motor installation of that device need not be marked for group motor as it is protected within its listing requirements.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-70 Log #4402 NEC-P11 **Final Action: Accept in Principle in Part**
(430.53(D)(2), FPN)

Submitter: Jay Tamblingson, Rockwell Automation
Recommendation: Add the following at the end of subsection 430.53.(D).(2):
FPN: Protection against physical damage can include use of raceways, enclosures, and other wiring methods such as that referenced in 336.10.(7).
Substantiation: The proposed FPN helps to clarify the possible means of protection from physical damage, particularly for the now very common distributed power and control applications on machines.
Panel Meeting Action: Accept in Principle in Part
Instead of adding this text in a FPN, the panel has revised 430.52(D)(2) to read:
No conductor to the motor shall have an ampacity less than one-third that of the branch-circuit conductors, with a minimum in accordance with 430.22, the conductors to the motor overload device being not more than 7.5 m (25 ft) long and being protected from physical damage by being enclosed in an approved raceway or other approved means.
Panel Statement: The panel has added language to be consistent with present language for physical protection of tap conductors in other sections of the NEC, such as 430.53(D)(3), 430.28 and 240.21. The additional language satisfies the submitter's concerns with the type of physical protection required for these tap conductors. This addresses the submitter's concerns in regard to referencing other wiring methods by adding the language "other approved means".
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-71 Log #3716 NEC-P11 **Final Action: Accept in Part**
(430.53(D)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Modify 430.53(D)(3) with the following added wording:
Conductors from the branch-circuit short-circuit and ground-fault protective device to a listed manual motor controller additionally marked "Suitable for Tap Conductor Protection in Group Installations" or to a branch-circuit protective device shall be permitted to have an ampacity not less than 1/10 the rating or setting of the branch-circuit short-circuit and ground-fault protective device. The conductors from the controller to the motor shall have an ampacity in accordance with 430.22. The conductors from the branch-circuit short-circuit and ground-fault protective device to the controller shall (1) be ~~suitably protected from physical damage and~~ enclosed either by an enclosed controller or by a raceway and be not more than 3 m (10 ft) long or (2) have an ampacity not less than that of the branch-circuit conductors.
Substantiation: This is a clarification of existing requirements. Additional Branch Circuit Protective Devices (such as fuses, inverse time circuit breakers and listed Self-Protected Combination Motor Controllers) may be used in the same location in the circuit of a Group Installation as a manual motor controller additionally marked "Suitable for Tap Conductor Protection in Group Installations". Further, this clarifies that the concepts in 430.28 are also applicable in group applications.
In addition, the phrase "suitably protected from physical damage" is redundant and confusing in light of the requirement for enclosing in an enclosed controller or a raceway.
Panel Meeting Action: Accept in Part
Modify 430.53(D)(3) with the following added wording:
Conductors from the branch-circuit short-circuit and ground-fault protective device to a listed manual motor controller additionally marked "suitable for tap conductor protection in group installations" or to a branch-circuit protective device shall be permitted to have an ampacity not less than 1/10 the rating or setting of the branch-circuit short-circuit and ground-fault protective device. The conductors from the controller to the motor shall have an ampacity in accordance with 430.22. The conductors from the branch-circuit short-circuit and ground-fault protective device to the controller shall (1) be suitably protected from physical damage and enclosed either by an enclosed controller or by a raceway and be not more than 3 m (10 ft) long or (2) have an ampacity not less than that of the branch-circuit conductors.
Panel Statement: The panel does not agree with deleting the text. This text provides necessary clarity for the raceway or enclosed controller.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
DESJARLAIS, J.: The purpose of 430.53(D)(3) is that the tap conductors terminate as a manual motor control additionally marked suitable for tap conductor protection in group installations. The intent is not for one BCP device to follow another. Note that the first sentence of 430.53(D) specifically excludes the need for another BCP device when the conditions in (1), (2) or (3) are met.

11-72 Log #1111 NEC-P11 **Final Action: Reject**
(430.61)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Part V specifies protection devices intended to protect feeder and service conductors supplying motors against overcurrent due to short circuits or grounds.
Substantiation: The provision should apply to service conductors especially those supplying only a motor branch circuit or only a motor feeder(s).
Panel Meeting Action: Reject
Panel Statement: Article 430 Part V relates to motor feeder short-circuit and ground-fault protection. As defined in Article 100 service conductors are the conductors from the service point to the service disconnecting means. See part VII of Article 230 for the protection of service equipment.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-73 Log #1110 NEC-P11 **Final Action: Reject**
(430.62(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"and service conductors" after "feeder" in three places.
Substantiation: The provision should apply to service conductors, especially those supplying only a motor branch circuit or only a motor feeder(s).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 11-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-74 Log #1109 NEC-P11 **Final Action: Reject**
(430.63)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"or service conductors" after "feeder" in two places.
Add:
FPN: Where service conductors supply a motor control center. See 430.94.
Substantiation: The provision should apply to service conductors, especially those supplying only a motor branch circuit or a motor feeder(s).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 11-72. The FPN does not add any clarity or usability to the code. In addition, the reference to 430.94 is incorrect.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-75 Log #2016 NEC-P11 **Final Action: Accept in Principle in Part**
(430.63)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where a feeder supplies a motor load and, in addition, ~~a lighting or a lighting and appliance~~ other types of load(s) the feeder overcurrent protective device(s) shall have a rating ~~sufficient to carry the lighting and appliance~~ not less than the other types of load(s) plus the following: (remainder unchanged)
Add: FPN: For continuous loads see 215.2 (A).
Substantiation: "Sufficient" is subjective and a term to be avoided per the Style Manual. Section 215.2 (A) applies to continuous load, and can be complied with by an overcurrent device rated not less than 125 percent of the largest motor or 125 percent of the continuous load, whichever is greater. A 125 percent rating for the largest load (motor or continuous) complies with the requirement for motor and continuous load since it serves the purpose for both.
Panel Meeting Action: Accept in Principle in Part
Revise 430.63 as follows:
430.63 Rating or Setting – ~~Power~~ Motor and ~~lighting~~ Other Loads.
Where a feeder supplies a motor load and other load(s), ~~in addition, a lighting or a lighting and appliance load~~ the feeder protective device shall have a rating ~~sufficient to carry the lighting or lighting and appliance load~~ not less than that required for the other load(s), plus the following:
(1) For a single motor, the rating permitted by 430.52
(2) For a single hermetic refrigerant motor-compressor, the rating permitted by 440.22
(3) For two or more motors, the rating permitted by 430.62
The exception is unchanged.
Panel Statement: The wording provided by the panel more clearly states the requirement and meets the intent of the submitter. The panel rejects the new FPN. Continuous loads are typically not a factor in feeder short-circuit and ground-fault protection as used in 430 Part V. The explanatory reference to 215.2(A) is not necessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-76 Log #1622 NEC-P11 **Final Action: Accept**
(Table 430.72(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In Note 2, change "Table 310.17" to "Table 310.15(B)(2)".
In Note 3, change "Table 310.16" to "Table 310.15(B)(1)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Panel Statement: The panel accepts this proposal based on the action of Panel 6 to change the numbering of the Tables in Article 310.
The panel refers this action to the Technical Correlating Committee for correlation based on Panel 6 action.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-77 Log #1103 NEC-P11 **Final Action: Reject**
(430.72(B) Exception No. 1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Where the opening of the control circuit ~~would~~ is likely to create a hazard... (remainder unchanged).
Substantiation: It can be difficult to determine with certainty if a hazard is created. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The true definition of likely is "a high probability". The use of the word "would" indicates that something "will" take place. The use of "likely" interjects some uncertainty and changes the intent of the text.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-78 Log #3710 NEC-P11 **Final Action: Accept**
(430.72(C))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise (C) **Control Circuit Transformer as follows:**
(C) Control Circuit Transformer. Where a motor control circuit transformer is provided, the transformer shall be protected in accordance with 430.72(C) (1), (C)(2), (C)(3), (C)(4), ~~or~~ (C)(5), or (C)(6).
Renumber 430.72(C)(5) to 430.72 (C)(6), and add a new (C)(5) as follows:
(5) Manual motor controller suitable for tap conductor protection. The primary of a control circuit transformer shall be permitted to be protected by a listed manual motor controller marked "Suitable for Tap Conductor Protection in Group Installation" when installed under all of the following conditions:
(a) The current adjustment of the manual motor controller is set at not more than the rated input current of the control transformer;
(b) A wiring diagram specifying the proper connections for using the manual motor controller as a control transformer overcurrent protection device is provided with the device by the manufacturer, and
(c) The manual motor controller is rated for use on the supply voltage system as marked on the device.
(~~5~~6) Other Means. Protection shall be permitted to be provided by other approved means.
Substantiation: The UL Standard for Safety for Industrial Control Equipment UL508 revision September 11, 2005 added provisions for manual motor controllers suitable for tap conductor protection to be used to protect control transformers. The revisions above reflect the application and marking requirements as stated in the section 73.1.3 and 75.7 of UL508.
See Companion proposal NEC 450.3(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SAPORITA, V.: I vote negative on Panel action
The text of 430.72 (A) General specifically states that the motor control circuit shall be permitted to be protected by either a supplementary or branch-circuit overcurrent protective device(s). Part (C) provides protection requirements for the control circuit transformer. Note well that the text of 430.72(C) (1),(2),(3),(4), and (5) is application specific referring to other NEC Sections or to performance requirements. 430.72 (C) (1) (2) (3) (4) and (5) are not product specific. If a manual motor protector is suitable for control circuit transformer protection then its use is already covered in 430.72 (C)(5), Other Means. The use of a manual motor protector for control circuit transformer protection is in fact a product standard issue and would be part of the product safety standard UL508 and verified by product listing after appropriate testing. Inclusion of product specific requirements in 430.72 (C) will lead to field misapplication.

11-79 Log #3711 NEC-P11 **Final Action: Accept**
(430.72(C))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise (C) **Control Circuit Transformer as follows:**
(C) Control Circuit Transformer. Where a motor control circuit transformer is provided, the transformer shall be protected in accordance with 430.72(C) (1), (C)(2), (C)(3), (C)(4), ~~or~~ (C)(5), or (C)(6).
Renumber 430.72(C)(5) to 430.72 (C)(6), and add a new (C)(5) as follows:
(5) Manual motor controller suitable for tap conductor protection. The primary of a control circuit transformer shall be permitted to be protected by a listed manual motor controller marked "Suitable for Tap Conductor Protection in Group Installation" when installed under all of the following conditions:
(a) The current adjustment of the manual motor controller is set at not more than the rated input current of the control transformer;
(b) A wiring diagram specifying the proper connections for using the manual motor controller as a control transformer overcurrent protection device is provided with the device by the manufacturer, and
(c) The manual motor controller is rated for use on the supply voltage system as marked on the device.
(~~5~~6) Other Means. Protection shall be permitted to be provided by other approved means.
Substantiation: The UL Standard for Safety for Industrial Control Equipment UL508 revision September 11, 2005 added provisions for manual motor controllers suitable for tap conductor protection to be used to protect control transformers. The revisions above reflect the application and marking requirements as stated in the section 73.1.3 and 75.7 of UL508.
See Companion proposal NEC 450.3(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:
SAPORITA, V.: See 11-78 which was a duplicate of 11-79.

11-80 Log #1102 NEC-P11 **Final Action: Reject**
(430.72(C) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Where the opening of the control circuit ~~would~~ is likely to create a hazard...(remainder unchanged).
Substantiation: It can be difficult to determine with certainty if a hazard is created. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The true definition of likely is “a high probability”. The use of the word “would” indicates that something “will” take place. The use of “likely” interjects some uncertainty and changes the intent of the text.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-81 Log #1101 NEC-P11 **Final Action: Reject**
(430.73)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Where damage to a motor control circuit ~~would~~ is likely to constitute a hazard...(remainder unchanged).
Substantiation: It can be difficult to determine with certainty if a hazard is created. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The true definition of likely is “a high probability”. The use of the word “would” indicates that something “will” take place. The use of “likely” interjects some uncertainty and changes the intent of the text.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-82 Log #2612 NEC-P11 **Final Action: Accept in Part**
(430.73)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
PROTECTION of CONDUCTORS ~~from PHYSICAL DAMAGE~~ Where damage to a motor control circuit ~~would~~ is likely to constitute a hazard, all conductors of such a remote control the circuit that are outside of the control device itself or the controlled equipment enclosure shall be installed in an identified raceway or cable or be otherwise ~~suitably~~ protected from physical damage by identified means.
Substantiation: “Damage” should include all forms such as chemical. Cables identified for the use such as Type MI or AC should be permitted. “Suitable” is a term to be avoided per the Style Manual. “Likely” is defined as such a nature or circumstance as to make something probable and a term used in many sections.
Panel Meeting Action: Accept in Part
Revise 430.73 to read as follows:
430.73 Protection of Conductors from Physical Damage.
Where damage to a motor control circuit would constitute a hazard, all conductors of such a remote motor control circuit that are outside the control device itself shall be installed in a raceway or be otherwise protected from physical damage.
Panel Statement: The panel accepts the deletion of the word “suitably” and the addition of “s” to “conductor,” making it plural in the title. All other proposed changes are rejected.
The term “physical damage” is used in many sections of the code. This term needs to remain in this section title to provide descriptive information to the installer on what type of damage the code section is concerned with and furthermore complies with Section 3.2.5.5 of the NEC Style Manual.
NEC Style Manual section 3.2.1 lists “likely” as a possible unenforceable or vague term. The present text uses the term “would” as a verb, and as such is used to express probability and is not used in the definitive context. The present text provides more clear language and is more specific than the proposed language.
No substantiation is provided as to why the proposed language “or the controlled equipment enclosure” or the addition of cable as a wiring method should be accepted.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-83 Log #2617 NEC-P11 **Final Action: Reject**
(430.73)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Where a motor control circuit is likely to be subject to damage, the conductors shall be installed in an identified raceway, cable, or enclosure, or otherwise protected by identified means.
Substantiation: “Hazard” is not defined; is control circuit damage which prevents a sump pump operation a hazard? A hazard is irrelevant to the provision of 110.27(B) which applies generally and uses the term “likely to be” which is used in numerous sections. Raceways, cables, and enclosures should be identified for the use whether damage is physical or chemical. “Suitable” is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The term “hazard” is defined in Webster’s Dictionary as “ a source of danger” and is used as such in the present text, thus making the intent of this section more user friendly and enforceable.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-84 Log #1079 NEC-P11 **Final Action: Accept**
(430.74)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “one side” to “one conductor”.
Substantiation: Edit.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
DESJARLAIS, J.: Revision does not add clarity. The intent of the clause is to distinguish between grounded control circuit conductors and ungrounded control circuit conductors. Changing “one side” to “conductor” does not promote this intent. The term “one side” is the more correct term since multiple conductors can be used in one side of a circuit.

11-85 Log #2613 NEC-P11 **Final Action: Accept**
(430.74)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “side” to “conductor”.
Substantiation: Edit. “Side” is vernacular, “conductor” is more appropriate.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
DESJARLAIS, J.: Revision does not add clarity. The intent of the clause is to distinguish between grounded control circuit conductors and ungrounded control circuit conductors. Changing “one side” to “conductor” does not promote this intent. The term “one side” is the more correct term since multiple conductors can be used in one side of a circuit.

11-86 Log #3077 NEC-P11 **Final Action: Accept**
(430.74)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
430.74 Electrical Arrangement of Control Circuits.
Where one side of the motor control circuit is grounded, the motor control circuit shall be arranged so that an ~~accidental ground~~ ground-fault in the control circuit remote from the motor controller will (1) not start the motor and (2) not bypass manually operated shutdown devices or automatic safety shutdown devices.
Substantiation: This proposal simply removes an undefined term and replaces with a term that is defined. This is consistent with work done in the 2008 cycle to clarify the use of grounding related terms.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-87 Log #1078 NEC-P11 **Final Action: Reject**
(430.75 Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "is likely to".
Substantiation: Edit. May is a term to be avoided per the Style Manual. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: Both "may" and "likely to" have a probability of occurring associated with them. According to the NEC Style Manual the word "likely" should be avoided. A definition of "likely" means a high probability, which in this case is not the same as "may". "May" as used in this context is correct and meets the requirements of 3.2.1 of the NEC Style Manual.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-88 Log #1077 NEC-P11 **Final Action: Accept**
(430.81(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"or cord connector" after "receptacle".
Substantiation: Portable motors may be supplied through a cord connector, and will be if equipped with a flanged surface inlet.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-89 Log #3341 NEC-P11 **Final Action: Reject**
(430.82(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Each controller shall be ~~capable of~~ identified for starting and stopping the motor(s) it controls and ~~shall be capable of~~ interrupting the locked-rotor current of the motor(s).
Substantiation: Edit. "Capable" is subjective. The provision should include multiple motors permitted to be controlled by one controller.
Panel Meeting Action: Reject
Panel Statement: The term "capable" is used many times throughout the code. When used in the context as an adverb it is defined as "having general efficiency and ability." The present text contains clear language and is more specific than the proposed language. The term "identified" is defined in Article 100 and relates to listings by testing agencies. The panel does not intend for a controller to control more than one motor unless the conditions of the applicable exceptions in 430.87 are met.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-90 Log #3340 NEC-P11 **Final Action: Reject**
(430.83(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Where two or more motors are controlled by one controller the horsepower rating shall be determined in accordance with the provisions of 430.110(C).
FPN; See 610.51 for cranes and hoists.
Substantiation: Horsepower ratings determined by 430.110(C) generally result in a rating greater than the arithmetical addition of horsepowers. The same provisions for disconnecting means should apply to controllers are a type of disconnecting means and may be employed where overload protection is shunted or not provided. 610.51(B) modifies this provision.
Panel Meeting Action: Reject
Panel Statement: The submitter's concerns are presently addressed by 430.87 Exception No. 1. The panel rejects the proposed new FPN. Section 90.3 addresses the submitters concerns as Chapter 6 supplements or modifies the general rules of Chapters 1 through 4.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-91 Log #601 NEC-P11 **Final Action: Reject**
(430.83(E), FPN)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add a new Fine Print Note as follows:
FPN: Motor controllers marked with a slash voltage rating are not intended for use on corner grounded delta, ungrounded or impedance grounded systems.
Substantiation: Where it is possible for full phase-to-phase voltage to be present across only one pole, such as may occur if phase "A" develops a fault-to-ground on a 480 volt, B-phase, corner grounded delta system, the ground-fault current may exceed the interrupting rating of the motor controller.
Panel Meeting Action: Reject
Panel Statement: The present code language in the second sentence presently addresses the submitter's concerns and the proposal would be redundant. In addition, the FPN contains mandatory language, which is not allowed by the NEC Style Manual.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-92 Log #2391 NEC-P11 **Final Action: Accept**
(430.94)

Submitter: Thomas F. Mueller, Southern Company
Recommendation: In Article 430.94, change IX to VIII as follows:
430.94 Overcurrent Protection. Motor control centers shall be provided with overcurrent protection in accordance with Parts I, II and VIII of Article 240. "The ampere rating...".
Substantiation: Reference Comment 11-33 in the May, 2001 ROC and the appended Technical Correlating Committee Note. "In the 1999 NEC, Article 240 was written with Parts A, B, C...". During the code change process, Panel 11 adopted a change to 430.94 and incorrectly placed Part I of Article 240 as part of the new 430.94. The Technical Correlating Committee recognized that Part I was incorrect and stated that the correct Part should be Part H. Part H was changed to Part VIII in the 2002 NEC but the editors failed to pick up on that and thus replaced Part H with Part IX. Part IX of Article 240 deals with protection of over 600 volt equipment and, thus, should not be included in 430.94 as this equipment is detailed in 430.221ff. On the other hand, Part VIII of Article 240 deals with supervised industrial installations where the overwhelming majority of MCCs are properly found.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-93 Log #3407 NEC-P11 **Final Action: Accept in Principle**
(430.95)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
430.95 Service Equipment. Where used as service equipment, each motor control center shall be provided with a single main disconnecting means to disconnect all ungrounded service-entrance conductors. (The remaining text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and

"Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

430.95 Service Equipment. Where used as service equipment, each motor control center shall be provided with a single main disconnecting means to disconnect all ungrounded service-entrance conductors. (The remaining text to be unchanged.)

Panel Statement: The panel accepts the proposed revision to insert the term "entrance" after "service" contingent upon Panel 4 acceptance of Proposal 4-10. This action based on the proposal and not the merits of the substantiation. This action is to be referred to the NEC Correlating Committee for review.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

COLE, T.: This is an attempt to redefine the point at which a service begins. The demarkation point of where the utility ends and the service begins is already well defined. Panel 1 rejected a similar proposal to 90.2 prior to Panel 11 voting on this proposal. Other panels also rejected similar proposals. This is now a correlation issue and should be rejected.

DESJARLAIS, J.: The proposed change does not add any clarity to the interpretation or readability of the NEC regarding the use of the term "Service." The submitter has not substantiated what value has been added by inserting the word "entrance".

11-94 Log #3655 NEC-P11 **Final Action: Reject**
(430.97(B))

Submitter: Donald A. Ganiere, Ottawa, IL

Recommendation: Revise text to read as follows:

(B) Phase Arrangement. The phase arrangement on 3-phase horizontal common power and vertical buses shall be so that when the leads of a phase rotation meter are connected A, B, C from front to back, top to bottom, or left to right, as viewed from the front of the motor control center that the phase rotation meter shall indicate a clockwise rotation. The B phase shall be that phase having the higher voltage to ground on 3-phase, 4-wire, delta-connected systems. Other busbar arrangements shall be permitted for additions to existing installations and shall be marked.

Substantiation: As this section is currently written it has no meaning. It appears that the intent is to require a clockwise rotation. If this is not the intent, then the section has no meaning as the terms A, B and C are only arbitrary terms and it should be deleted from the code.

Panel Meeting Action: Reject

Panel Statement: The added language does not enhance the safety to the installation. The NEC is not a design manual in accordance with 90.1(C).
This is consistent with sections 408.3(E) on panelboards and switchboards and 430.97(B) on motor control centers.
This section, as written, does provide a benefit. For example, it requires that the middle phase, the B-phase, be the phase with the higher voltage to ground, if such a situation exists.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-95 Log #1565 NEC-P11 **Final Action: Accept in Principle**
(430.102)

TCC Action: The Technical Correlating Committee directs the panel to reconsider the proposal and correlate with the action taken on Proposal 1-63.

This action will be considered by the panel as a public comment.

Submitter: Stanley J. Folz, Henderson, NV

Recommendation: Revise text to read as follows:

430.102 Location.

(A) Controller. An individual disconnecting means shall be provided for each controller and shall disconnect the controller. The disconnecting means shall be located in sight from the controller location.

Exception No. 1: For motor circuits over 600 volts, nominal, a controller disconnecting means ~~capable of being locked in the open position~~ shall be permitted to be out of sight of the controller, provided **the disconnecting means is lockable and the** controller is marked with a warning label **identifying** ~~giving~~ the location of the disconnecting means.

Exception No. 2: A single disconnecting means shall be permitted for a group of coordinated controllers that drive several parts of a single machine or piece of apparatus. The disconnecting means shall be located in sight from the controllers, and both the disconnecting means and the controllers shall be located in sight from the machine or apparatus.

Exception No. 3: The disconnecting means shall not be required to be in sight from valve actuator motor (VAM) assemblies containing the controller where such a location introduces additional or increased hazards to persons or property and conditions (a) and (b) are met.

(a) The valve actuator motor assembly is marked with a warning label giving the location of the disconnecting means.

(b) **The disconnecting means is lockable.** ~~The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.~~

(B) Motor. A disconnecting means shall be provided for a motor in accordance with (B)(1) or (B)(2).

(1) Separate Motor Disconnect. A disconnecting means for the motor shall be located in sight from the motor location and the driven machinery location.

(2) Controller Disconnect. The controller disconnecting means required in accordance with 430.102(A) shall be permitted to serve as the disconnecting means for the motor if it is in sight from the motor location and the driven machinery location.

Exception to (1) and (2): The disconnecting means for the motor shall not be required under either condition (a) or condition (b), provided the controller disconnecting means required in accordance with 430.102(A) is **a lockable disconnecting means.** ~~individually capable of being locked in the open position. The provision for locking or adding a lock to the controller disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.~~

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(1) The valve actuator motor assembly is marked with a warning label identifying ~~giving~~ the location of the disconnecting means.

Panel Statement: The panel accepts the proposed revision contingent upon CMP 1's acceptance of proposed definition of "lockable". This action is to be referred to the Correlating Committee for review. In addition, the panel changed "giving" to "identifying" to correlate with other accepted changes in this section.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-96 Log #1076 NEC-P11 **Final Action: Accept in Principle**
(430.102 Exception No. 1)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

For motor circuits over 600 volts, nominal, a controller disconnecting means ~~capable of being locked~~ with an identified permanent integral means for locking in the open (off) position shall be permitted...(remainder unchanged).

Substantiation: Edit. "Capable of being locked" is not specific and doesn't actually require locking provisions. Proposal is specific and doesn't allow for makeshift methods or locking of covers or enclosures for disconnecting means.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel has satisfied the submitter's concerns by the action taken on Proposal 11-95. Please see action and panel statement on Proposal 11-95.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-97 Log #1848 NEC-P11 **Final Action: Accept in Principle**
(430.102(A) Exception No. 1)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: Exception No. 1: For motor circuits over 600 volts, nominal, a controller disconnecting means ~~capable of~~ with integral permanent identified means for being locked in the open (off) position...(remainder unchanged).

Substantiation: "Capable of being locked" is not specific and allows for makeshift methods. Locking should be specific and not apply to the cover or door of the disconnecting means.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel has satisfied the submitter's concerns by the action taken on Proposal 11-95. Please see action and panel statement on Proposal 11-95.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-98 Log #1075 NEC-P11 **Final Action: Reject**
(430.102(B)(2)(b))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
In industrial <u>or commercial</u> installations...(remainder unchanged).
Substantiation: The provisions should be the determining factor, not the type of occupancy.
Panel Meeting Action: Reject
Panel Statement: Expanding this exception to commercial installations would decrease the level of safety intended to be provided by the main requirement of this section for disconnecting means. It is not the intent of Panel 11 to reduce the level of safety by expanding the exception for other than industrial installations.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-99 Log #1074 NEC-P11 **Final Action: Reject**
(430.103)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
The disconnecting means shall simultaneously open all ungrounded conductor of the ~~supply~~ branch circuit ~~and shall be designed so that no pole can be operated independently~~.
Substantiation: Edit. "All" supply conductors include feeder and service conductors.
Panel Meeting Action: Reject
Panel Statement: The panel intends that all supply conductors regardless of whether they are service, feeder, or branch circuit conductors be designed so that no pole can be operated independently. The proposal deletes language that provides clarity as to the operation of the disconnecting means.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-100 Log #1072 NEC-P11 **Final Action: Reject**
(430.104)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The disconnecting means shall ~~plainly indicate~~ <u>be permanently and durable marked to indicate</u> whether in the open (off) or closed (on) position.
Substantiation: Marking should be required; an up or down position should not be an acceptable indication.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any technical substantiation that there are any field problems indicating that a change is needed. In many installations this is, in fact, an indication rather than a marking on the disconnecting means.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-101 Log #733 NEC-P11 **Final Action: Accept**
(430.109(F))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
430.109 Type.
The disconnecting means shall be a type specified in 430.109(A), unless otherwise permitted in 430.109(B) through (G), under the conditions specified.
(F) Cord-and-Plug-Connected Motors. For a cord-and-plug-connected motor, a horsepower-rated attachment plug <u>or flanged surface inlet</u> and receptacle <u>or cord connector</u> having ratings no less than the motor ratings shall be permitted to serve as the disconnecting means. A horsepower-rated attachment plug <u>or flanged surface inlet</u> and receptacle <u>or cord connector</u> shall not be required for a cord-and-plug-connected appliance in accordance with 422.33, a room air conditioner in accordance with 440.63, or a portable motor rated 1/3 hp or less.
[remainder of 430.109 unchanged by this Proposal]
Substantiation: To eliminate confusion and uneven enforcement regarding cord connectors and flanged surface inlets (also known as motor caps) as an alternative to plugs and receptacles. Some draw a distinction between a cord connector and a receptacle or between an attachment plug and a flanged surface inlet, but many manufacturers' cord connectors employ the same contact carrier subassemblies as their flanged receptacles, and many manufacturers' flanged surface inlets employ the same plug blade carrier subassemblies as their attachment plugs. Some manufacturers eliminate commercially the terminology distinctions present in the NEC®: they identify cord connectors as female attachment plugs and the flanged surface inlets as male receptacles. As a consequence, where one manufacturer's cord connector is disallowed as a motor disconnect, another manufacturer's completely substitutable female attachment plug is permitted as a motor disconnect. 210.50(A) indicates that "a cord connector that is supplied by a permanently connected cord pendant shall be considered a receptacle outlet."
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-102 Log #1073 NEC-P11 **Final Action: Accept in Principle**
(430.109(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"or cord connector" after "receptacle" in two places.
Substantiation: Cord connectors should be included in the provisions.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 11-101.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-103 Log #1861 NEC-P11 **Final Action: Reject**
(430.110(A) and Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: GENERAL. The disconnecting means for motor circuits rated 600 volts, nominal, or less, shall have an ampere rating not less than 115 percent of the <u>nameplate</u> full-load current rating of the motor, <u>and for motors rated more than one horsepower a current rating not less than the percentage specified in 430.32(A) for overload devices</u> Delete exception:...
Substantiation: Where overload devices permit a substantial current in excess of full load current such as for large motors, the disconnecting means should be rated for that current. Full load current should be derived from the nameplate rating since they may vary from the tables in Part XIV. To allow for temporary overload, 115 percent should be a minimum. "Less than 115 percent" does not establish a lower limit; 50 percent is lower.
Panel Meeting Action: Reject
Panel Statement: The present language requires the values in the tables be used to size the disconnecting means. This requirement and value consistently guarantees the disconnect is properly and safely sized for the present motor and future replacement motors. No technical information is provided as required by 4.3.3(d) of the Regulations Governing Committee Projects to substantiate deleting the exception.
Only overload protection is based upon nameplate current. Everything else is based upon table values. The intent of the submitter is not clear as "not less than 115 percent" is certainly greater than "50 percent".
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-104 Log #1071 NEC-P11 **Final Action: Reject**
(430.110(C)(2) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter portion...shall be permitted to have an ampere rating <u>not</u> less than <u>100</u> ~~115~~ percent...(remainder unchanged).
Add: FPN: See 430.128 for adjustable speed drive systems.
Substantiation: Edit. Present wording implies any value less than 115 percent is acceptable.
Panel Meeting Action: Reject
Panel Statement: The exception allows less than 115% for listed unfused motor circuit switches only when calculated in accordance with 430.110(C)(1). This calculation along with the listing of the motor circuit switch assures the sizing is adequate for the loads to be served.
The proposal and substantiation indicate that the submitter does not understand the meaning of "not less than". "Not less than 115 percent" has the same meaning as "115 percent or greater".
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-105 Log #2034 NEC-P11 **Final Action: Reject**
(430.110(C)(2) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
A listed motor-circuit switch having a horsepower rating ~~equal to or greater~~ <u>not less</u> than the equivalent horsepower of the combined loads, determined in accordance with 430.110(C)(1), <u>or a molded case switch</u> shall be permitted to have an ampere rating less than 115 percent <u>but not less than 100 percent</u> of the sum of all currents at the full-load condition.
Substantiation: A molded case switch is suitable for this exception. Less than 115 percent should have a lower limit of 100 percent.
Panel Meeting Action: Reject
Panel Statement: The exception does not apply to molded case switches, as these switches are not rated in horsepower. The listed motor circuit switches are applicable under the exception and are rated in horsepower.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-106 Log #2033 NEC-P11 **Final Action: Reject**
(430.113 and Exception No. 1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: MORE THAN ONE SUPPLY CIRCUIT. Motors and motor-operated equipment supplied by more than one circuit shall be provided with an identified disconnecting means for each supply circuit on or immediately adjacent to the motor or equipment. A permanent durable sign shall be provided on or immediately adjacent to multiple disconnecting means indicating the presence of other disconnecting means.

Exception No. 1: The disconnecting means shall not be required to be on or immediately adjacent to the motor or equipment if an identified disconnecting means is provided to disconnect the controller for the motor or equipment and has identified integral and permanent means for locking in the open (off) position.

Substantiation: “Source” is not defined; is it different circuits, panelboards, generators, services? Disconnecting means should be identified for the use (ratings, simultaneous disconnection of ungrounded conductors, etc.) “capable of being locked” does not impose specific requirements; proposal is specific and doesn’t allow for makeshift methods.
Panel Meeting Action: Reject
Panel Statement: No substantiation was provided that a field problem exists with the existing language. The proposal does not add clarity or improve readability.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-107 Log #3717 NEC-P11 **Final Action: Accept**
(430.122)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise text and add FPN as follows:

430.122 Conductors — Minimum Size and Ampacity.

(A) Branch/Feeder Circuit Conductors. Circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system shall have an ampacity not less than 125 percent of the rated input current to the power conversion equipment.

FPN: Power conversion equipment can have multiple power ratings and corresponding input currents.

(B) Bypass Device. For an adjustable speed drive system that utilizes a bypass device, the conductor ampacity shall not be less than required by 430.6. The ampacity of circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system that utilizes a bypass device shall be the larger of either of the following:

(1) 125 percent of the rated input current to the power conversion equipment
(2) 125 percent of the motor full-load current rating as determined by 430.6.

Substantiation: Addition of current is for editorial purposes and to be consistent with 430-128.

This proposal clarifies current practice in that power conversion equipment may have multiple input ratings.

Equipment might have only one rating on the name plate. Additional ratings can be provided in the manufacturers instructions for use.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-107a Log #CP1102 NEC-P11 **Final Action: Accept**
(430.123)

Submitter: Code-Making Panel 11,
Recommendation: Revise text to read as follows:

430.123 Branch Circuit Short-Circuit and Ground Fault Protection.
(A) Drive Protection and Markings. The branch circuit short-circuit and ground-fault protection for a circuit supplying power conversion equipment shall be of the type and size specified by the manufacturer’s instructions provided with the power conversion equipment. When the instructions do not specify the type and size, a branch-circuit fuse or inverse-time circuit breaker shall be used and shall be sized based upon the input current rating of the power conversion equipment multiplied by the percentage from Table 430.52.

Exception No. 1: Additional branch circuit short-circuit and ground-fault protection is not required for power conversion equipment where provided with integral branch circuit rated protection such as: an inverse-time circuit breaker, branch-circuit fuses or semiconductor fuses, as provided in section 430.52(C)(5), in all ungrounded input conductors.

Exception No. 2: Unless specified in the manufacturer’s instructions supplied with the power conversion equipment, ”common dc bus” power conversion equipment is not required to have individual branch circuit protective devices installed in the dc input conductors.

(B) Drive and Bypass Protection. Where a branch circuit short-circuit and ground-fault protective device provides protection for both the adjustable speed drive system and a bypass circuit, the specific branch circuit protective device and its ratings or settings must not exceed those marked on the adjustable speed drive controller. Where the bypass circuit requires a different branch circuit short-circuit and ground-fault protective device, ratings or settings other than those marked on the adjustable speed drive controller, then separate branch circuit short-circuit and ground-fault protection shall be provided for both the adjustable speed drive controller and bypass circuit.
Substantiation: The panel has incorporated the intent of the submitters of both 11-108 and 11-110.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-108 Log #4405 NEC-P11 **Final Action: Accept in Principle**
(430.123)

Submitter: Jay Tamblingson, Rockwell Automation
Recommendation: Add new paragraph 430.123 as follows:

430.123 Branch Short-Circuit and Ground Fault Protection. The branch short-circuit and group fault protection for a circuit supplying power conversion equipment shall be of the type and size specified by the manufacturer’s instructions provided with the power conversion equipment. When the instructions do not specify the type and size, a branch-circuit fuse or inverse-time circuit breaker shall be used and shall be sized based upon the input current rating of the power conversion equipment multiplied by the percentage from Table 430.52.

Exception No. 1: Additional branch short-circuit and ground fault protection is not required for a power conversion equipment provided with integral inverse-time circuit breaker, branch-circuit, or semiconductor fuses in all ungrounded input conductors.

Exception No. 2: Unless specified in the manufacturer’s instructions supplied with the power conversion equipment, ”common dc bus” power conversion equipment is not required to have individual branch circuit protective devices installed in the dc input conductors.

Substantiation: Existing language in Article 430 does not specifically address how to select the branch circuit protection for power conversion equipment. As such, questions often arise as to acceptable types of devices and sizing. The proposed language is directly adapted from the language in UL 508A Paragraph 31.3.2 which provides the needed clarity.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and substantiation on Proposal 11-107a.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-109 Log #3322 NEC-P11 **Final Action: Reject**
(430.130)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: or encased in brick or tile or concrete block construction.
Substantiation: Additional noncombustible construction should be permitted.
Panel Meeting Action: Reject
Panel Statement: Section 430.130 does not exist and therefore the panel cannot determine the submitter’s intent and rejects the proposal.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-110 Log #3960 NEC-P11 **Final Action: Accept in Principle**
(430.130 (New))

Submitter: Lori L. Tennant, Schneider Electric North America
Recommendation: Add new text as follows:

430.130 Branch Circuit Overcurrent Protective Devices.
(A) Drive Protection and Markings. The adjustable speed drive controller shall be protected by a branch circuit overcurrent protective device. Overcurrent protection shall be provided in accordance with the type of overcurrent device and the rating of the overcurrent device marked on the drive controller. Where a rating is not marked on the drive controller, overcurrent protection shall be provided in accordance with 430.52. The type of overcurrent protective device, its rating and setting may be marked on the adjustable speed drive controller or instruction literature referenced on the controller. In no event shall the rating or setting of the overcurrent protective device exceed that allowed by 430.52.
(B) Drive and Bypass Protection. Where a branch circuit overcurrent protective device provides protection for both the adjustable speed drive system and a bypass function, the specific branch circuit overcurrent protective device and its ratings or settings must not exceed those marked on the adjustable speed drive controller. Where the bypass function requires different overcurrent protective device, ratings or settings than those marked on the adjustable speed drive controller, then separate overcurrent protection shall be provided for both the adjustable speed drive controller and bypass function.

Substantiation: The selection of overcurrent protective devices used with adjustable speed drive controllers is unique as compare to presently described requirements found in section 430.52 which describes the allowable overcurrent protective devices for motor circuits and their ratings and settings. While the existing text is adequate for electromechanical motor starting equipment, adjustable speed drive controllers may have special requirements that preclude the use of certain or require different settings of the overcurrent protective devices.

The new section 430.130 will address the special requirements of the adjustable speed drive controller overcurrent protection functions.

Some protective devices found in section 430.52 may not be suitable for use with adjustable speed drive controllers or may require ratings or settings less than those found in section 430.52. Many adjustable speed drive controllers utilize power electronic conversion techniques instead or in addition to traditional electromechanical control devices. The power electronic conversion process utilizes semiconductor devices and therefore may have different protective coordination requirements.

Coordination of the overcurrent protective device for an adjustable speed drive controller considers the following points.

1. The ability to clear an external short-circuit at the motor output terminals of the drive controller.
2. The apparent transformation of current from the line to the motor terminals based on the power conversion process used in the drive controller. The continuous rated line current of the drive controller may be significantly different than the motor full-load current.
3. The ability to contain or limit the effects of a component breakdown in the internal circuitry of the drive controller when used in conjunction with appropriate enclosures or approach boundaries.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and substantiation on Proposal 11-107a.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-111 Log #1276 NEC-P11 **Final Action: Accept**
(430.223)

Submitter: Stephen Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:

430.223 ~~Conductor Enclosures Adjacent to Motors.~~ Raceway Connection to Motors. Flexible metal conduit or liquidtight flexible metal conduit not exceeding 1.8 m (6 ft) in length shall be permitted to be employed for raceway connection to a motor terminal enclosure.

Substantiation: We believe a title change to this article would be beneficial to the code user in locating and understanding the purpose of this article. The use of more user friendly wording will help in better recognition of the purpose of this article.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-112 Log #682 NEC-P11 **Final Action: Accept**
(430.225(A) Exception)

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: Revise the Exception to 430.225(A) as follows:

Exception: Where a motor is ~~vital~~ critical to an operation ~~of the plant~~ and the motor should operate to failure…(the rest of the sentence is to remain unchanged.)

Substantiation: This proposal is the work of the "High Voltage Task Group" appointed by the Technical Correlating Committee. The task group consisted of the following members: Alan Peterson, Paul Barnhart, Lanny Floyd, Alan Manche, Donny Cook, Vince Saporita, Roger McDaniel, Stan Folz, Eddie Guidry, and Jim Dollard.

This proposal seeks to delete the phrase "vital to operation of the plant" and add the new word "critical" in the exception to 430.225(A) due to the fact that there is motor-driven machinery (over 600V) that is not located in a plant, but that must to operate to failure.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-113 Log #681 NEC-P11 **Final Action: Accept in Principle**
(430.225(B)(1))

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: Revise text to read as follows:

430.225 Motor-Circuit Overcurrent Protection
(B) Overload Protection
(1) Type of Overload Device. Each motor shall be protected against dangerous heating due to motor overloads and failure to start by a thermal protector integral with the motor or external current-sensing devices, or both. A relay coordination study for each motor shall be performed under engineering supervision.

Substantiation: This proposal is the work of the "High Voltage Task Group" appointed by the Technical Correlating Committee. The task group consisted of the following members: Alan Peterson, Paul Barnhart, Lanny Floyd, Alan Manche, Donny Cook, Vince Saporita, Roger McDaniel, Stan Folz, Eddie Guidry, and Jim Dollard.

A relay coordination study should be performed to correctly size the protective relaying or thermal protectors based on the motor damage curves under qualified engineering supervision.

Selecting the proper overload and short-circuit protection for medium voltage motor circuits is much more complicated than for low voltage circuits. For medium voltage motor circuits, it becomes very critical for the overload relay to coordinate with the short-circuit protection because some short-circuit protective devices cannot safely open below certain multiples of their rating. In these overload cases the overload relay must open before the short-circuit protective device is asked to open. At the same time, the overload relay can not safely open beyond certain multiples of its rating, requiring the short-circuit protective device to open. This all requires the engineer to lay out the curves of both the overload relay and the short-circuit protective device and make sure that they are coordinated so that each opens only on levels of current for which it can safely open.

Panel Meeting Action: Accept in Principle
Revise text to read as follows:

430.225 Motor-Circuit Overcurrent Protection.
(B) Overload Protection.
(1) Type of Overload Device. Each motor shall be protected against dangerous heating due to motor overloads and failure to start by a thermal protector integral with the motor or external current-sensing devices, or both. Protective device settings for each motor circuit shall be determined under engineering supervision.

Panel Statement: The panel accepts the proposal in principle understanding the need for the determination of protective device settings under engineering supervision for motors over 600 volts. The revised text more accurately describes the process needed for proper motor circuit protection. These requirements will assist the AHJ to verify proper overload protection.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:

HAMER, P.: We disagree with the committee action and the committee statement. This code section describes the purpose of an overload protection device as a means of preventing a motor overload condition and a failure to start a motor by means of the overload detecting device. Neither of these provisions require a relay coordination study to ensure that the motor overload protection method is coordinated with the motor overcurrent protection. Additionally, the previous section of the code, Article 430.225 (A) already requires "coordinated protection" to ensure proper overload and overcurrent protection. Furthermore, no substantiation has been presented to the panel to indicate that the existing requirements of Article 430.225 are contributing to electrical failures or injuries.

Comment on Affirmative:

DESJARLAIS, J.: A definition for engineering supervision should be considered for addition to Article 100.

Engineering Supervision - A process where by critical calculations, selection of components and decisions pertinent to the construction of the equipment under review are made with the collaboration of personnel trained in the relative discipline and the resulting decisions are acceptable to the AHJ.

WIDUP, R.: I agree with the panel action, but also think it is an important aspect for the AHJ to understand that "determining protective device settings" also includes function and system testing of the actual performance of the protective device settings (through fields testing is required if the owner is to be assured of a safe and reliable (motor) electrical power system. Merely setting it does not complete the process, you have to test it as well.

11-114 Log #1566 NEC-P11 **Final Action: Accept**
(430.227)

TCC Action: The Technical Correlating Committee directs the panel to reconsider the proposal and correlate with the action taken on Proposal 1-63.

This action will be considered by the panel as a public comment.

Submitter: Stanley J. Folz, Henderson, NV

Recommendation: Revise text to read as follows:

The controller disconnecting means. shall be **lockable.** ~~capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed~~.

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Accept

Panel Statement: The panel accepts the proposed revision contingent upon Panel 1's acceptance of proposed definition of "lockable". This action is to be referred to the NEC Correlating Committee for review.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-115 Log #65 NEC-P11 **Final Action: Reject**
(430.243)

TCC Action: The Technical Correlating Committee understands that the "statement on Proposal 11-116" refers to the substantiation in Proposal 11-116.

Note: This Proposal appeared as Comment 11-35 on Proposal 11-87 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 11=87 was:

Revise as follows:

The frames of portable motors supplied by a premises wiring system ~~that operate at over 150 volts to ground~~ shall be ~~guarded or~~ grounded unless guarded or isolated from contact.

Submitter: Charles A. Goetz, Underwriters Laboratories Inc.

Recommendation: Revised from 2005 edition as follows:

430.243 Portable Motors. The frames of portable motors supplied by a premises wiring system ~~that~~ and operate at 50 V or more ~~over 150 volts to ground~~ shall be ~~guarded or~~ grounded unless guarded or isolated from contact.

~~FPN No. 1: See 250.114(4) for grounding of portable appliances in other than residential occupancies.~~

FPN ~~No. 2~~: See 250.119(C) for color of equipment grounding conductor.

Exception No. 1: Listed motor operated tools, listed motor operated appliances, and listed motor operated equipment shall not be required to be grounded where protected by a system of double insulation or its equivalent. Double insulated equipment shall be distinctively marked.

Exception No. 2: Listed motor operated tools, listed motor operated appliances, and listed motor operated equipment connected by a cord and attachment plug other than those required to be grounded in accordance with 250.114.

Substantiation: Acceptance of proposal 11-87 during the ROP meeting will require motor frames on all portable motor operated appliances, which must comply with Article 430 as noted in Section 422.3, to be grounded regardless of the use voltage, the intended use or listing for the purpose. By eliminating the voltage requirement, all portable motors are affected including those that operate at 50V or less where the revision imposes a higher level of compliance for motor frames than currently stated in section 430.232 for live parts. The revision to section 430.243 effectively supercedes the current section 250.114 which would otherwise cover cord and plug connected equipment operating at 150V to ground or less. Currently listed motor operated appliances operating at not more than 150V to ground and that do not involve water or use in wet locations may be connected by a two conductor cord and attachment plug. The listing requirements for such appliances operating at 150V or less to ground require leakage currents available at accessible metal parts to be monitored during various operating conditions including, in some cases, high humidity conditions, and to not exceed prescribed limits in the product Standards. The substantiation for proposal 11-87 did not indicate any problems with specific portable motors that necessitated the revision. The requirements in Section 250.114 appropriately cover grounding for residential and non-residential applications of motor operated appliances.

In addition, (portable) equipment, connected by a cord and plug, can be double insulated, which is neither grounded nor guarded, and would not comply with the revised section 430.243. The current section 250.114 permits listed double insulated equipment to be utilized without need for grounding, guarding or isolation.

To address these issues, the recommended text for 430.243 has been revised to (1) include provision to omit grounding for frames of motors rated 50V or less; (2) add exception for listed double insulated equipment similar to the current exception to 250.114; and (3) add exception to refer to section 250.114 for listed motor-operated appliances, and delete Fine Print Note 1.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 11-116.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-116 Log #2260 NEC-P11 **Final Action: Accept**
(430.243)

Submitter: Robert G. Fahey, City of Janesville

Recommendation: This proposal maintains existing 2008 NEC requirements.

Substantiation: This Code proposal is a result of Report on Comment 11-35 submitted by the Technical Correlating Committee. This proposal was crafted by Task Group 2-4, members included Chairman, Wayne Brinkmeyer (CMP 11), Jeff Desjarlais (CMP 11), Bob Fahey (CMP 11), Doug White (CMP 5) and Greg Steinman (CMP 5).

The Code language located in 430.243 is recommended to remain as presently written in the 2008 NEC in order to correlate with similar Code language in 250.114, as these Code sections relate to the minimum voltage of 150 volts to ground. By reducing the voltage to 50 volts or more to ground, this would encompass essentially all electrical products used in residential, commercial and industrial applications. The majority of these types of products are constructed in accordance with existing safety product standards, and in most cases certified by third parties. In commercial and residential applications the majority of products, except as noted in (3) and (4) of 250.114 are connected to the voltage source via two-prong attachment plugs. The existing standards to which these products are evaluated adequately address shock hazards.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-117 Log #2015 NEC-P11 **Final Action: Accept in Part**
(430.245)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete first paragraph, (A) and (B) and substitute:

(A) Terminal Housings. Where the supply circuit conductors to motor terminals are field-installed, junction boxes or enclosures to house motor terminals shall be provided.

(B) Separation of Junction Box from Motor. The junction box specified in 430.245(A) shall be permitted to be separated from the motor by not more than 1.8m (6ft) provided the leads to the motor are stranded within a flexible cord or cable identified for the use. Type AC cable, Type MC cable or an identified raceway and each strand of the conductors is not larger than 10 AWG.

Substantiation: The first paragraph is already covered by Article 250. The provisions of (A) should apply to field-wired motors whether or not fixed. Section 430.12 (A) implies some motors do not have terminal housings e.g., hot water circulating pumps, exhaust blowers for gas-fired water heaters which have integral factory installed flexible supply cords with no terminal housings. Flexible cords are permitted by 400.7 (A)(9), 501.140, 502.10, 503.10, etc.

Panel Meeting Action: Accept in Part

Revise 430.245(A) to read:

(A) Grounding Through Terminal Housings.
Where the wiring to motors is metal-enclosed cable or in metal raceways, junction boxes to house motor terminals shall be provided, and the armor of the cable or the metal raceways shall be connected to them in the manner specified in Article 250.

Panel Statement: The reference to Article 250 in the first paragraph is general to the entire section and provides the intent of the section. The panel has removed "fixed" in paragraph (A) as suggested by the submitter. The panel rejects the revised language for paragraph (B) as the present language provides clarity as to the intent of this section; this section applies to motors with permanent wiring methods.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

11-118 Log #1906 NEC-P11 **Final Action: Reject**
(430.245(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (A): Where the wiring to fixed motors is metal-covered cable or in metal raceways, metal junction boxes or metal terminal housings to house for motor terminals shall be provided and bonded to the motor frame and the armor of the cable or the metal raceways in the manner specified in Article 250.

Revise latter part of first paragraph of (B):...or are stranded leads enclosed in liquidtight flexible metal conduit, <u>liquidtight flexible nonmetallic conduit,</u> flexible metal conduit, intermediate metal conduit, rigid metal conduit, <u>rigid nonmetallic conduit,</u> or electrical metallic tubing not smaller than metric designer 2 (trade size 3/8), <u>where these wiring methods are identified for the use.</u> ~~The armor or raceway being connected to the motor and to the box.~~

Delete the second paragraph.
Substantiation: Edit. Proposal incorporates the second paragraph. Stranded leads are required in the first paragraph. Connect of grounding conductors is covered elsewhere in the Code and apply.
Panel Meeting Action: Reject
Panel Statement: The present layout within (B) provides the user a separate paragraph for the nonmetallic conduits, which provides more clarity than does the proposed layout of the rules. The additional proposed text is not necessary as the permitted and not permitted uses are specified with the respective article.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-119 Log #3787 NEC-P11 **Final Action: Reject**
(Table 430.248)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Add new text to read as follows:

<u>Include a column for 277 volt single-phase motors. The value of current can be calculated as follows:</u>

$$I = \frac{IP \times 746}{E \times COS\theta \times \frac{\%Eff.}{100\%}}$$

<u>where: E = 277v, COSΦ = power factor, H = Horsepower</u>
Substantiation: Current values for 277 volt, single phase AC motors are needed for engineers to properly size branch circuit wiring to such motors.
Panel Meeting Action: Reject
Panel Statement: The proposed language is not consistent with the layout of the present tables in Article 430 with the amperage values listed. The panel encourages the submitter to provide text similar to the present tables and provide technical documentation with the proposed amperage for 277 volt motors.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 440 — AIR CONDITIONING AND REFRIGERATING EQUIPMENT

11-120 Log #1623 NEC-P11 **Final Action: Accept**
(440.6)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Table 310.16 through Table 310.19” to “Table 310.15(B)(1) through Table 310.15(B)(4)”.
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Accept
Panel Statement: The panel accepts this proposal based on the action of Panel 6 to change the numbering of the Tables in Article 310.
The panel refers this action to the NEC Correlating Committee for correlation based on Panel 6 action.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-121 Log #4245 NEC-P11 **Final Action: Reject**
(440.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 440.9 in Part I.

<u>440.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:</u>

<u>(1) Equipment listing or labeling</u>

<u>(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation</u>

<u>(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV’s, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of “other” options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be “approved”, it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-123.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-122 Log #4246 NEC-P11 **Final Action: Reject**
(440.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 440.9 in Part I.

<u>440.9 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.</u>
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-123.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-123 Log #4247 NEC-P11 **Final Action: Reject**
(440.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 440.9 in Part I.
440.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: The proposal limits the ability of installing and constructing electrical equipment. The authority having jurisdiction already has the authority to require listing of electrical equipment through NEC sections 90.4, 90.7, and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
FAHEY, R.: The action on this proposal requiring air conditioning and refrigeration equipment be listed should have been to accept. The acceptance of this proposal would improve electrical safety, and assure the AHJ this equipment is manufactured properly and safely. As of this date, the majority of this equipment utilized in residential, commercial and industrial applications is listed. The concern was regarding larger specialty equipment used in large industrial applications. Although present Code sections 90.7, 110.2 and 110.3(A) do allow the AHJ to require a product be listed, the proposed language would directly allow and greatly enhance the ability of the AHJ, as this proposal directly addresses the listing of air conditioning and refrigeration equipment. Panel members had a concern with the larger equipment where the air conditioners and refrigeration equipment are specifically manufactured for a particular application; this equipment is typically installed in large industrial facilities where the product could be field evaluated by a recognized testing agency for these special and limited situations. Overall, this proposal will add safety to the electrical system and assure the AHJ, the end user and the manufacturers of air conditioning and refrigeration equipment, that this equipment which is manufactured worldwide would be required to comply with the same standard of safety.

11-124 Log #4248 NEC-P11 **Final Action: Reject**
(440.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 440.9 in Part I.
440.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-123.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-125 Log #4249 NEC-P11 **Final Action: Reject**
(440.9)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new section 440.9 in Part I.
440.9 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-123.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-126 Log #2237 NEC-P11 **Final Action: Accept**
(440.14, FPN (New))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action on this proposal since there is no need to duplicate 110.26 in accordance with 4.1 of the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Add new FPN as follows:
440.14 Location.
FPN: See 110.26.
Substantiation: Just a reminder that 440.14 must still comply with 110.26.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SAUNDERS, L.: Adequate substantiation has not been provided for the addition of the reference. The requirements of "110.26 Spaces About Electrical Equipment" already apply to this section.

11-127 Log #1567 NEC-P11 **Final Action: Accept**
(440.14 Exception No. 1)

TCC Action: The Technical Correlating Committee directs the panel to reconsider the proposal and correlate with the action taken on Proposal 1-63.
This action will be considered by the panel as a public comment.
Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
Exception No. 1: Where ~~the~~ **a lockable** disconnecting means **is** provided in accordance with 430.102(A) ~~is capable of being locked in the open position,~~ and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required. ~~The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker and shall remain in place with or without the lock installed.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Accept

Panel Statement: The panel accepts the proposed revision contingent upon Panel 1's acceptance of proposed definition of "lockable". This action is to be referred to the correlating committee for review.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-128 Log #1801 NEC-P11 **Final Action: Reject**
(440.14 Exception No. 1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Where the disconnecting means provided in accordance with 430.102(A) ~~is capable of~~ <u>has identified integral and permanent means for</u> being locked in the open <u>(off)</u> position, and the refrigeration or air-conditioning equipment is essential to the industrial <u>or commercia</u>l process in a facility with written safety procedures, and where the conditions of maintenance and supervision assure that only qualified persons service the equipment, a disconnecting means within sight of the equipment shall not be required.
Delete remainder.
Substantiation: Commercial facilities such as meat packing and storage should be included. Proposal for locking is specific and prohibits makeshift methods.
Panel Meeting Action: Reject
Panel Statement: The term "capable" is used many times throughout the code. When used in the context as an adverb it is defined as "having general efficiency and ability." The present text contains clear language and is more specific than the proposed language. The term "identified" is defined in Article 100 and relates to listings by testing agencies. The panel does not feel the expansion of this exception to commercial applications will provide a safe installation, the panel believes facilities such as meat packing plants would be an industrial process as covered in the present exception.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-129 Log #2053 NEC-P11 **Final Action: Accept in Principle**
(440.15 (New))

TCC Action: Technical Correlating Committee directs that this proposal be referred to Code-Making Panels 5, 7, and 8 for information.
Submitter: Chuck Rende, City of Park Ridge
Recommendation: Add new text to read as follows:
<u>Any wiring method employed shall contain an insulated coper equipment grounding conductor sized in accordance with 250.122. This grounding conductor shall extend from the panel upstream of the disconnect, bond to the disconnect and continue to the AC unit.</u>
Substantiation: (1) Consumer Product Safety Commission data for electrocutions due to Air Conditioners:
2000 = 10
2001 = 14
2002 = 8 (Latest information found)
(2) 2007: Boy in Chicago Area Electrocuted by AC (to fence).
(3) Concentric K.O.s on disconnects, loose fittings, and broken down conduit systems in a damp area lack for adequate safety. Photo 1&2.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Add new section 440.9 to read as follows:
<u>**440.9 Equipment Grounding.** Any wiring method employed shall contain an equipment grounding conductor in accordance with 250.118(1).</u>
Panel Statement: The panel has reworded the proposal to better align with other Chapter 4 articles in a clear manner. The action on the proposal better addresses the submitter's concerns by the rewording and relocation of the requirement.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 11 Negative: 4
Explanation of Negative:
BUNCH, R.: This should be rejected and continue to allow grounding per 250.188 requirements. The substantiation data is such that you don't know if the air conditioners were window units with the ground wire defeated for example. Likewise the one example could have had the same problem with a separate conductor not properly installed. Mandating a grounding conductor does not address either of these potential causes for the cited problems. Further, this section covers disconnects for all refrigeration and air conditioning equipment (indoor and outdoor). The change says "... to the AC unit." so we would be applying a special requirement which overrides 250.118 just for air conditioners. This does not appear justified based on the data provided.
DESJARLAIS, J.: Proposed revision eliminates currently accepted means of grounding equipment noted in 250.118.
TODD, L.: Documentation sent with the proposal only covers outdoor ground mounted Air Conditioning units. The accepted proposal goes into all product covered by Article 440 no matter where located. In addition the problem is a maintenance issue/installation issue and if maintained the original grounding would have been sufficient.
WRIGHT, J.: The Technical Correlating Committee should refer this Proposal to Panels 7 and 8 because these Panels have responsibility for acceptance of wiring methods as equipment grounding conductors.
Comment on Affirmative:
COLE, T.: During the discussion of this proposal numerous panel members confirmed their experience in noting that conduit installed on top of a roof is subject to damage and it is very easy for the conduit to become separated which affects the integrity of the grounding system. There are State jurisdictions that already require a separate ground in conduit installed on a roof top. Safety definitely would be enhanced by accepting this proposal. The panel's actions were correct in accepting this proposal in principal.
GLOVER, W.: The panel action was an appropriate remedy for an equipment grounding problem that exists with residential and commercial air conditioning installations. The supporting documentation identified a problem that exists with these residential and commercial installations but there was no evidence presented that the existing practices in industrial installations should be modified by this new code section. Typical industrial refrigeration units involve large motors whose installation does not require a local disconnect switch (440.14 Exception No. 1) and therefore the cited equipment grounding problem does not exist and the substantiation does not apply. The equipment grounding requirements of 250.118 should continue to apply to industrial installations and the following exception should be included:
<u>Exception: In industrial installations with written safety procedures and where the conditions of maintenance and supervision insure that only qualified persons service the equipment, provisions of 250.118 shall apply for equipment grounding.</u>

11-130 Log #191 NEC-P11 **Final Action: Reject**
(440.22(A) Exception No. 2 (New))

Submitter: Bryan P. Holland, City of North Port
Recommendation: Add an exception to read as follows:
Exception No. 2: Where the valves for branch-circuit short-circuit and ground-fault protective devices determined by 440.22(A) do not correspond to the standard size, the next higher overcurrent device rating shall be permitted to be used as permitted in 240.4(B), but shall not exceed 440.22(C).
Substantiation: It is unclear if the general allowance of 240.4(B) applies to Article 440 equipment. The last sentence in Section 440.21 implies it does not. Like for motors and other similar equipment, this exception provides more flexibility without reducing safety or the protection of the branch-circuit conductors.
Panel Meeting Action: Reject
Panel Statement: Section 440.22(A) addresses individual motor compressors and already permits the branch-circuit short-circuit and ground-fault protective device to be increased to 225 percent if the 175 percent is not sufficient for motor starting. The submitter has not provided technical substantiation to show a need to apply section 240.4(B).
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-131 Log #2565 NEC-P11 **Final Action: Reject**
(440.22(B) Exception (New))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute
Recommendation: Add the following next text to 440.22(B)
Exception: Where the circuitry is interlocked so as to prevent simultaneous operation of the motor-compressor(s) and all other loads connected, the branch-circuit short-circuit and ground fault protection shall be determined from the load requiring the largest overcurrent protective device at a given time.
Substantiation: 440.12(B) permits the rating of the disconnecting means to be based on the largest simultaneous load. 440.33 and 440.34 permit conductor sizes to be based on the largest load at a given time. There is, however, no similar language for overcurrent protective devices. For example, a roof top unit with a motor-compressor load of 100 amperes and an electric heat load of 100 amperes would require an overcurrent device in excess of 200 amps even though the loads are noncoincident. Sizing the overcurrent device for the largest noncoincident load would add consistency to the requirements of Article 440 and Article 220.
Panel Meeting Action: Reject
Panel Statement: The submitter's concerns are addressed in 430.53. The proposal describes a group installation and as a result 430.53(C)(4) as referenced by 440.22(B)(2) is required to be applied. The panel acknowledges that the ground-fault short-circuit protection for motors might be greater than is permitted for other loads in accordance with Article 240.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
BUNCH, R.: This should be accepted. We allow for the disconnect and conductors to be sized per the largest load with the appropriate 125% factors. We also allow for conductor selection for interlock circuits in 430.24 exception 3. Accepting this would recognize the largest load for the BCSC and ground fault protection and in effect be based of a smaller load, providing added equipment and personnel safety.

11-132 Log #2014 NEC-P11 **Final Action: Accept in Part**
(440.34)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Conductors supplying a motor compressor load in addition to other load shall have an ampacity not less than required in 440.33 plus the other calculated load. Exception No. 1: Where the circuitry is interlocked to prevent simultaneous operation of the motor compressor(s) and all other loads, the required conductor ampacity shall be determined in accordance with 440.32 or 440.33 as applicable. Exception No. 2: Where conductors supply a motor-compressor(s), motor(s) and continuous load, they shall have an ampacity not less than 125 percent of the full-load current of the largest motor, the largest rated load or branch circuit selection current, or the continuous load, whichever is greater.
Substantiation: "Sufficient" is subjective and a term to be avoided per the Style Manual. Other loads cover lighting, appliances, motors, etc. Where a 125 percent ampacity is required for continuous load, the 125 percent ampacity requirement for motor compressors also applies, which is excessive since 125 percent ampacity for the motor-compressor or continuous load, whichever is greater, allows for overload current permitted by overload protection and heating at terminals and overcurrent devices from continuous current.
Panel Meeting Action: Accept in Part
Revise text to read as follows:
440.34 Combination Load.
Conductors supplying a motor-compressor load in addition to ~~a lighting or appliance~~ other load as calculated from Article 220 and other applicable articles shall have an ampacity sufficient for the ~~lighting or appliance~~ other load plus the required ampacity for the motor-compressor load determined in accordance with 440.33 or, for a single motor-compressor, in accordance with 440.32.
Panel Statement: The panel accepts the proposed change of the term "a lighting or appliance load" with "other load(s)" to be consistent with Article 220, specifically 220.18(A). The panel rejects the remainder of the proposal. The term "sufficient" is used many times throughout the code, and as used in this section accurately it describes the intent. The proposed revision in regards to the 125 percent requirements are not substantiated and does not improve the usability of this section.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
BUNCH, R.: Vote affirmative with panel action but want to clarify that the exception is still part of the section. It is not in the change but the action of AinP deals only with the struck and added text in the main section.

11-133 Log #3283 NEC-P11 **Final Action: Accept in Part**
(440.34)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Conducts supplying a motor-compressor load in addition to other load(s) ~~a lighting or appliance load~~ as calculated from Article 220 and other applicable articles, shall have an ampacity ~~sufficient~~ not less than calculated for the ~~lighting and appliance~~ other load(s) plus the required ampacity for the motor-compressor load determined in accordance with 440.33, or, for a single motor-compressor, in accordance with 440.32. Where the other load(s) is a continuous load the 125 percent ampacity requirement for continuous load and largest motor load shall only be required to apply to the largest of such loads.
Substantiation: A feeder may supply other loads which are not lighting and appliance loads such as motors. "Sufficient" is subjective and a term to be avoided per the Style Manual. The 125 percent ampacity requirement for continuous load and largest motor should apply to only the largest since it allows for temporary overcurrent (overload) of the motor-compressor and the effects of continuous load on overcurrent devices and terminals.
Panel Meeting Action: Accept in Part
Revise text to read as follows:
440.34 Combination Load.
Conducts supplying a motor-compressor load in addition to other load(s) ~~a lighting or appliance load~~ as calculated from Article 220 and other applicable articles, shall have an ampacity sufficient for the ~~lighting and appliance~~ other load(s) plus the required ampacity for the motor-compressor load determined in accordance with 440.33, or, for a single motor-compressor, in accordance with 440.32.
Panel Statement: The panel accepts the proposed change of the term "a lighting or appliance load" with "other load(s)" to be consistent with Article 220 specifically 220.18(A). The panel rejects the remainder of the proposal. The term "sufficient" is used many times throughout the code, and as used in this section accurately as it describes the intent. The proposed revision in regards to the 125 percent requirements are not substantiated and does not improve the usability of this section.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
BUNCH, R.: See my affirmative comment on Proposal 11-132.

11-134 Log #1802 NEC-P11 **Final Action: Reject**
(440.41(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: A motor-compressor controller shall have research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)
Revise: A motor-compressor controller shall have both a continuous duty full-load current rating and a locked-current rating not less than the nameplate rated-load current or branch circuit selection current, whichever is greater, and locked-rotor current, respectively of the compressor, or be rated in horsepower in accordance with 430.110.
Substantiation: The first sentence has current requirements without exception; the second sentence implies there are no current ratings; which governs?
Panel Meeting Action: Reject
Panel Statement: It is unclear as to what the submitter is asking for in the first paragraph. The existing first sentence requires the controller be rated for the full load current and locked rotor current of the compressor. The second sentence allows the controller to omit these values if rated only in horsepower. Therefore, the present text adequately addresses the submitter's concerns.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-135 Log #2013 NEC-P11 **Final Action: Reject**
(440.51)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "branch circuit" to "supply".
Substantiation: Edit. The specified devices, while intended to protect branch circuit conductors from overheating, may also provide protection for other supply conductors depending on their ampacity and the load carried.
Panel Meeting Action: Reject
Panel Statement: The overload protective device is typically located in the branch circuit, downstream from the feeder or service conductors, and therefore cannot offer protection for these other supply conductors. It cannot protect for problems that occur on its line side.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-136 Log #2600 NEC-P11 **Final Action: Accept**
(440.55(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "or cord connector" after "receptacle".
Substantiation: Edit. Cord connectors should be included.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-137 Log #2599 NEC-P11 **Final Action: Accept**
(440.63)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text: "or cord connector" after "receptacle".
Substantiation: Edit. Cord connectors should be included.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-138 Log #3683 NEC-P11 **Final Action: Reject**
(440.63)

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Revise text as follows:
...and located within 1.8 m (6 ft) of the floor ~~or (2) and approved manually operable disconnecting means is installed in a readily accessible location within sight from the room air conditioner.~~
Substantiation: ~~(2) an approved manually~~ etc. should be removed because it makes no sense. It is not required to have two disconnects, i.e., cord and plug in addition to a manually operable disconnecting means. It is only required to have one or the other.
Panel Meeting Action: Reject
Panel Statement: The intent of this section is to allow the unit to be turned off from a readily accessible location on the unit or within sight of the unit, thus eliminating the load before disconnecting the attachment plug from receptacle.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 445 — GENERATORS

13-3 Log #4415 NEC-P13 **Final Action: Accept in Principle**
(445.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: Mark C. Ode, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
445.1 Scope.
This article covers the ~~installation~~ location, marking, overcurrent protection, internal bushing requirements, terminal housings and disconnecting means for generators and the ampacity of conductors from the generator terminal to the first disconnecting means with overcurrent protection.
Substantiation: Article 445 does not cover the installation of generators, as much as it covers the location, marking, overcurrent protection, ampacity sizing of conductors from the terminal housings to the disconnecting means incorporating overcurrent protection. Making this change to the scope will more accurately describe the coverage of Article 445, rather than describing the article as only the requirements for installation of generator.
This proposal was developed by a Task Group composed of Task Group Chairman Paul Casparro and Chair of Panel 3 (NJATC); Jim Wiseman at Square D Schneider-Electric and Panel 15 (NEMA); John R. Kovacik with Underwriters Laboratories, Panels 10, 13 and the NEC TCC (UL); Richard Owen with City of St Paul, Minnesota, Panel 3, and the NEC TCC (IAEI); and Mark C. Ode with Underwriters Laboratories, Panels 3, 13, and the NEC TCC (UL).
Panel Meeting Action: Accept in Principle
This article contains installation and other requirements for generators.
Panel Statement: The panel action provides a more general statement than recommended. This would preclude having to revise the scope each time new requirements are added to the article. The committee understands that scope statements are the responsibility of the NEC TCC and recommends that they accept this action.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-4 Log #4240 NEC-P13 **Final Action: Reject**
(445.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
445.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-5 Log #4241 NEC-P13 **Final Action: Reject**
(445.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
445.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-6 Log #4242 NEC-P13 **Final Action: Reject**
(445.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
445.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-7 Log #4243 NEC-P13 **Final Action: Reject**
(445.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
445.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-8 Log #4244 NEC-P13 **Final Action: Reject**
(445.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
445.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: The recommended text is unnecessary based on existing requirements in 90.7, 110.2, and 110.3. Section 110.2 already states that electrical equipment or conductors required or permitted by the NEC must be approved so repeating this text is unnecessary. Section 90.4, as well as 90.7, provides a method for the authority having jurisdiction (AHJ) to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at time of installation, Sections 90.4 and 90.7 permit field equipment evaluation, making this text unnecessary.
Permitting manufacturer's self-evaluation or an owner's engineering judgment may permit equipment to be installed as unevaluated, untested, and uninspected equipment to be installed since many states only have electrical inspection in the major metropolitan areas, not counties or unincorporated areas.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-9 Log #366 NEC-P13 **Final Action: Reject**
(445.11)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
"rated revolutions/minute ~~revolutions per minute~~"
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The context in which "per" is used is acceptable in accordance with the NEC Style Manual list of acceptable terms.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-10 Log #3909 NEC-P13 **Final Action: Reject**
(445.11)

Submitter: Eugene F. Swisher, City of Tampa / Rep. Tampa Area Apprenticeship Training
Recommendation: Add the following new sentence at end of paragraph:
The manufacturer's nameplate shall also include the minimum distance from combustible materials and the minimum distance from door and window openings.
Substantiation: With the dramatic increase in the use of permanently installed whole house generator systems, I find many of them installed in close proximity to door and window openings, thus, allowing hazardous amounts of exhaust fumes to enter the house. Also, if hot exhaust is too close to combustible material (wood siding) it is a fire hazard.
Panel Meeting Action: Reject
Panel Statement: The location of the generator should remain with the engineer, the installer, and the authority having jurisdiction as a field decision based on the construction of any structures as well as the type and amount of fuel stored in or with the generator. Generators are built for various types of fuel and various exhaust system configurations. Each different fuel and exhaust configuration may require a different distance from combustible materials and from window and door openings so providing manufacturers' data for all the possible distances would be almost impossible. In addition, the various types of construction may combine noncombustible materials, such as block or brick, with combustible frames for doors and windows. The location of the generator should remain with the engineer, the installer, and the authority having jurisdiction as a field decision based on the construction of any structures as well as the type and amount of fuel stored in or with the generator.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-11 Log #3146 NEC-P13 **Final Action: Accept in Part**
(445.12)

Submitter: Rick Lorenz, Cummins Power Generation
Recommendation: Revise text to read as follows:
445.12 Overcurrent Protection
(A) Constant-Voltage Generators. Constant-voltage generators, except ac generator exciters, shall be protected from ~~overload~~ overcurrent by ~~inherent design,~~ circuit breakers, fuses, protective relays or other acceptable overcurrent protective means suitable for the conditions of use.
445.13 Ampacity of Conductors
Exception: ~~*Where the design and operation of the generator prevent overloading, the ampacity of the conductors shall not be less than 100 percent of the nameplate current rating of the generator.*~~ *When design of the generator incorporates listed overcurrent protection, ampacity of the conductors shall not be less than 100 percent of the rating of the overcurrent device.*
Substantiation: With the advent of boosted excitation systems it is now possible for modern constant voltage generators to produce current over time in excess of generator and conductor thermal damage curves, unlike shunt excited generators produced in the past. The recommended change would also make generator feeder conductor protection consistent with feeder overcurrent protection in Article 215 and Article 240.
Panel Meeting Action: Accept in Part
The panel accepts in part the recommended revision of 445.12(A) and the resultant text is to read as follows:
(A) Constant-Voltage Generators. Constant-voltage generators, except ac generator exciters, shall be protected from ~~overload~~ overcurrent by inherent design, circuit breakers, fuses, protective relays, or other acceptable overcurrent protective means suitable for the conditions of use.
The panel rejects the recommendation to revise the exception to 445.13.
Panel Statement: The panel does not accept the deletion of "inherent design" from 445.12(A) because this is a protective technique currently employed by generator manufacturers. The panel rejects the changes to the exception in 445.13 because there has been no technical substantiation presented to change the rating from 100 percent of the nameplate of the generator to 100 percent of the overcurrent protective device. The conductors do not have overcurrent protection on the line side of the overcurrent protective device and may have to

carry the full value of the generator rating.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-12 Log #2596 NEC-P13 **Final Action: Reject**
(445.12 Exception to (A) through (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text: "or damage to equipment or process" after "greater hazard to persons".
Substantiation: Edit. The provision should also apply where failure to operate would cause damage to equipment or processes.
Panel Meeting Action: Reject
Panel Statement: The submitter has failed to provide any technical substantiation to support the recommendation. The exception covers installations where generators should be permitted to operate to failure to prevent a greater hazard to people, not to equipment or processes. This section does not deal with failure to operate. For example, where a generator is providing power to a critical branch for an operating room in a hospital, installing an overload-sensing device that would shut the generator down during an overload would endanger the patient. This exception permits an annunciator to be installed that would provide an alarm rather than shutting the system down.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-13 Log #1009 NEC-P13 **Final Action: Reject**
(445.12(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "acceptable" to "identified".
Substantiation: Edit. Acceptable is not the same as identified.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation to support the recommendation. The submitter's use of the term "identified" is incorrect in the context of this requirement. The correct word is "acceptable".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-14 Log #457 NEC-P13 **Final Action: Reject**
(445.13)

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Change the existing Exception to Exception Number 1 and add new Exception Number 2 as follows:
Where the conductors are installed in accordance with the requirements of Sections 240.21(C)(2), (3), (4), and (6).
Substantiation: This change is intended to allow some flexibility in the connection of tap conductors from generator terminals. In particular, the change will allow for the installation of multiple sets of conductors to be connected to the generator terminals — similar to what is allowed for transformer secondary conductors. Generally, there should be no major differences in what is currently allowed for transformer secondary conductors and generator conductors. Logically, the conductors do not care if they receive their supply source from a transformer or a generator. A transformer and generator can be separately or non-separately derived systems — grounding and bonding requirements are generally the same. As presently worded, Section 445.13 requires that all conductors from the generator terminals be sized at 115 per cent of the nameplate current rating of the generator. This is over restrictive where the need for multiple generator taps is necessary, such as taps for emergency systems and optional standby systems. This change is well over
due and has no impact on safety. It simply provides further flexibility in the installation and use of generator feeder tap conductors. No different than what is presently allowed for the installation of other tap conductors from separately derived systems!
Panel Meeting Action: Reject
Panel Statement: The proposal fails to recognize the possibility of short circuits or ground faults between the source of supply and the first overcurrent protective device with the conductors having to carry the full current of the generator. Generators and transformers, using the same grounding electrode and bonding conductor sizing and installation rules, is really not the issue here since the size of the conductors from the generator source to the first overcurrent protective device must be large enough to carry the nameplate current of the generator, even in a short circuit (does not involve grounding or bonding issues since the fault may be between two phase conductors). There was no technical substantiation provided to permit the use of the requirements in 240.21(C) for conductors from the generator to the first overcurrent protective device.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-15 Log #2017 NEC-P13 **Final Action: Reject**
(445.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Neutral conductors of dc generators that must carry ground-fault currents shall ~~not be smaller than the minimum size of~~ have an ampacity not less than the largest conductor.
Substantiation: Ampacity should be the criterion; equal sizes of conductors of different material and insulation do not have the same ampacity.
Panel Meeting Action: Reject
Panel Statement: Conductors are rated in ampacity and sized based on this rating. The existing text using the words "not smaller than the minimum size" is technically correct. In addition, the submitter has proposed revising from "not smaller than the minimum size" to "not smaller than the maximum size", with no technical substantiation for the change.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-16 Log #3002 NEC-P13 **Final Action: Reject**
(445.13)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
445.13 Ampacity of Conductors.
The ampacity of the conductors from the generator terminals to the first ~~distribution device(s) containing~~ overcurrent protection device shall not be less than 115 percent of the nameplate current rating of the generator. It shall be permitted to size the neutral conductors in accordance with 220.61. Conductors that must carry ground-fault currents shall not be smaller than required by 250.30(A). Neutral conductors of dc generators that must carry ground-fault currents shall not be smaller than the minimum required size of the largest conductor.
Exception: Where the design and operation of the generator prevent overloading, the ampacity of the conductors shall not be less than 100 percent of the nameplate current rating of the generator.
Substantiation: The term "distribution device containing overcurrent protection" is the root of many debates. It can easily be argued that this means the conductors from the generator to the first panelboard must be rated 115%, although this would not make any sense. This proposal helps clarify that the conductors in the generator to the breaker in the generator must be 115%.
Panel Meeting Action: Reject
Panel Statement: The existing text is clear that the size of conductors from the source at the generator to the first overcurrent protective device at the point of distribution, on the generator as mentioned in the substantiation, within a switchboard, or within a panelboard, must be 115 percent of the rating of the generator. If a short circuit occurs before the overcurrent protective device at that point of distribution, the source conductors must be able to carry the full rating of the generator, hence the sizing at 115 percent.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-17 Log #1012 NEC-P13 **Final Action: Reject**
(445.14)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Live parts of generators ~~operated at more than 50 volts to ground~~ shall not be exposed ~~to accidental contact~~ where accessible to unqualified persons.
Substantiation: Depending on conditions, 50 volts or less may not always be safe re: electric shock, arcing, and fire ignition.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation to support deleting the more than 50-volt requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-18 Log #66 NEC-P13 **Final Action: Reject**
(445.19)

TCC Action: The Technical Correlating Committee understands that the action on Proposal 13-18 does not add any new code text, and is superseded by the action taken on Proposal 13-19.
Note: This Proposal appeared as Comment 13-10 on Proposal 13-11 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-11 was:
Add text to read as follows:
Ground-Fault Circuit Interrupter Protection for Receptacles on Portable Generators. All 125-volt, single-phase, 15- 20-, and 30 ampere receptacle outlets that are a part of a portable generator shall have ground-fault circuit interrupter protection for personnel.
Submitter: Kurt Eckroth, Waukesha County Technical College
Recommendation: Proposal 13-11 should be rejected.
Substantiation: 702.6 requires the use of a transfer switch to connect a portable generator to premises wiring. The proposed addition to Article 445 would require GFCI protection on all outlets of all portable generators. Unfortunately, GFCI protected generators are incompatible with currently available transfer switch technology. If the proposed addition to Article 445 is approved, users may be encouraged, if not forced, to connect their new GFCI protected generator to their premises wiring by ungrounded backfeeding. Backfeeding is a notoriously dangerous practice, and the reason for the NEC transfer switch requirement in the first place. It is illogical to institute a change to Article 445 that forces/encourages users to violate Article 702. Therefore, the proposal should be rejected.

523.23(C) prohibits GFCI protection of egress lighting at carnivals, circuses, fairs and similar events. These events are commonly powered by portable generators. The proposed addition to Article 445, which would require GFCI protection on all outlets of all portable generators, would be in direct conflict with 523.23(C). It is illogical to institute a change to Article 445 that requires users to violate Article 523. Therefore, the proposal should be rejected.

The exception to 590.6(A) exempts GFCI protection of circuits in temporary installations where a greater hazard sold be created if power were interrupted. The proposed addition to Article 445, which would require GFCI protection on all outlets of all portable generators, would be in direct conflict with 590.6(A). It is illogical to institute a change to Article 445 that requires users to create safety hazards anticipated by Article 590. Therefore, the proposal should be rejected.

The proposed addition to Article 445 would require GFCI protection on all outlets of all portable generators. The GFCI protection would only function if the portable generator was properly grounded to a properly installed grounding rod. It is common knowledge that a significant percentage of users of portable generators do not ground the generator. It is illogical to require the addition of a “safety” device to a portable generator that, in many instances, will not function, but only provide the user with the illusion of safety and a false sense of security. Therefore, the proposal should be rejected.
Panel Meeting Action: Reject
Panel Statement: Ground-fault circuit-interrupter protection on generators is not incompatible with available transfer switches technology. A generator connected to a 2-pole transfer switch for a 120/240-volt single-phase grounded service will trip the GFCI protection on the generator. However, a 3-pole transfer switch (switching both phases and the neutral as a separately derived system) will provide proper isolation of the GFCI and permit the GFCI device on the generator to operate properly.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
CZARNECKI, N.: See NEMA statement on Proposal 13-19.

13-19 Log #4418 NEC-P13 **Final Action: Accept**
(445.20)

Submitter: Mark C. Ode, Underwriters Laboratories Inc.
Recommendation: Add new text to read as follows:
445.20. Ground-Fault Circuit Interrupter Protection for Receptacles on 15 kW or Smaller, Portable Generators. All 125-volt, single-phase, 15- 20-, and 30-ampere receptacle outlets, that are a part of a 15 kW or smaller, portable generator, shall have ground-fault circuit interrupter protection for personnel integral to the generator or receptacle.
Substantiation: Small portable generators, sized at 15 kW or smaller, are used for many different purposes, such as power on camping trips; on construction sites for temporary power for electrical equipment, such as table saws, pressure washers, and hand-held tools as well as lighting and similar purposes; for temporary connection of electrical circuits in a home or for small commercial buildings; and for power during emergency situations for all different types of installations due to natural disasters. In all of these applications, there are many potential hazards associated with these temporary installations, such as cut and abraded wire and cable, standing water and wet locations, and similar hazardous applications.

During power outages from storms and other natural disasters, persons who may not be familiar with adequate safety procedures often use these generators to supply power in less than optimal conditions. Requiring all 125-volt, single phase, 15-, 20-, and 30-ampere on 15 kW or smaller generators to be integrally GFCI protected will help eliminate the possibilities of shock hazards from damaged circuits, damaged equipment, or use of equipment in wet locations.

This new section will ensure that portable generators will have adequate personnel protection for these receptacles wherever these generators are used. By limiting GFCI protection to only 15-, 20-, and 30-ampere, single phase, 120 volt circuits, these small generators can still be used for supplying standby power for non-GFCI protected 20-ampere, 30-ampere, and larger 120/240 single phase, 3-wire with ground as well as 3-phase circuits of all sizes for houses and small commercial buildings. Providing the proper transfer switch or transfer method with the proper compliance with the requirements in Article 250 for separately derived systems or non-separately derived systems is incumbent upon the installer of the system.

This proposal was developed by a Task Group composed of Task Group Chairman Paul Casparro and Chair of Panel 3 (NJATC); Jim Wiseman at Square D Schneider-Electric and Panel 15 (NEMA); John R. Kovacik with Underwriters Laboratories, Panels 10, 13 and the NEC TCC (UL); Richard Owen with City of St Paul, Minnesota, Panel 3, and the NEC TCC (IAEI); and Mark C. Ode with Underwriters Laboratories, Panels 3, 13, and the NEC TCC (UL).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
CZARNECKI, N.: This proposal seeks to add GFCI protection to all 125V generator outlets without any substantiation that an issue exists at all levels. In order to establish a functional GFCI configuration on the generator, the generator is forced to be of the bonded neutral variety. Therefore, this proposal would have the effect of eliminating floating neutral generators used to power structures, non-separately derived standby systems, and transfer switches for non-separately derived systems. Eliminating such equipment will not enhance safety, but obsolete safe infrastructure already in place. Enhanced safety has not been accomplished and potentially compromised with users defeating the system by removing grounding connections to find a means to get power on in their home.
Comment on Affirmative:
CARON, D.: Although I agree with the panel action, I am concerned over the apparently arbitrary size of “15 kW or Smaller”. If GFCI devices are proven to increase safety for these types of generators, then they should be required for any size generator with integral receptacles.

ARTICLE 450 — TRANSFORMERS AND TRANSFORMER VAULTS

9-161 Log #4104 NEC-P09 **Final Action: Reject**
(450.2)

Submitter: Sebastien Muller, Transformer Protector Corp.
Recommendation: Revise text to read as follows:
450.2 Definition. For the purpose of this article, the following definitions shall apply.

Transformers. An individual transformer, single- or polyphase, identified by a single nameplate, unless otherwise indicated in this article.

Fast Tank Depressurization Technique. A protective system that prevents transformer tank explosion by activating within milliseconds after an electrical fault occurs and by depressurizing the whole tank before uniform static pressure makes the tank explodes.
Substantiation: The definition of a Fast Tank Depressurization Technique is inserted here in order to be used in the next paragraphs. To understand the use of such a definition and to explain the wording, the following gives a small summary of why oil-filled transformers explode and proposes a setting of an efficient chain of protections to limit the explosion.

In fact, oil-filled transformers explosions are caused by the sequence of the following events. For any reason (oil pollution, transformer overload, temperature increase...), low impedance faults that result in arcing can occur in transformer tanks. Oil is then vaporized and the generated gas is pressurized because the liquid inertia prevents bubble expansion. The pressure difference between the gas bubble and the surrounding liquid oil generates a dynamic pressure peak that propagates inside the tank and interacts with the walls. The dynamic pressure peak and its reflections build up static pressure inside the tank. The average pressure thus rises and the tank ruptures, resulting in very dangerous explosions, fires and very expensive damages.

To reduce the consequences of a transformer explosion, fuses enable limiting the electrical fault time duration, protective walls can surround the transformers to limit the propagation of the explosions while sprinklers extinguish the induced fire. But despite all these precautions, transformers can still explode very violently (“Some contend that the violent nature of a transformer failure renders automatic water spray systems useless.” [4] or see section 2.1 in report [5]). In many cases for indoor transformers, there is not enough oxygen to create a real fire so the short circuits result in the creation of a very hot gas bubble (approximately 1000°C) traveling through the substation and destroying all material on its way and that cannot be prevented by sprinklers.

Therefore, in order to complete the chain of protections, a strategy to mitigate transformer tank rupture should be considered. The attached research articles ([1], [2] and [3]) where experiments as well as numerical simulations were performed, show that an efficient tank protection includes using a technology based on the fast tank depressurization induced by the quick oil evacuation out of the transformer. This fast activation can be achieved by the direct and passive response of a rupture disc to the dynamic pressure peak generated by the electrical arc. Therefore, the protection is activated within milliseconds by the first dynamic pressure peak, avoiding transformer explosions before static pressure increases. Such fast tank depressurization strategies should thus be considered as an efficient first step of a global chain of protections against oil filled transformers explosions and their subsequent fires. This is why a reference to fast tank depressurization techniques in section 450.26 and 450.27 is proposed.

[1] G. PERIGAUD, S. MULLER, G. de BRESSY, R. BRADY, P. MAGNIER, "Contribution to the Study of Transformer Tank Rupture due to Internal Arcing: Development of a Computer Simulation Tool", IEEE PES General Meeting, Pittsburgh, USA, 2008, provided in attachment.

[2] S. MULLER, R. BRADY, G. de BRESSY, P. MAGNIER, G. PERIGAUD, "Prevention of Transformer Tank Explosion, Part 1: Experimental Tests on Large Transformers", ASME PVP08 Conference, 2008, provided in attachment.

[3] R. BRADY, S. MULLER, G. de BRESSY, P. MAGNIER, G. PERIGAUD, "Prevention of Transformer Tank Explosion, Part 2: Development and Application of a Numerical Simulation Tool", ASME PVP08 Conference, 2008, provided in attachment.

[4] NFPA Fire Protection Handbook, 20th edition, Section 9 p. 188, 2008

[5] Report on failure of 400/220kV/33kV, 315 MVA Transformer (BHEL make) at Bamnauli Substation of Dehli Transco on 11-02-2008, section 2.1, provided in attachment.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 9-183. The term is not being added to the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-162 Log #683 NEC-P09 **Final Action: Reject**
(450.3(A) Note)

Submitter: Technical Correlating Committee on National Electrical Code®,

Recommendation: Add note to 450.3(A) under header "Primary Protection over 600 Volts" to read:

Primary Protection over 600 Volts <u>**(See Note 6.)**</u>

Add a sixth note under Table 450.3(A) to read:

<u>**6. When selected under engineering supervision, differential relay protection is acceptable as an alternate to overcurrent protection provided by a circuit breaker or fuses.**</u>

Substantiation: This proposal is the work of the "High Voltage Task Group" appointed by the Technical Correlating Committee. The task group consisted of the following members: Alan Peterson, Paul Barnhart, Lanny Floyd, Alan Manche, Donny Cook, Vince Saporita, Roger McDaniel, Stan Folz, Eddie Guidry, and Jim Dollard.

Differential relays are often used in sophisticated protection schemes, in networks or other designs where current can flow in multiple directions. They are commonly used where continuity of service is critical, to protect switchgear, and transformers. The sophisticated nature of the protection scheme typically requires the expertise of a supervising engineer.

Panel Meeting Action: Reject

Panel Statement: There is no evidence that using only differential relay protection will always provide the level of protection required. Differential relay protection of a transformer consists of comparing input current to output current (factoring in the turns ratio) and providing tripping if there is a difference. Such differences would only be detected in the event there was a fault internal to the transformer. An overcurrent on the secondary side of the transformer would not be detected by differential relay protection. If differential relay protection were used in combination with overcurrent protection for the primary and secondary conductors, the combination would provide the necessary protection. The proposed Note 6 under Table 450.3(A) would allow differential relay protection as a substitute for overcurrent protection provided by a circuit breaker or fuses.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

BREITKREUTZ, B.: Differential protection does not provide overload or through fault protection.

9-163 Log #3709 NEC-P09 **Final Action: Accept**
(450.3(B))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Modify 450.3 (B) by adding (C) (6) to the Exception as follows:

(B) Transformers 600 Volts, Nominal, or Less. Overcurrent protection shall be provided in accordance with Table 450.3(B).

Exception: Where the transformer is installed as a motorcontrol circuit transformer in accordance with 430.72(C) (1) through (C)~~(5)~~<u>(6)</u>.

Substantiation: To ensure the appropriate reference is made relative to the proposed modification made to companion proposal 430.72(C).

Note: See companion proposal to NEC 430.72(C).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-164 Log #3712 NEC-P09 **Final Action: Accept**
(450.3(B))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Modify 450.3 (B) by adding (C) (6) to the Exception as follows:

(B) Transformers 600 Volts, Nominal, or Less. Overcurrent protection shall be provided in accordance with Table 450.3(B).

Exception: Where the transformer is installed as a motorcontrol circuit transformer in accordance with 430.72(C) (1) through (C)~~(5)~~<u>(6)</u>.

Substantiation: To ensure the appropriate reference is made relative to the proposed modification made to companion proposal 430.72(C).

Note: See companion proposal to NEC 430.72(C).

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-165 Log #2598 NEC-P09 **Final Action: Reject**
(450.3(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

~~VOLTAGE~~ INDOOR TRANSFORMERS Transformers installed indoors ~~or enclosed~~ shall be ~~protected~~ <u>provided</u> with primary <u>overcurrent protection</u> ~~fuses~~.

Substantiation: Edit. It is not clear if "enclosed" refers to a structure or the transformer case. Table 450.3(A) doesn't restrict overcurrent protection to fuses.

Panel Meeting Action: Reject

Panel Statement: This section covers instrument voltage (potential) transformers used for metering or relaying. The proposal addresses power transformers and is not relevant to this requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-166 Log #369 NEC-P09 **Final Action: Reject**
(450.5)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise second sentence as follows:

"Such transformers shall have a continuous ~~per-phase~~ current rating <u>for each phase</u> and a continuous neutral current rating."

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Reject

Panel Statement: See committee statement on Proposal 9-27.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-167 Log #367 NEC-P09 **Final Action: Reject**
(450.5(A)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise first sentence as follows:
"An overcurrent sensing device shall be provided that will cause the main switch or common-trip overcurrent protection referred to in 450.5(A)(1) to open if the load on the autotransformer reaches or exceeds 125 percent of its continuous current on any phase ~~per-phase~~ or neutral rating."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-168 Log #368 NEC-P09 **Final Action: Reject**
(450.5(B)(2)(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise first sentence as follows:
"The overcurrent protection shall be rated or set at a current not exceeding 125 percent of the autotransformer continuous ~~per-phase~~ current rating of each phase or 42 percent of the continuous-current rating of any series-connected devices in the autotransformer neutral connection."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-169 Log #372 NEC-P09 **Final Action: Reject**
(450.6)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise second sentence as follows:
"The tie shall be permitted to consist of one or more conductors for each ~~per~~ phase or neutral."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-170 Log #370 NEC-P09 **Final Action: Reject**
(450.6(A)(2) Exception)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
"*Exception: Tie circuits comprised of multiple conductors for each ~~per~~ phase shall be permitted to be sized and protected in accordance with 450.6(A)(4).*"
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-171 Log #371 NEC-P09 **Final Action: Reject**
(450.6(A)(4))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
"Where the tie consists of more than one conductor for each ~~per~~ phase or neutral, the conductors of each phase or neutral shall comply with one of the following provisions."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See committee statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-172 Log #3788 NEC-P09 **Final Action: Reject**
(450.11)

Submitter: Steven R. Musial, II, CJL Engineering
Recommendation: Revise text to read as follows:
"Each transformer shall be provided with a name plate giving the name of the manufacturer, rated kilovolt-amperes, frequency, primary and secondary voltage, rated percent efficiency at full load, impedance..."
Substantiation: The rated efficiency at full load on the transformer secondary enables the engineer to more accurately determine the worst case full load amperes for the purpose of secondary conductor sizing and performing short circuit calculations as follows:
Examples:

$$(3\Phi \times \text{fmr})\text{FLA sec.} = \frac{\text{KVA} \times 1000}{\sqrt{3 \times \text{E sec.} \times (\%\text{Eff.}/100\%)}}$$

$$\text{Max. Short Circuit Current} = \frac{\text{FLA sec.}}{(\%\text{IZ}/100\%)}$$

Panel Meeting Action: Reject
Panel Statement: The information is available from the manufacturer and space on nameplates is limited. There is insufficient safety justification to justify a revised marking protocol for all transformer nameplates.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: The submitter's substantiation is incorrect. ANSI transformer MVA rating is secondary rating.

9-173 Log #1722 NEC-P09 **Final Action: Reject**
(450.13(B))

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text as follows:
Where the hollow space is a suspended ceiling space used for environmental air, the dry-type transformers may not be installed.
Substantiation: 300.22(C)(2) references the electrical equipment that is suitable for this air-handling space, and dry-type transformers are not included.
Panel Meeting Action: Reject
Panel Statement: 300.22(C)(2) permits "electrical equipment with a metal enclosure … unless prohibited elsewhere in this Code." Since this section (450.13) does not prohibit this installation, it can proceed in accordance with 450.13(B). This proposal is not necessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-174 Log #1685 NEC-P09 **Final Action: Reject**
(450.13(B), FPN)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text as follows:
FPN: See 300.22(C)(2) for equipment in other space used for environmental air.
Substantiation: This section covers the installation of electrical equipment with a metal enclosure or with a nonmetallic enclosure listed for the use that is suitable for this space.
Panel Meeting Action: Reject
Panel Statement: This note is not required. The installation requirements in this case are straightforward. See also the panel statement on Proposal 9-173.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-175 Log #659 NEC-P09 **Final Action: Accept in Principle in Part**
(450.14)

Submitter: Harold F. Willman, Colorado Code Consulting
Recommendation: Add new text to read as follows:
450.14 Transformer disconnecting means. Transformers shall have a disconnecting means located within sight of the transformer.
Substantiation: In larger commercial buildings and multistory buildings, many transformers have the overcurrent protection and the disconnecting means for the transformer at the main distribution center. This main distribution center is normally located on the bottom floor of the multistory building or in an electrical room of a large commercial building. Transformers are scattered throughout the building without signage on the transformer indicating the location of disconnecting means for the transformer. By installing a disconnecting means within sight of the transformer, maintenance and modification of the primary and/or secondary side of the transformer would be safer for the electricians working on the transformer. The lock out-tag out method is not always available in the main distribution center.
Panel Meeting Action: Accept in Principle in Part
CMP-9 accepts in principle the concept of a disconnect provision for transformers. CMP-9 rejects the requirement that this disconnecting means must be located within sight of the transformer.
Panel Statement: See the action on Proposal 9-176 for the final requirement that addresses the concept in this proposal that is being accepted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-176 Log #3821 NEC-P09 **Final Action: Accept in Principle**
(450.14)

Submitter: James J. Rogers, Bay State Inspectional Agency
Recommendation: Add new text to read as follows:
450.14 Disconnecting Means. Transformers other than listed class 2 or class 3 transformers shall have a disconnecting means located either in sight of the transformer or remotely provided the remote disconnect is capable of being locked in the off position. When the disconnecting means is located remote from the transformer the locking means required shall remain in place whether or not the locking means is installed.
Substantiation: Requiring a disconnecting means for a transformer is intended to enhance safety for the qualified individual that is required to work on the transformer. This is especially true in installations utilizing the requirements of 240.21(B)(3) whereby there may be several transformers in different locations all tapped from one feeder and it may be impractical to de-energize the entire feeder system to work on one of the transformers.
Panel Meeting Action: Accept in Principle
Revise the rule to read as follows: “Transformers, other than Class 2 or Class 3, shall have a disconnecting means located either in sight of the transformer or in a remote location. Where located in a remote location, the disconnecting means shall be lockable, and the location shall be field marked on the transformer.”
Panel Statement: CMP-9 has made editorial changes to avoid a run-on sentence, used “open” instead of “off” for the disconnect position in accordance with customary code usage, used “where” instead of “when” because it is a question of place and not time, and removed the listing limitation on the Class 2 and 3 transformers because it has no bearing on whether a disconnecting means needs to be installed. The lockable wording correlates with the task group results reported in Proposal 9-201.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
YOUNG, R.: The disconnecting means should be lockable in the open position whether or not the disconnecting means is mounted either within sight of the transformer or in a remote location.

9-177 Log #4235 NEC-P09 **Final Action: Reject**
(450.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
450.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: The AHJ should accept equipment unless he inspects it and identifies a specific NEC violation.

9-178 Log #4236 NEC-P09 **Final Action: Reject**
(450.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
450.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-126.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-179 Log #4237 NEC-P09 **Final Action: Reject**
(450.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
450.19 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-128.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-180 Log #4238 NEC-P09 **Final Action: Reject**
(450.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
450.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-129.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-181 Log #4239 NEC-P09 **Final Action: Reject**
(450.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
450.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 9-127.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-182 Log #4105 NEC-P09 **Final Action: Reject**
(450.26)

Submitter: Sebastien Muller, Transformer Protector Corp.
Recommendation: Revise text to read as follows:
450.26 Oil-Insulated Transformers Installed Indoors. Oil-insulated transformers installed indoors shall be installed in a vault constructed as specified in Part III of this article.
In addition, for transformers rated more than 35,000 volts, the following protections should be considered:
(1) Automatic fire suppression systems
(2) Fast tank depressurization techniques.
Substantiation: The proposal follows the one made for section 450.2 by the same author.
When a short circuit occurs in a tank not equipped by any transformer-dedicated protections, the presence of a large quantity of oil can lead to huge transformer explosions and fires even if the transformer is in a vault [6, 7]. The role of a vault is to contain the explosion, however, adding protections such as automatic fire suppression systems associated with fast tank depressurization techniques enables sharply reducing the potential damages and thus the environmental pollution, the safety risks and the costs: after an electrical fault occurrence, a relatively short maintenance is performed so that the transformer can be reenergized more quickly after the short circuit.
Thus, as mentioned in the proposal made for section 450.2 and in the attached scientific articles ([1], [2] and [3]), an efficient chain of protections to reduce the consequences of a transformer explosion consists of:
- circuit breakers that enable limiting the electrical fault time duration (as mention in section 450.3);
- a vault that surround the transformers to limit the propagation of the explosions (as mention in the current section 450.26);
- sprinklers which extinguish the induced fire;
- and a fast tank depressurization technique to prevent transformer tank rupture and the release of flammable gases.

Note that during many indoor transformers explosions, there was not enough oxygen to create a fire so the short circuits resulted in the creation of a very hot gas bubble (approximately 1000°C). After tank explosion, this bubble, which often has a diameter of more than 1 meter travels in the plant galleries and destroys all materials on its way. This incident cannot be detected by fire detectors and sprinklers. Nevertheless, this type of incident can be avoided by fast tank depressurization techniques.
It is thus proposed to add references to automatic fire suppression systems and to fast tank depressurization techniques, especially for high power transformers.
[1] G. PERIGAUD, S. MULLER, G. de BRESSY, R. BRADY, P. MAGNIER, "Contribution to the Study of Transformer Tank Rupture due to Internal Arcing: Development of a Computer Simulation Tool", IEEE PES General Meeting, Pittsburgh, USA, 2008, provided in attachment.
[2] S. MULLER, R. BRADY, G. de BRESSY, P. MAGNIER, G. PERIGAUD, "Prevention of Transformer Tank Explosion, Part 1: Experimental Tests on Large Transformers", ASME PVP08 Conference, 2008, provided in attachment.
[3] R. BRADY, S. MULLER, G. de BRESSY, P. MAGNIER, G. PERIGAUD, "Prevention of Transformer Tank Explosion, Part 2: Development and Application of a Numerical Simulation Tool", ASME PVP08 Conference, 2008, provided in attachment.
[6] Transformer explosions at Hartford Civic Center
[7] Transformer explosion at Pasadena, Texas,
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposed language "should be considered" is vague and unenforceable. Insufficient substantiation has been provided to warrant the additional language if stated as a mandatory requirement. Nothing in the Code currently precludes the use of such systems; an owner can choose such a protection system if desired.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-183 Log #4106 NEC-P09 **Final Action: Reject**
(450.27)

Submitter: Sebastien Muller, Transformer Protector Corp.
Recommendation: Revise text to read as follows:

450.27 Oil-Insulated Transformers Installed Outdoors. Combustible material, combustible buildings, and parts of buildings, fires escapes, and door and window openings shall be safeguarded from fires originating in oil-insulated transformers installed on roofs, attached to or adjacent to a building or combustible material.

In cases where the transformer installation present a fire hazard, one or more of the following safeguards shall be applied according to the degree of hazard involved:

(1) Space separations
(2) Fire-resistant barriers
(3) Automatic fire suppression systems
(4) Fast tank depressurization techniques
(5) Enclosures that confine the oil of a rupture transformer tank

Oil enclosures shall be permitted to consist of fire-resistant dikes, curbed areas or basins, or trenched filled with coarse, crushed stone. Oil enclosures shall be provided with trapped drains where the exposure and the quantity of oil involved are such that removal of oil is important.

Substantiation: The proposal follows the one made for section 450.2 by the same author.

To reduce the consequences of an electrical fault occurring in an outdoor transformer, circuit breakers enable limiting the electrical fault time duration, barriers and separations can surround the transformers to limit the propagation of the explosions while sprinklers extinguish the induced fire. But, despite all these precautions mentioned in section 450.3 or in the current 450.27 section, transformers can still explode very violently (see [4], [5]).

So, in order to complete this chain of protections, a strategy to mitigate transformer tank rupture should be considered. As shown in the attached scientific articles ([1], [2] and [3]), rupture mitigation can be obtained by a fast tank depressurization technique, as defined in the proposal related to section 450.2. Thus, during a transformer short circuit, the fast tank depressurization technique is activated within milliseconds by the first dynamic pressure peak generated by the arc, avoiding transformer explosions before static pressure increases.

Such a fast tank depressurization technique is thus an efficient complementary protection to automatic fire extinguishing systems, protective separations and enclosures in order to prevent huge transformers explosions, especially in cases where the transformer installation presents a fire hazard.

[1] G. PERIGAUD, S. MULLER, G. de BRESSY, R. BRADY, P. MAGNIER, “Contribution to the Study of Transformer Tank Rupture due to Internal Arcing: Development of a Computer Simulation Tool”, IEEE PES General Meeting, Pittsburgh, USA, 2008, provided in attachment.

[2] S. MULLER, R. BRADY, G. de BRESSY, P. MAGNIER, G. PERIGAUD, “Prevention of Transformer Tank Explosion, Part 1: Experimental Tests on Large Transformers”, ASME PVP08 Conference, 2008, provided in attachment.

[3] R. BRADY, S. MULLER, G. de BRESSY, P. MAGNIER, G. PERIGAUD, “Prevention of Transformer Tank Explosion, Part 2: Development and Application of a Numerical Simulation Tool”, ASME PVP08 Conference, 2008, provided in attachment.

[4] NFPA Fire Protection Handbook, 20th edition, Section 9 p. 188, 2008.

[5] Report on failure of 400/220kV/33kV, 315 MVA Transformer (BHEL make) at Bamnauli Substation of Dehli Transco on 11-02-2008.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: CMP-9 does not agree that there is sufficient field experience to justify the placement of this system into the list of recognized options at this time. Based on the presentation at the meeting, the system is still in the IEEE review stage. The system is available as an option in addition to the list items in 450.27(1) through (4) if owners choose to go beyond code requirements in order to increase the reliability of their systems.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-184 Log #373 NEC-P09 **Final Action: Reject**
(450.45(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

“…shall not be less than ~~1900 mm2~~ ~~(3 in.2)~~ ~~per kVA~~ 1900 mm^2 (3 $in.^2$)/kVA of transformer capacity in service…”.

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 455 — GENERATORS

13-20 Log #4230 NEC-P13 **Final Action: Reject**
(455.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:

455.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.

Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-21 Log #4231 NEC-P13 **Final Action: Reject**
(455.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:

455.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment

Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-22 Log #4232 NEC-P13 **Final Action: Reject**
(455.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
455.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-23 Log #4233 NEC-P13 **Final Action: Reject**
(455.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
455.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-24 Log #4234 NEC-P13 **Final Action: Reject**
(455.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
455.19 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-25 Log #1010 NEC-P13 **Final Action: Reject**
(455.22)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "power" to "circuits supplying".
Substantiation: Edit. A power interruption in itself will disconnect the power. Intent appears to require disconnecting means of circuit conductors.
Panel Meeting Action: Reject
Panel Statement: The proposed text would only require disconnection of multiple circuits. The phase converter may supply a single circuit to a single piece of equipment.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 460 — CAPACITORS

11-139 Log #4225 NEC-P11 **Final Action: Reject**
(460.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
460.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: The proposal limits the ability of installing and constructing electrical equipment. The authority having jurisdiction already has the authority to require listing of electrical equipment through NEC sections 90.4, 90.7, and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-140 Log #4226 NEC-P11 **Final Action: Reject**
(460.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
460.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-139.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-141 Log #4227 NEC-P11 **Final Action: Reject**
(460.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
460.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-139.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-142 Log #4228 NEC-P11 **Final Action: Reject**
(460.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
460.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-139.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-143 Log #4229 NEC-P11 **Final Action: Reject**
(460.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
460.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 11-139.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-144 Log #1004 NEC-P11 **Final Action: Reject**
(460.8(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: An identified disconnecting means shall be permitted to disconnect a capacitor or bank of capacitors as a regular operating procedure. An identified disconnecting means shall disconnect each ungrounded conductor for a capacitor or capacitor bank and shall meet the following requirements:
(`) The disconnecting means shall simultaneously open all ungrounded conductors
(2) The current rating of the disconnecting means shall not be less than 135 percent of the rated capacitor(s).
Exception: no change.
Substantiation: The disconnecting means should be identified as suitable for the use. Present (2) is incorporated into the proposal since it is permitted and not a requirement.
Panel Meeting Action: Reject
Panel Statement: The term "identified" is defined in Article 100 and relates to listings by testing agencies. Using the term in this sense would require the disconnecting means to be listed and identified by testing agencies. The panel rejects the revisions as proposed as no technical substantiation has been provided in regards to the disconnecting means.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-145 Log #2671 NEC-P11 **Final Action: Reject**
(460.10 Exception No. 2 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Exception No. 2: Capacitor cases installed on wood poles or structures for overhead line construction shall not be required to be grounded.
Substantiation: Most overhead pole line construction does not provide an equipment grounding conductor.
Panel Meeting Action: Reject
Panel Statement: The submitter refers to line construction. This section is contained in Part I of 460, which applies to 600 volts, nominal or less circuits. In these systems there is typically an equipment grounding conductor present. Therefore the present language is applicable.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-146 Log #1003 NEC-P11 **Final Action: Reject**
(460.27)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence and substitute: Capacitor cases shall be grounded by approved means. Revise exception: Capacitor cases shall not be grounded ~~connected to an equipment grounding conductor~~ where the capacitor units are supported on a structure ~~designed to~~ operating at other than ground potential.
Substantiation: Pole line construction does not usually provide an equipment grounding conductor run with circuit conductors. The grounding means should be approved as to manner, wire size and material, electrode, etc.
Panel Meeting Action: Reject
Panel Statement: The present text allows multiple methods of grounding the capacitor. The submitter's concerns are presently addressed in the existing second sentence. The existing language uses the proper terminology used throughout the code.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-147 Log #1011 NEC-P11 **Final Action: Reject**
(460.27 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: The rule states "if grounded" and does not require grounding therefore the exception which appears to exempt grounding is not needed. A support structure for capacitor cases operating at above ground potential cannot also be grounded. See exception for 470.19. Pole line construction usually doesn't include an EGC.
Panel Meeting Action: Reject
Panel Statement: The proposal indicates that the code section states "if grounded". The actual language in the code section requires grounding by the term "shall", therefore, the present exception is needed.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 470 — RESISTORS AND REACTORS

11-148 Log #4214 NEC-P11 **Final Action: Reject**
(470.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See action and panel statement on Proposal 11-149.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-149 Log #4215 NEC-P11 **Final Action: Reject**
(470.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: The proposal limits the ability of installing and constructing electrical equipment. The authority having jurisdiction already has the authority to require listing of electrical equipment through NEC sections 90.4, 90.7, and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-150 Log #4216 NEC-P11 **Final Action: Reject**
(470.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified

testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See action and panel statement on Proposal 11-149.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-151 Log #4217 NEC-P11 **Final Action: Reject**
(470.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See action and panel statement on Proposal 11-149.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-152 Log #4218 NEC-P11 **Final Action: Reject**
(470.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See action and panel statement on Proposal 11-149.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-153 Log #4219 NEC-P11 **Final Action: Reject**
(470.29)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.29 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 11-154.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-154 Log #4220 NEC-P11 **Final Action: Reject**
(470.29)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.29 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: The proposal limits the ability of installing and constructing electrical equipment. The authority having jurisdiction already has the authority to require listing of electrical equipment through NEC sections 90.4, 90.7, and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-155 Log #4221 NEC-P11 **Final Action: Reject**
(470.29)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.29 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 11-154.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-156 Log #4222 NEC-P11 **Final Action: Reject**
(470.29)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.29 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 11-154.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

11-157 Log #4223 NEC-P11 **Final Action: Reject**
(470.29)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
470.29 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See action and statement on Proposal 11-154.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 480 — STORAGE BATTERIES

13-26 Log #2850 NEC-P13 **Final Action: Reject**
(480)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
Article 480 ~~Storage~~ ~~Batteries~~ Stationary Batteries.
Substantiation: The focus of Article 480 should be on stationary battery systems that might be viewed as part of the premises wiring. The Standards Correlating Committee is requested to consider change to the title and scope of Article 480.
Per the IEEE Stationary Battery Committee/ Glossary WG:
"Storage battery" is another name for a "secondary battery," which is the preferred term.
A **secondary battery** is "an electrochemical cell that is capable of being discharged and then recharged."
A **stationary battery** is "a battery designed for service in a permanent location."
Stationary batteries are, almost without exception, secondary (or storage) batteries, but not all secondary batteries are stationary.
Secondary batteries can be portable (e.g., AAA) or stationary.

See proposals on 480.1 (scope) and 480.2: (storage battery definition.)
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, utilities, battery service organizations, battery testing companies, and consulting engineering firms. Current members at the time of this proposal include: Samuel Aguirre / FAA; Phyllis Archer / C&D Technologies ; Curtis Ashton / Qwest Communications; Gary Balash / East Penn Mfg ; Tim Bolgeo / Southern Company ; Allen Byrne / Interstate Batteries ; Thomas Carpenter / Arnold AFB ; Richard Hassick / Dekka; Dan Lambert / Schneider Electric; Daniel Levin / New York Port Authority; Ronald Marts / Telcordia; Dan McMenamin / consultant; Stephen McCluer / APC; Russell Miller / Douglas Battery; John Polenz / Emerson Electric; Chris Searles / BAE Batteries.
Panel Meeting Action: Reject
Panel Statement: The scope of the article specifies that the article applies to stationary installations of storage batteries. The key is the stationary installation, not a stationary battery or a secondary battery as alluded to in the substantiation. The article title of storage battery is correct.
The panel understands that article titles and scope statements are under the jurisdiction of the Technical Correlating Committee and any action to revise an article title or scope statement by this panel is only advisory. Additionally, the term “storage battery” is used in NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*, and acceptance of this recommendation creates a correlation problem between the NEC and that standard. CMP-13 requests the TCC to work with IEEE in developing a joint NEC/IEEE task group to work toward harmonization between terminology used in the NEC Article 480 requirements and the terminology used in IEEE standards.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-27 Log #2851 NEC-P13 **Final Action: Reject**
(480.1)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
480.1 Scope The provisions of this article shall apply to all ~~stationary installations of storage batteries~~ rechargeable batteries intended for service in a permanent location.
480.1(A) Covered:
(1) Rechargeable batteries or cells rated over 20 Ampere-hours or 50 volts nominal.
480.1(B) Not covered:
(1) portable batteries
(2) primary (non-rechargeable)batteries
(3) starting batteries
(4) motive (fork lift) batteries.
Substantiation: This proposal clarifies that Article 480 covers rechargeable batteries above a certain size. It should not cover primary batteries or small secondary batteries such as those in small, plug-in electronic systems (e.g., personal computers or desktop UPS systems), even though they be intended to stay in one place once installed.
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Reject
Panel Statement: The existing scope is more definitive than the suggested change to “rechargeable batteries intended for service in a permanent location.” The phrase “intended for service” in the NEC denotes utility supplied power and may cause confusion for the user of the NEC. While there is no argument that small batteries in a personal computer or a desktop UPS system are not covered in Article 480, there was no technical substantiation to justify the ampere-hour size or voltage change in the proposal. Referencing portable batteries, non-rechargeable batteries, starting batteries, and forklift batteries in Article 480 is unnecessary because this article only applies to stationary installations of storage batteries. Storage batteries are defined as a battery comprised of one or more rechargeable cells of the lead-acid, nickel-cadmium, or other rechargeable electrochemical types, not internal to equipment.
This Panel would appreciate it if the IEEE Stationary Battery Committee/Code Working Group would provide technical data for the suggested changes. The NEC cannot be changed without sufficient technical substantiation. Any recommendations to revise the scope are first submitted to the responsible code-making panel whose action is subject to the approval of the NEC TCC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-28 Log #2852 NEC-P13 **Final Action: Accept in Principle**
(480.2.Battery System)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Add new text to read as follows:
Battery System – A system that consists of these interconnected subsystems:
- stationary batteries;
- battery chargers
- a collection of inverters, converters, and associated electrical equipment as required for a particular application.

Substantiation: The term “battery system” is used in several places within Article 480, yet it has not been defined. The proposed definition is derived from NFPA-1 Paragraph 3.3.22, except that it is suitable for all types of batteries including (but not limited to) lead-acid batteries.
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, utilities, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Battery System. Interconnected battery subsystems consisting of storage batteries, battery chargers, inverters, converters, and associated electrical equipment.
Panel Statement: Based on the NEC Style Manual, a definition cannot use mandatory phrases (“as required for a particular application”) and cannot use the definition as part of the definitive portion (“a system”).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-29 Log #374 NEC-P13 **Final Action: Accept**
(480.2.Nominal Battery Voltage)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise Nominal Battery Voltage as shown:
“The voltage calculated on the basis of 2 volts for each ~~per~~ cell for the lead-acid type and 1.2 volts for each ~~per~~ cell for the alkali type.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-30 Log #2853 NEC-P13 **Final Action: Accept in Principle in Part**
(480.2.Nominal Battery Voltage)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
Nominal ~~Battery~~ Voltage - The voltage ~~calculated on the basis of 2 volts per cell for the lead-acid type and 1.2 volts per cell for the alkali type.~~value assigned to a cell or a battery (as opposed to its actual voltage at any given moment) for the purpose of conveniently designating its voltage as appropriate to its electrochemistry
FPN: The most common nominal cell voltages are; 2 volts per cell for the lead-acid systems, 1.2 volts per cell for alkali systems, and 4 volts per cell for Li-ion systems.
Substantiation: This proposal changes the NEC definition to be consistent with IEEE preferred definition. It clarifies that “nominal voltage” can be applied to either a cell or a complete battery. For example, a nominal 48-volt lead-acid “battery” would be made up of 24 nominal 2-volt “cells.” This proposal moves product-specific examples to a Fine Print Note (FPN).
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Accept in Principle in Part
Revise the existing definition in 480.2 to read:
Nominal Battery Voltage. The voltage calculated on the basis of 2 volts for each cell for the lead-acid type, 1.2 volts for each cell for the alkali type, and 4 volts for each cell for lithium-ion type.
Panel Statement: The panel accepts only the inclusion of the information on lithium ion batteries in the existing definition and rejects the remainder of the recommendation. The existing definition provides the user of the NEC with voltage specific levels for the battery types covered in Article 480.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-31 Log #2854 NEC-P13 **Final Action: Accept in Principle in Part**
(480.2.Sealed Cell or Battery)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
Sealed Cell ~~or Battery~~. ~~A sealed cell or battery is one:~~ One that has no provision for the routine addition of water or electrolyte or for external measurement of electrolyte specific gravity. The individual cells shall be permitted to contain a venting arrangement as described in 480.10(B).
Substantiation: A "battery" is made up of multiple "cells." The provisions for pressure relief valves apply only to the cells, not to the entire battery. The proper term for such cells is "valve-regulated."
The word "routine" is added because some recovery activities do provide a way to re-hydrate a dried out VRLA cell, even though such practice was not intended in the original design.
This proposed definition is consistent with the IEEE stationary battery committee definition -
"sealed cell: A cell that is designed not to allow release of gas to the atmosphere during normal operation. "
Valve-regulated cells, as the name implies, are technically not "sealed." Although valve regulated cells "function" as sealed cells under normal operation, they are designed with a safety mechanism to permit release of gas under excess internal pressure.
See related proposal: 480.10(B)
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, utilities, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Accept in Principle in Part
Revise the existing definition to read:
Sealed Cell or Sealed Battery. A cell or battery that has no provision for the addition of water or electrolyte or for external measurement of electrolyte specific gravity and may contain pressure relief venting.
Panel Statement: The deletion of the phrase "A sealed cell or battery is" was accepted to comply with the NEC Style Manual to not repeat the defined words in the text of the definition. "Sealed" was added to the title and to the text to indicate the definition applies to both sealed cells and sealed batteries. The "shall be permitted to" was eliminated, as well as the reference to 480.10(B), and "may" was added to conform to the NEC Style Manual to not contain mandatory text in a definition.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-32 Log #2855 NEC-P13 **Final Action: Reject**
(480.2.Storage Stationary Battery)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
~~Storage~~ Stationary Battery. A secondary battery designed for service in a permanent location, and comprised of one or more rechargeable cells. ~~of the lead-acid, nickel-cadmium, or other rechargeable electrochemical types~~. Individual cells may be contained in either single-cell or multi-cell containers.
Substantiation: See proposal on paragraph 480.
"Secondary battery," is the preferred term over "Storage battery," which is often used interchangeably but incorrectly.
Per the IEEE Stationary Battery Committee/ Glossary WG:
"Secondary battery: An electrochemical cell that is capable of being discharged and then recharged."
A "**stationary battery**" is:
"A battery designed for service in a permanent location." Stationary batteries are, almost without exception, secondary batteries.
Secondary batteries can be portable (e.g., AAA) or stationary. The focus of Article 480 is on stationary battery systems that might be viewed as part of the premises wiring.
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Reject
Panel Statement: The proposed definition uses the phrase "secondary battery" that is not defined but "storage battery" is a more common phrase than "secondary battery". The scope of the article already states that storage batteries are for stationary installations so adding "permanent location" into the definition is unnecessary. "Designed for service" is a misapplication in the NEC since the word "service" denotes utility company power. The phrase "individual cell" can only denote a single cell, not multi-cells. This panel would appreciate it if the IEEI Stationary Battery Committee/Code Working Group would provide technical data for the suggested changes. The NEC cannot be changed without sufficient technical substantiation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-33 Log #4896 NEC-P13 **Final Action: Accept in Principle**
(480.4)

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Add a fine print note as follows:
FPN: See 240.21(H) for information on the location of the overcurrent device for battery conductors.
Substantiation: To reference other code section containing information on battery conductor overcurrent protection.
Panel Meeting Action: Accept in Principle
Move the recommended fine print note to Section 480.5.
Panel Statement: This information is more appropriately located as a fine print note to Section 480.5.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-34 Log #1116 NEC-P13 **Final Action: Reject**
(480.5)

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Delete entire section 480.5 as follows:
~~**480.5 Disconnecting Means.** A disconnecting means shall be provided for all ungrounded conductors derived from a stationary battery system over 30 volts. A disconnecting means shall be readily accessible and located within sight of the battery system.~~
Substantiation: Section 480.5 should be deleted for the following reasons:
(1) The assignment of the 30 volt threshold, above which a disconnect for stationary batteries is required, is arbitrary and is in conflict with requirements elsewhere in the NEC. For example, Article 690, *Solar Photovoltaic Systems*, Sections 690.71(E) and (F) require a "disconnecting means" for battery circuits of more than 48 volts, nominal. Hence, there is a correlation issue between 690.71(E) and (F), and 480.5. Section 480.4, the directly preceding section, cites 50 volts at which an action must be taken.
(1) Section 480.5 will serve to confuse the reader or AHJ regarding the term "disconnecting means". Article 100 defines "Disconnecting Means" as "A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply". Clearly the definition implies a switch or similar device. Stationary batteries are typically connected via bolted connections; switches introduce reliability concerns.
(2) The concern for isolation of a stationary battery for shock hazard is flawed as 480.5 addresses only "all ungrounded conductors". This would not protect a technician from electrical shock hazard or from hazards associated with a ground fault while maintaining the battery system.
(3) Concern over explosive gases is invalid. Battery rooms are vented and exhausted to prevent the accumulation of explosive gas. Further, if explosive gas is a concern, a disconnect would not necessarily prevent accidental arcing or sparking during battery maintenance.
(4) Section 480.5 makes no mention of the energy level of the battery, i.e. the ampere-hour rating. Any "hazard" is directly proportional to the stored (potential) energy within the battery.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for deleting the disconnecting means requirement in 480.5. The voltage difference between 480.5 and the requirements in 690.71(E) and (F) is permitted based on 90.3 where Chapter 6 can modify or supplement the requirements in Chapters 1 through 4. Section 480.5 does not mention hazardous locations; however, lead-acid batteries can generate hydrogen, and without proper ventilation based on 480.9(A) the battery area could be a classified location. The panel action on Proposal 13-28 meets the intent of the recommendation with respect to the second paragraph of the submitter's substantiation. The new definition of "battery system" will clarify that the required disconnecting means is for the "battery system" conductors and not for individual cells or batteries.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
DEGNAN, J.: In conjunction with the panel statements on proposals 13-26, 13-28 and the text of 480.1 the panel should consider changing "stationary battery" in 480.5 to "storage battery". "Stationary" is unnecessarily redundant to 480.1. The panel should also consider acceptance in part for this proposal for applications where the addition of a disconnecting means may introduce a significant reduction in reliability, such as when a battery system is used to start a generator.

13-35 Log #2856 NEC-P13 **Final Action: Accept in Principle in Part**
(480.6)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
480.6 Insulation of Batteries ~~Not Over 250 Volts.~~
This section shall apply to stationary battery containers ~~storage batteries having cells connected so as to operate at a nominal battery voltage of not over 250 volts.~~

(A) **Vented Lead-Acid Batteries** Cells ~~and multicomparment batteries~~ (and single containers with more than one cell) with their covers sealed to containers of nonconductive ~~heat-resistant~~ material shall not require additional insulating support.

(B) Vented Alkaline-Type Batteries. Cells with covers sealed to jars of nonconductive~~, heat-resistant~~ material shall require no additional insulation support. Cells in ~~jars~~ containers of conductive material shall be installed in trays or on racks of nonconductive material with not more than 20 cells (24 volts, nominal) in the series circuit in any one tray.

~~**(C)** Rubber Jars. Cells in rubber or composition containers shall require no additional insulating support where the total nominal voltage of all cells in series does not exceed 150 volts. Where the total voltage exceeds 150 volts, batteries shall be sectionalized into groups of 150 volts or less, and each group shall have the individual cells installed in trays or on racks.~~

~~**(D)** Sealed Cells or Batteries. Sealed cells and multicompartment sealed batteries constructed of nonconductive, heat-resistant material shall not require additional insulating support. Batteries constructed of a conducting container shall have insulating support if a voltage is present between the container and ground.~~

Substantiation: (A) The term "multicompartment batteries" is not a recognized term. A "battery" consists of multiple "cells". A container can consist of one or more cells, and a battery usually consists of multiple containers. So by addressing sealing of the cells, the proposal automatically addresses the entire battery.

The term "heat-resistant" is deleted because battery materials are typically plastic that is not rated by heat resistance; they are classified by their flammability and mechanical ratings.

(B) The term "heat-resistant" is deleted because battery materials are typically plastic and are classified by their flammability and mechanical ratings.

The term "jar" is a slang term. The preferred term is "container."

We are aware of no technology that permits cells to be installed in containers made of conductive material. However, there are containers that are steel encased. We are not sure of the intent of this section, what problem it attempts to solve, or how the existing language mitigates the problem. We request that the panel consider deleting the final sentence. ~~Cells in jars of conductive material shall be installed in trays of nonconductive material with not more than 20 cells (24 volts, nominal) in the series circuit in any one tray.~~

(C) Delete this requirement. Rubber or composition containers are no longer available.

(D) The requirements for insulation of cells & batteries of conductive material are already covered in 480.6 (A) & (B).

There are no known batteries manufactured with containers of conductive material.

The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, utilities, battery service organizations, battery testing companies, and consulting engineering firms.

Panel Meeting Action: Accept in Principle in Part
The panel accepts the deletion of the term "multi-compartment" and replacing it with "multi-cell" to read as follows:

(A) Vented Lead-Acid Batteries. Cells and multi-cell batteries with covers sealed to containers of nonconductive, heat-resistant material shall not require additional insulating support.

The panel rejects the remainder of the recommendation.

Panel Statement: By deleting "not over 250 volts," this section could apply to unlimited voltage cells. There was no technical substantiation provided for deleting "not over 250 volts." The existing text in 480.6(A) concerning "heat-resistant" battery containers is retained since the intent is to require the battery containers to be manufactured from a material that will withstand a level of heat without distortion, warping, or leaking and does not allude to flammability rating. The term "jar" and "container" are interchangeable and the electrical industry is familiar with the term "jar" and these jars can be hard rubber or glass but also can be nickel-plated steel containers. The submitter has stated that rubber or composition battery containers are not available but does not provide any information whether there are existing rubber or composition systems still in use so deletion of the text must not be done until this issue can be determined from a study or a technical review.

The submitter stated that the reason for deleting 480.6(D) was that there are no known batteries manufactured with containers of conductive material but states in (B) of the substantiation that there are containers that are steel encased. These two statements are in conflict with each other so the text in 480.6(D) should not be deleted until the submitter provides more technical substantiation. Deleting existing text in the NEC must be based on technical substantiation, not just based on perception that something is not "available" anymore.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-36 Log #2857 NEC-P13 **Final Action: Reject**
(480.7)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Delete the following text:
~~**480.7 Insulation of Batteries Over 250 Volts.**~~
~~The provisions of 480.6 shall apply to storage batteries having the cells connected so as to operate at a nominal voltage exceeding 250 volts, and, in addition, the provisions of this section shall also apply to such batteries. Cells shall be installed in groups having a total nominal voltage of not over 250 volts. Insulation, which can be air, shall be provided between groups and shall have a minimum separation between live battery parts of opposite polarity of 50 mm (2 in.) for battery voltages not exceeding 600 volts.~~

Substantiation: DELETE 480.7

The intent of this requirement is not clear. There is no evidence that the separation or insulating material required by this section creates any safety benefit.

For example, let's say we have a nominal 480 volt battery consisting of (240) two-volt cells. The voltage or fault potential between cells 125 and 126 will not change just because we have added a 2" separation. It only increases the cost and complexity of installation and introduces failure points. The voltage on all cells past the mid-point will still be higher than 250 volts. The voltage at the end of the string will still be 480 volts.

The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, battery service organizations, battery testing companies, and consulting engineering firms.

Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided for deleting this text. The substantiation states the submitter does not understand the intent of this requirement and that there is no safety benefit. This simple statement is not a technical reason for deleting existing text.

This Panel would appreciate it if the IEEI Stationary Battery Committee/Code Working Group would provide technical data for the suggested changes. The NEC cannot be changed without sufficient technical substantiation.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-37 Log #3765 NEC-P13 **Final Action: Reject**
(480.9)

Submitter: Bobby J. Summerville, Metropolitan Atlanta Transit Consultants
Recommendation: Add:

FPN: For large installations requiring ventilation see Article 500.5 Classification of Locations (B) Class I Locations (2) Class I, Division 2 (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation and which might become hazardous through failure or abnormal operation of the ventilating equipment, or

Substantiation: Article 500.5 (B)(2) is clear, but much misunderstanding is caused by a FPN to the NEC Handbook which states that ventilating battery rooms eliminates the need to classify these areas. I have provided articles for more information.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided by the proposal for the recommended fine print note. With proper ventilation provided and/or a combustible gas detection system installed that would activate a mechanical ventilation limiting the hydrogen level to no more than 25 percent of the lower flammable limit, a hazardous (classified) location can be avoided. There are also batteries available that can be installed that have self-containment of gases and do not constitute a hazard of gas ignition.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-38 Log #2858 NEC-P13 **Final Action: Reject**
(480.9(A))

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
480.9 Battery Locations.
(A) Ventilation. Provisions appropriate to the battery technology shall be made for sufficient diffusion and ventilation of ~~the~~ any gases from the battery to prevent the accumulation of an explosive mixture.

Add new text as follows:

FPN: See IEEE / ASHRAE Std 1635, *Guide for the Ventilation and Thermal Management of Stationary Battery Installations.*
Substantiation: Some battery technologies do not require ventilation greater than that required for human habitation.
A new FPN references a new standard, created jointly by the Stationary Battery Committee of the Institute of Electrical and Electronics Engineers (IEEE) and the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE), which provides guidelines for calculating gassing hazards on battery systems.
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Reject
Panel Statement: The existing text already provides the requirement for ventilation to keep the accumulation of gases to an appropriate level. The battery technology used in the installation would determine the amount of ventilation necessary to keep the accumulation of gases to 25 percent of the lower flammable limit based on Article 500 of the NEC. The referenced standard is not available from IEEE, ASHRAE, or ANSI. If the standard is to be referenced in a fine print note the panel needs verification that it can be obtained.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-39 Log #3904 NEC-P13 **Final Action: Reject**
(480.9(A), FPN (New))

Submitter: Bobby J. Summerville, Metropolitan Atlanta Transit Consultants
Recommendation: Add:
FPN: For large installations requiring ventilation see 500.5 Classification of Locations (B) Class I Locations (2) Class I, Division 2 (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation and which might become hazardous through failure or abnormal operation of the ventilating equipment.
Substantiation: 500.5(B)(2) is clear, but much misunderstanding is caused by a FPN to the NEC Handbook, 480.9 Battery Locations (A) Ventilation, which states that ventilating battery rooms eliminates the need to classify these areas. Please refer to the articles I have provided for more information.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-37.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-40 Log #1008 NEC-P13 **Final Action: Reject**
(480.9(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~Guarding of~~ Live parts shall ~~comply with 110.27~~ not be exposed where accessible to other than qualified persons.
Substantiation: This article applies to stationary installations which generally involve industrial or commercial occupancies. Banks of batteries at 50 volts or less can provide substantial arcing current and shock hazard under certain conditions.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation to indicate there have been specific safety related problems in systems under 50 volts. The recommendation is based on supposition and does not provide documentation that the current requirement is inadequate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-41 Log #2859 NEC-P13 **Final Action: Reject**
(480.10)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
480.10 Vents.
(A) Vented Cells. Each vented cell shall be equipped with a flame arrester that is designed to prevent destruction of the cell due to ignition of gases within the cell by an external spark or flame under normal operating conditions.
(B) Sealed Cells Sealed cells shall comply with (B)(1) or (B)(2).
(1) Sealed ~~battery or~~ cells ~~shall be~~ equipped with a pressure-release vent to prevent excessive accumulation of gas pressure shall be permitted.
(2) Sealed cells or batteries without pressure-release vents ~~or the battery or cell~~ shall be designed to ~~prevent~~ minimize scatter of cell parts in event of a cell explosion.
Substantiation: (B) A "battery" is made up of multiple "cells." The provisions for pressure relief valves apply only to the cells, not to the entire battery. The proper term for such cells is "valve-regulated."
Cells that have no mechanism for release of gas are truly "sealed." Explosions in sealed stationary batteries are extremely rare, but let's assume that such an event could occur (typically as a result of being consumed by fire, puncture, or a severe short circuit). Some stationary batteries, such as lithium-ion, might be (but typically are not) encased in an enclosure which could mitigate the consequences of an explosion, but cannot prevent the spread of debris altogether in all circumstances.
The IEEE Stationary Battery Committee/Codes Working Group is made up of members who are battery manufacturers, battery integrators, battery users, utilities, battery service organizations, battery testing companies, and consulting engineering firms.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient technical substantiation to support a significant reduction in the level of safety provided by the current wording. The existing text in 480.10(B) requires a pressure-release vent for sealed batteries or sealed cells while the proposed text in (B)(1) makes it permissive, not mandatory. Where a pressure-release vent is not installed, the sealed batteries or sealed cells must be designed to prevent the scatter of cell parts. This design would normally require an enclosure that would surround the sealed battery or sealed cell. This would prevent scatter of parts, not just minimize the scatter. The recommended reorganization of 480.10(B) does not improve the clarity of this section.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-42 Log #4209 NEC-P13 **Final Action: Reject**
(480.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
480.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-43 Log #4210 NEC-P13 **Final Action: Reject**
(480.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
480.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-44 Log #4211 NEC-P13 **Final Action: Reject**
(480.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
480.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-45 Log #4212 NEC-P13 **Final Action: Reject**
(480.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
480.19 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-46 Log #4213 NEC-P13 **Final Action: Reject**
(480.19)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
480.19 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-8.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 490 — EQUIPMENT, OVER 600 VOLTS, NOMINAL

9-185 Log #4763 NEC-P09 **Final Action: Reject**
(490.2.High Voltage)

Submitter: Steven Bruno, Sabic Industrial Plastics
Recommendation: Add new text to read as follows:
Put high voltage and medium voltage in definitions for clarity because I consider medium voltage of 2001 to be high voltage.
A companion proposal has been sent to CMP 7 for 328.2.
Substantiation: Article 328 and Article 490 are confusing to the electrical industry.
Panel Meeting Action: Reject
Panel Statement: Submitter failed to provide suggested text for recommended change. The terms “high voltage” and “medium voltage” are used in many US and international standards, but the definitions of these terms are inconsistent within these standards. Defining these terms in NFPA 70 will merely add another set of definitions to the wide array of definitions already in existence. Currently, 490.2 defines high voltage as more than 600 V, nominal. For the purposes of the requirements in NFPA 70, this definition is adequate, since “over 600 volt” installations, such as “medium voltage” and “high voltage” systems, are treated similarly throughout the NEC with respect to installation requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-186 Log #1977 NEC-P09 **Final Action: Accept in Principle**
(490.2.Low Voltage (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal regarding “600 volts, and below” to what is more commonly used in the Code “600 volts, nominal, or less”.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Add definition: LOW VOLTAGE. For the purpose of this Article, 600 volts, nominal, or less.
Substantiation: There should be a definition of low voltage as pertaining to this article in 490.33 and 490.35.
Panel Meeting Action: Accept in Principle
Do not insert the proposed definition. In 490.33 retitle the section to read “Guarding of Energized Parts Operating at 600 Volts and Below Within Compartments.” In 490.35(B), revise as follows: “(B) Control Equipment. Where operating at 600 volts and below, control equipment, relays, … (remainder as in the present NEC).
Panel Statement: CMP-9 does not want to introduce the concept of a defined term “low voltage” because it would raise the low, medium, and high voltage definition problem that prompted the rejection of Proposal 9-1. This rewording eliminates the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-187 Log #375 NEC-P09 **Final Action: Reject**
(490.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
“Installation of electrical equipment, other than transformers covered in Article 450, containing more than 38 L (10 gal) of flammable oil in each ~~per~~ unit shall meet the requirements of Parts II and III of Article 450.”
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-27.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-188 Log #4204 NEC-P09 **Final Action: Reject**
(490.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
490.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer’s self-evaluation or an owner’s engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-125.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-189 Log #4205 NEC-P09 **Final Action: Reject**
(490.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
490.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV’s, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of Standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-127.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-190 Log #4206 NEC-P09 **Final Action: Reject**
(490.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
490.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-129.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-191 Log #4207 NEC-P09 **Final Action: Reject**
(490.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
490.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-128.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-192 Log #4208 NEC-P09 **Final Action: Reject**
(490.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
490.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-126.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BREITKREUTZ, B.: See my Comment on Affirmative on Proposal 9-177 (Log #4235).

9-193 Log #3351 NEC-P09 **Final Action: Accept in Part**
(490.21(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(A)(1)(b) circuit breakers used to control-filled transformers in a vault shall be located in the vault or ~~be capable of~~ have identified means of operation from outside the vault.
(2)(1) An accessible mechanical or other ~~approved~~ identified means for manual tripping independent of control power.
(2)(3) If ~~capable of~~ having identified means ~~of~~ for being opened or closed manually while energized, main contacts that operate independently of the speed of the manual operation.
(2)(5) ~~A~~ An approved means of indicating the open and closed position of the breaker at the breaker and at the point(s) from which it ~~may~~ can be operated.
Add (2)(6): Where more than one circuit breaker is installed to provide for alternate connection to deferent supply conductors each circuit breaker shall be mechanically or electrically interlocked to prevent more than one circuit breaker from being closed at the same time. A prominent and durable sign shall be provided on or immediately adjacent to each circuit breaker with the following words or equivalent: WARNING Load side terminals may be energized by backfeed.
Substantiation: Edit. "Approved" is not necessarily the same as "identified". "Capable" is not specific.
Proposed (6) is similar to 404.6(C) exception for knife switches and 490.2(E).
Panel Meeting Action: Accept in Part
Accept the insertion of the words "in a vault" after the words "control oil-filled transformers" in 490.21(A)(1)(b). Accept the change in 490.21(A)(2)(1). Reject all other parts of the proposal.
Panel Statement: In 490.21(A)(1)(b) the change from "be capable of" is rejected because the proposed text is no clearer and the method may or may not meet the definition of "identified" in Article 100. In 490.21(A)(2)(3) the changes are rejected because the capability of the operating means can be determined at the time of inspections, such as by reviewing whether there is a stored energy mechanical operating mechanism that functions independently of the speed of the manual operator. The change in 490.21(A)(2)(5) is rejected because the type of indication, if any, can be easily determined at the time of inspection and no increased standard of product acceptance is required. The additional provision 490.21(A)(2)(6) is rejected because the ability to close multiple breakers at the same time is technically justified. The parallel wording to comparable applications operating at 600 volts and below is not correct, and the existence of such a requirement for lower voltages is insufficient substantiation to justify this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-194 Log #1007 NEC-P09 **Final Action: Reject**
(490.21(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second paragraph: Where more than one switch or circuit breaker is installed with interconnected load terminals to provide for alternate connection to different supply conductors, the switches and circuit breakers shall be mechanically or electrically interlocked to prevent simultaneous, closing of more than one switch or circuit breaker and each switch and circuit breaker shall be provided with a conspicuous durable sign identifying ~~this hazard~~ the presence of more than one source of supply.
Substantiation: The exception for 490.21(B)(7) for fuses is appropriate for this section. Proposed wording for the sign is more specific than "identifying the hazard".
Panel Meeting Action: Reject
Panel Statement: The substantiation cites an exception dealing with access, not system design. No justification was provided to add circuit breakers to this section, which addresses load interrupters. The ability to close multiple load interrupter switches at the same time is technically justified.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-195 Log #1781 NEC-P09 **Final Action: Reject**
(490.21(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise heading and last sentence: LOAD INTERRUPTERS and CIRCUIT BREAKERS. Where more than one switch or circuit breaker or combination of both is installed with interconnected load terminals to provide for alternate connections to different supply conductors each switch and circuit breaker shall be provided with an interlock(s) to prevent more than the switch or circuit breaker being closed at the same time. A durable and conspicuous sign on the exterior front of each switch and circuit breaker indicating load terminals may be energized in the open (off) position.
Substantiation: Circuit breakers used for this function should be included. A sign alone is not sufficient to prevent a potential hazard.
Panel Meeting Action: Reject
Panel Statement: No justification was provided to add circuit breakers to this section, which addresses load interrupters. The ability to close multiple load interrupter switches at the same time is technically justified. The additional sign requirements are not necessary to deal with the hazard.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-196 Log #1006 NEC-P09 **Final Action: Accept in Principle in Part**
(490.22)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by providing specific text on "designed for the purpose" in the last sentence of this section.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Means shall be provided to completely isolate an item of equipment from supply conductors, including grounded conductors.
Substantiation: Complete isolation includes disconnection of grounded conductors and should be clearly indicated.
Panel Meeting Action: Accept in Principle in Part
Accept the principle that the concept of complete isolation should be clarified.
Reject the solution offered because it is diametrically opposite to the intent.
Revise 490.22 as follows:
490.22 Isolating Means.
Means shall be provided to completely isolate an item of equipment from all ungrounded conductors. The use of isolating switches shall not be required where there are other ways of de-energizing the equipment for inspection and repairs, such as draw-out-type metal-enclosed switchgear units and removable truck panels.
Isolating switches not interlocked with an approved circuit-interrupting device shall be provided with a sign warning against opening them under load.
A fuseholder and fuse, designed for the purpose, shall be permitted as an isolating switch.
Panel Statement: The intent of this section is to isolate equipment from ungrounded conductors. Isolation from a grounded conductor is not required. CMP-9 has clarified the text accordingly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-197 Log #657 NEC-P09 **Final Action: Accept in Principle**
(Table 490.24)

Submitter: David L. Hittinger, IEC of Greater Cincinnati
Recommendation: In the heading of Table 490.24 the following text "Impulse Withstand, B. I. L" is used. B. I. L is an abbreviation that is not defined. Please define the abbreviation.
Substantiation: Users of the Code may not know what this abbreviation means. The NFPA Manual of Style provides guidance on the use of acronyms and abbreviations as found in 3.2.5.1.1. All acronyms and any abbreviations that are not in common use shall be spelled out with the acronym or abbreviation following in parentheses for the first use of the term in the document.
This may have been extracted material from the NESC. The term is used frequently in that Code as basic impulse insulation level or BIL.
Panel Meeting Action: Accept in Principle
Add a third line to the column header between "Impulse Withstand" and "B.I.L. (kV)" reading as follows: "Basic Impulse Level".
Panel Statement: This provides the reference required by the NFPA Style Manual. The definition of this term can be found in engineering handbooks and need not be actually explained in the NEC.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-198 Log #647 NEC-P09 **Final Action: Reject**
(Table 490.24, Note 2)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
For approach boundaries to live parts for shock protection, see NFPA 70E, Standard for Electrical Safety in the Workplace.
Substantiation: The approach boundaries of NFPA 70E, Table 130.2(E), are related to the minimum clearances referenced in Table 490.24 and this information will be helpful in understanding this relationship.
Panel Meeting Action: Reject
Panel Statement: This information might be appropriate to include in NFPA handbooks both on the NEC and also on 70E but does not belong in the NEC itself. The referenced note is not a fine print note; rather it is mandatory text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-198a Log #4314 NEC-P09 **Final Action: Accept in Principle in Part**
(490.40)

Submitter: Tim Rohrer, IRISS, Inc.
Recommendation: Revise text as follows:
430.40 Inspection Windows.
(A) Visual Inspection Windows. Windows intended for inspection of disconnecting switches or other devices shall be of a suitable transparent material.
(B) Infrared Inspection Windows. Windows intended for use with an infrared camera or imager to facilitate thermographic inspection of energized conductors and circuit parts of electrical equipment while keeping panel covers and doors closed, shall utilize materials which will maintain a stable and reasonably unchanging infrared transmission rate.
Substantiation: The assumed intent of the current requirement for an "Inspection Windows" to "be of suitable transparent material" is to ensure that the functionality of this critical feature of switchgear is not compromised, so that users are able to perform important visual inspections (as per 70E lockout/tagout requirements, etc). If a manufacturer or installer were to utilize a material in the visual inspection window which either provided poor transparency on day 1 or if the material's transparency degraded over a period of a few years, that material would by definition interfere with the safe and proper use of that equipment since the intended use of the inspection window would be compromised.
Just as the functional performance of a visual inspection window is critical to verification and troubleshooting of high-voltage gear, the functional performance of an infrared window is equally important to verification and troubleshooting of high voltage electrical equipment. Therefore if a manufacturer of high-voltage equipment will be including infrared windows on that equipment it is important that the infrared inspection window functions as reliably as the visual inspection window. Ie. the infrared inspection window should be able to transmit the infrared wavelengths in a consistent manner so the window itself does not compromise the thermographic inspection which could thereby lead to unsafe use of the equipment.
Infrared thermography as a troubleshooting tool is valued by NFPA as is evidenced in the many references to using thermography in the 70B Electrical Preventive Maintenance Standard. In fact, 70B section 20.17 goes into great detail with regard to the use of infrared thermography. Section 20.17.5.6 refers practitioners to the NETA temperature benchmarks which prescribe a course of action based on temperature differences. For example:
· Temperature difference of 1° to 3°C indicates a possible deficiency and warrants investigation

· Temperature differences of 4° to 15°C indicates a deficiency; repairs should be made as time permits

· Temperature differences of 16°C and above indicates a major deficiency; repairs should be made immediately

Obviously NFPA and NETA both see the importance of accurate temperature calculations to prescribe a course of action based on the condition of the equipment in question. This is similar to the importance which an accurate visual inspection would provide relative to inspecting whether or not a switch or contact was successfully disconnected prior to opening a panel cover or cabinet door.

Unfortunately, infrared windows pose a unique issue: whereas a user would be able to ascertain the condition of a visual inspection panel simply by looking through it (so that the user would understand that if visibility was restricted, additional care should be taken), the same cannot be said for an infrared window. Instead, the transmission rate (the ability of infrared wavelengths to pass through a material) of an infrared window cannot be determined simply by "looking through" the material with an infrared imager in practical field use. Therefore a thermographer could assume his transmission rate to be one value, he would calibrate his camera or software to compensate for that value, but if the transmission rate is actually a different value, then the temperature calculations will be wrong. As a result, an apparent difference in temperature of 7°C could be a real difference in temperature of 18°C if the window material was transmitting at less than the thermographer expected. The result of this error could cause a company to delay the repairs which are actually in urgent need.

The transmission rate in the visual light spectrum is what NFPA is referring to as suitably transparent. The transmission rate for an infrared window in the infrared spectrum is a similar issue with more significant consequences. The reality is that there are many optic materials which will maintain a stable transmission rate, while there are some others which will experience degradation in the transmission rate. Therefore, equipment manufacturers must utilize materials that will support the intended use of the inspection window.

Panel Meeting Action: Accept in Principle in Part

Accept the proposed revision to the title of 490.40 and reject the proposed 490.40(B) as follows:

490.40 <u>Visual</u> Inspection Windows.

Windows intended for <u>visual</u> inspection of disconnecting switches or other devices shall be of suitable transparent material.

Panel Statement: CMP-9 has clarified the intended application of this section. Windows that are transparent in the infrared spectrum are available as a design option.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-199 Log #4629 NEC-P09 **Final Action: Accept in Principle**
(490.41)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Provide wording following the section title to clarify the intended application and organization of the section, as follows:

Location of Industrial Control Equipment. Routinely operated industrial control equipment shall meet the requirements of (A) unless infrequently operated, as covered in (B).

(A) Control and Instrument Transfer Switch Handles or Pushbuttons. Control and instrument transfer switch handles or pushbuttons shall be in a readily accessible location at an elevation of not over 2.0 m (6 ft 7 in.).

Exception (unchanged from 2008 NEC)

(B) Infrequently Operated Devices. (unchanged from 2008 NEC)

Substantiation: This wording is more clear as to the intended application of this rule, and better structured. This proposal will also afford CMP 9 the opportunity to discuss whether further modifications are appropriate relative to permitted mounting heights in 490.41(B), which was the topic at a UL discussion relative to whether 404.8(A) limits apply in this section.

The issue of 490.41(B) is an interesting one, because it is an example of inadvertent outcomes when material moves from Chapter 7 to Chapter 4. Of course, this material was 710-24(I) Exception No. 2 and automatically modified what was then 380-8(a) through the operation of 90-3. The issue gets even murkier, however, because when it was an exception, it was an exception to what is now 490.41(A), and therefore only applied to equipment covered in (A). The title has changed, but the content of this subsection reads exactly the way it did prior to the Article 710 diaspora.

The current wording follows the action on the submitter's editorial Comment 13-54 in the 1999 cycle. In particular, the equipment covered in (B) that is proposed to be exempt from the vertical height limit must still be, as was the case prior to the 1999 NEC, "control and instrument transfer switchhandles or pushbuttons." To say otherwise would require the insertion of parent text in 490.41 that sets forth which subsection applies when. This proposal clarifies this question by its minor rarrangement of the material.

This leads to the question whether an isolating switch for a motor power circuit qualifies in the category of "control... switch handles". There is a jurisdictional problem, however, because this happens to be about medium-voltage motor equipment. Through the scope of Article 430, CMP 11 has exclusive jurisdiction over this equipment, in Parts VIII and XI of that article.

On the merits, this submitter is somewhat uncomfortable saying any isolating switch is "infrequently operated" in this context, because with the exception of an actual medium-voltage motor controller, almost no medium voltage equipment of is frequently operated in the way one usually thinks that phrasing describes. For example, during the submitter's tenure as the head electrician at a college, medium-voltage sectionalizing switches in the campus distributions would be operated perhaps once in five years, typically when an underground cable fault necessitated isolation of the faulted section and the reverse feeding of the remaining loads.

Every five years is, presumably, infrequent, but do we then reach the conclusion that any medium-voltage equipment, excepting only equipment handles requiring over 50 lbs of force to operate [see 490.41(A) Exception)], gets the height exception? This would seem counterintuitive. This section must be read in the context of 490.41(A), which does not suggest a general application to most across-the-line devices. Note that the "bus transfer switches" covered in 490.41(B) seem philosophically consistent with the busway switches covered in 404.8(A) Exception No. 1, so not much of a problem there. This proposal will provide a vehicle for more feedback from industrial users of this equipment.

Panel Meeting Action: Accept in Principle

Accept 490.41 as organized in this proposal, but the wording of (B) will be as accepted in Proposal 9-200.

Panel Statement: This will correlate with Proposal 9-200 and still meet the intent of the submitter.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-200 Log #1159 NEC-P09 **Final Action: Accept in Principle**
(490.41(B))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise text to read as follows:

(B) Infrequently Operated Devices. <u>If the</u> ~~O~~operating handles for ~~infrequently operated devices~~ such <u>devices</u> as drawout fuses, fused potential or control transformers and their primary disconnects, and bus transfer <u>and isolating</u> switches~~,~~ <u>are only operated infrequently, the handles</u> shall be permitted to be located where they are safely operable and serviceable from a portable platform.

Substantiation: Isolating switches of the type used in controllers over 600V are intended to isolate the controller for the purposes of maintenance and service after the load has been interrupted by a switching device (i.e. contactor). In most applications, these switches are infrequently operated. Isolating switches are, however. not specifically mentioned in the "such as" list of devices in 490.41(B), prompting some AHJ's to interpret that the 2.0 m maximum handle height of 404.8(A) applies. The purpose of this proposal is to clarify the applicability of 490.41(B) to isolating switches.

Note: See companion proposal to 404.8(A).

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(B) Infrequently Operated Devices. <u>Where</u> ~~O~~operating handles for ~~infrequently operated devices~~ such <u>devices</u> as drawout fuses, fused potential or control transformers and their primary disconnects, and bus transfer <u>and isolating</u> switches~~,~~ <u>are only operated infrequently, the handles</u> shall be permitted to be located where they are safely operable and serviceable from a portable platform.

Panel Statement: The panel action corrects a violation of the NEC Style Manual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

9-201 Log #1568 NEC-P09 **Final Action: Accept**
(490.44(C))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by Code-Making Panel 9 based upon the action of Code-Making Panel 1 taken on Proposal 1-63.

This action will be considered by the panel as a public comment.

Submitter: Stanley J. Folz, Henderson, NV

Recommendation: Revise text to read as follows:

(C) Switching Mechanism. The switching mechanism shall be arranged to be operated from a location outside the enclosure where the operator is not exposed to energized parts and shall be arranged to open all ungrounded conductors of the circuit simultaneously with one operation. Switches shall be <u>**a lockable disconnecting means.**</u> ~~capable of being locked in the open position. The provisions for locking shall remain in place with or without the lock installed.~~

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-202 Log #3414 NEC-P09 **Final Action: Accept**
(490.47)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
490.47 Metal-Enclosed and Metal-Clad Service Equipment. Metal-enclosed and metal-clad switchgear installed as high-voltage service equipment shall include a ground bus for the connection of service-entrance cable shields and to facilitate the attachment of safety grounds for personnel protection. This bus shall be extended into the compartment where the service-entrance conductors are terminated.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-203 Log #1793 NEC-P09 **Final Action: Reject**
(490.48 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: 490.48 INTERLOCKED CIRCUIT BREAKERS. Where more than one circuit breaker is installed with interconnected load terminals to provide for alternate connection to different supply circuits, the circuit breakers shall be mechanically or electrically interlocked, or both, to prevent closing of more than one circuit breaker. Each circuit breaker shall be posted with a durable conspicuous sign indicating the presence of more than one source of voltage.
Substantiation: A provision similar to 490.21(E) is appropriate.
Panel Meeting Action: Reject
Panel Statement: The ability to close multiple circuit breakers at the same time is technically justified.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-204 Log #1780 NEC-P09 **Final Action: Reject**
(490.51(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: ~~Adequate~~ Identified enclosures, guarding, or location shall be provided to protect portable and mobile equipment ~~from~~ where likely to be subject to physical damage or deteriorating agents.
Substantiation: Protective measures should be suitable for the use and also provide protection from damage other than “physical”. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: No substantiation was provided to require identified enclosures. All portable and mobile equipment is subject to physical damage. The proposed requirements are not practicable.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-205 Log #714 NEC-P09 **Final Action: Reject**
(490.53)

Submitter: Joe Tedesco, Boston, MA
Recommendation: New FPN: NFPA 70E-2009, Standard for Electrical Safety in the Workplace, covers arc flash hazard analysis, 130.3.
Substantiation: NFPA 70E does not require signs reading: “DANGER HIGH VOLTAGE KEEP OUT”.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-94.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-206 Log #715 NEC-P09 **Final Action: Reject**
(490.55)

Submitter: Joe Tedesco, Boston, MA
Recommendation: Insert new FPN: NFPA 70E-2009, Standard for Electrical Safety in the Workplace, covers arc flash hazard analysis, 130.3.
Substantiation: NFPA 70E does not require signs reading: “DANGER HIGH VOLTAGE KEEP OUT”.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 9-94.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

9-207 Log #1779 NEC-P09 **Final Action: Accept**
(490.74)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change heading to “Bonding”.
Substantiation: Edit. This section relates to bonding.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 500 — HAZARDOUS (CLASSIFIED) LOCATIONS, CLASSES I, II, AND III DIVISIONS 1 AND 2

14-6a Log #CP1400 NEC-P14 **Final Action: Reject**
(Articles 500 through 516)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as “Reject” since it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced NFPA documents.
Submitter: Code-Making Panel 14,
Recommendation: In the Fine Print Notes (FPNs) appearing in Articles 500 through 506, 510, 511, 513, 514, 515, and 516, delete all publication and revision dates for referenced documents.
Substantiation: Fine print notes are intended for reference only. This action correlates with Annex A of the Code, which does not include publication dates.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BATTA, JR., D.: This proposal should be rejected. Revision dates and publication dates provide information to the user to direct the user to the applicable document. The lack of a date citation could lead to the use of out-of-date or non-applicable documents. Also, the date citation is necessary for extracted text references.

In the July 2004 edition of the "Manual of Style for NFPA Technical Committee Documents", rule 2.4.1.4.4 for Nonmandatory Documents states that "All reference listings in Chapter 2 shall contain complete reference information [i.e., document number (if applicable), document title, and date of publication (if applicable)]". The date citation for references in fine print notes should be retained.

14-7 Log #4424 NEC-P14 **Final Action: Accept**
(500.2)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since removal of the publication dates violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Dusttight FPN, Hermetically Sealed FPN, Nonincendive Circuit FPN, Nonincendive Component FPN, Nonincendive Equipment FPN, Nonincendive Equipment, and Nonincendive Field Wiring Apparatus FPN: Change ANSI/ISA-12.12.01-2000, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations* to ANSI/ISA-12.12.01-2007, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*
Electrical and Electronic Equipment FPN: Change ISA-RP12.12.03-2002, *Portable Electronic Products Suitable for Use in Class I and II, Division 2, Class I Zone 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations* to ISA-RP12.12.03-2002, *Recommended Practice for Portable Electronic Products Suitable for Use in Class I and II, Division 2, Class I Zone 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the titles of the referenced documents.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-8 Log #4438 NEC-P14 **Final Action: Accept**
(500.2)

TCC Action: The Technical Correlating Committee directs that the number, title and edition of the document from which this extract is taken be listed at the end of the extract in accordance with NEC Style Manual 4.3.2.3.
This action will be considered by the panel as a public comment.
Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
<u>**Combustible dust.** Any finely divided solid material that is 420 microns (0.017 in) or smaller in diameter (material passing a U.S. No. 40 Standard Sieve) and presents a fire or explosion hazard when dispersed and ignited in air.</u>
Substantiation: This definition is extracted from NFPA 499. The definition for combustible dust has been changed in a number of other NFPA documents. This change eliminates the dust size and creates confusion with the NEC and NFPA 499 considerations of a dust. For example, in NFPA 654, a combustible dust is now defined as: "Combustible Dust. A combustible particulate solid that presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape." Inclusion of the proper historic definition for combustible dust upon which these NEC Articles and NFPA 499 are based will retain this important term without adding confusion.
Panel Meeting Action: Accept
Panel Statement: See panel action on Proposal 14-9.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
OFFERDAHL, D.: The definition of combustible dust is covered in NFPA 499 which is reference in 500.4 (B). The classification of the area should be determined by professionals using NFPA 499. Once that is completed it is required to be documented in accordance with 500.4 (A) This process take place before the inspector or electrician gets involved. Placing the definition in 500.2 could create confusion that there is enough information that the electrician or inspector can classify the area. In result placing undue pressure from the user to have the area classify as a class 2 area or even worse to unclassified the area. If accepted at all, this proposal should be placed in 500.5c as a fine print note. Placing the definition as a fine print note would achieve the recommendations that submitter proposes. In addition enforces the fact that the responsibly of classification of the area is the responsibly of the owner or user.

14-9 Log #4311 NEC-P14 **Final Action: Accept**
(500.2.Combustible Dust)

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add the following new definition under 500.2:
<u>Combustible Dust. Any finely divided solid material that is 420 microns (0.017 in.) or smaller in diameter (material passing a U.S. No. 40 Standard Sieve) and presents a fire or explosion hazard when dispersed and ignited in air.</u>
Substantiation: For many different reasons, the definition for combustible dust has been changed in a number of other NFPA documents. This change eliminates the dust size and creates confusion with the NEC and NFPA 499 considerations of a dust. For example, in NFPA 654, a combustible dust is now defined as "Combustible Dust. A combustible particulate solid the presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape." Inclusion of the proper historic definition for combustible dust upon which these NEC Articles and NFPA 499 are based will retain this important term without adding confusion.
Panel Meeting Action: Accept
Accept the definition verbatim, but add the appropriate designation for extracted text so that the definition reads as follows:
<u>Combustible Dust. Any finely divided solid material that is 420 microns (0.017 in.) or smaller in diameter (material passing a U.S. No. 40 Standard Sieve) and presents a fire or explosion hazard when dispersed and ignited in air. (***499***, 2008)</u>
Panel Statement: The added text complies with NFPA's Regulations Governing Committee Projects and NEC Style Manual.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
OFFERDAHL, D.: The definition of combustible dust is covered in NFPA 499 which is reference in 500.4 (B). The classification of the area should be determined by professionals using NFPA 499. Once that is completed it is required to be documented in accordance with 500.4 (A) This process take place before the inspector or electrician gets involved. Placing the definition in 500.2 could create confusion that there is enough information that the electrician or inspector can classify the area. In result placing undue pressure from the user to have the area classify as a class 2 area or even worse to unclassified the area. If accepted at all, this proposal should be placed in 500.5c as a fine print note. Placing the definition as a fine print note would achieve the recommendations that submitter proposes. In addition enforces the fact that the responsibly of classification of the area is the responsibly of the owner or user.

14-10 Log #1268 NEC-P14 **Final Action: Reject**
(500.2.Dusttight, Explosionproof Apparatus)

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
500.2 Definitions
~~**Dusttight.** Enclosures constructed so that dust will not enter under specified test conditions.~~
~~FPN: See ANSI/ISA-12.12.01-2000, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.*~~
~~**Explosionproof Apparatus.** Apparatus enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.~~
~~FPN: For further information, see ANSI/UL 1203-1994, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*~~
Substantiation: Definitions that are in Article 100 should not have to be repeated in Section 500.2 word for word as stated in the scope of Article 100. We will submit a proposal to move the FPN to Dusttight in 500.2 to Article 100's definition.
Panel Meeting Action: Reject
Panel Statement: It is appropriate for these definitions to be retained in Article 500.2, as they pertain directly to the subject matter of Chapter 5. There is no prohibition in the NEC or in 2.2.2.1 of the NEC Style Manual against definitions appearing in other articles of the code.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-11 Log #2824 NEC-P14 **Final Action: Accept**
(500.2.Explosionproof Apparatus)

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:

Explosionproof Equipment ~~Apparatus~~. Equipment ~~Apparatus~~ enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited thereby.

FPN: For further information, see ANSI/UL 1203-2006~~1999~~, *Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.*

Substantiation: Equipment is a defined term. Apparatus is included within the definition of equipment. Explosionproof equipment is a commonly used term to describe electrical equipment that is explosion protected by use of an explosionproof enclosure. Explosionproof apparatus is not in common use. Both terms are used in various places within the Code. This proposal corrects this inconsistency and is a companion to proposals in 100 and 500.7.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-12 Log #4425 NEC-P14 **Final Action: Accept**
(500.4(B))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:

FPN No. 1: Change the Instrumentation, Systems, and Automation Society (ISA) to ISA, the International Society of Automation
Substantiation: Update to ISA new name.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-13 Log #3972 NEC-P14 **Final Action: Reject**
(500.4(B), FPN 2)

Submitter: Gordon Robertson, American Petroleum Institute (API)
Recommendation: For ANSI/API RP500, Change the document date from ~~1997~~ to 2009.
Substantiation: ANSI/API RP 500, Recommended Practice for Classification of Locations of Electrical Installations at Petroleum Facilities is being updated. The 2009 revision is anticipated to be released well in advance of the release of the 2011 NEC.
Panel Meeting Action: Reject
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-14 Log #4298 NEC-P14 **Final Action: Reject**
(500.5(C)(1)(3), FPN)

Submitter: Mindy Wang, Ampco Safety Tools
Recommendation: Add new text as follows:
500.5 Classification of Locations

(C) Class II Locations.

(1) Class II, Division 1.

(3) In which Group E combustible dusts may be present in quantities sufficient to be hazardous.

FPN: Dusts containing magnesium or aluminum are particularly hazardous, and the use of extreme precaution is necessary to avoid ignition and explosion. For additional information on safeguards against fire and explosion for combustible metal dusts, see NFPA 484 – 2009, Standard for Combustible Metals.
Substantiation: NFPA 484 is a standard containing guidelines for handling of combustible metals dust including magnesium and aluminum. Adding proposed text provides reference to an existing standard for information on safeguards against fire and explosion in handling of combustible metals, powders, and dusts.
Panel Meeting Action: Reject
Panel Statement: The information included in NFPA 484 does not address area classification.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-15 Log #1853 NEC-P14 **Final Action: Reject**
(500.5(C)(2)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: In which combustible dusts due to abnormal operations ~~may~~ is likely to be present in the air...remainder unchanged).
Substantiation: Edit. “May” is subjective and a term to be avoided per the Style Manual. “Likely” is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The current text is correct. “May” is not subjective, but denotes physical possibility and is the appropriate term. The term “is likely to be” denotes probability, or a greater chance of occurrence.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-16 Log #868 NEC-P14 **Final Action: Reject**
(500.5(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

Class III locations are those that are hazardous because of the presence of easily ignitible fibers/flyings ~~or where materials producing combustible fibers/flyings~~ are handled, manufactured, or used but in which such fibers/flyings are not likely to be in suspension in the air in quantities ~~sufficient~~ to produce ignitable mixtures. (remainder unchanged).
Substantiation: Edit. Proposed deletion is superfluous. “Easily” and “sufficient” are subjective and terms to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The change suggested by the submitter does not add clarity to the requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:

NEAGLE, J.: I agree with the panel action and statement. However, the submitter introduces text (although shown incorrectly with struck-through formatting) which would clarify the current text of the code. Revise 500.5(D) as follows:
‘(D) Class III Locations. Class III locations are those that are hazardous because of the presence of easily ignitible fibers or where materials producing combustible flyings are handled, manufactured, or used, but in which such fibers/flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitible mixtures. Class III locations shall include those specified in 500.5(D)(1) and (D)(2).’

14-17 Log #910 NEC-P14 **Final Action: Reject**
(500.5(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence and substitute: Class III locations are those that are hazardous because of the presence of easily ignitable fibers/flyings in quantities likely to produce explosive mixtures.
Substantiation: “Flyings” should be noted to conform to (D)(1) and (2). This is a general type provision; (D)(1) and (2) are specific re: handled, manufactured, used, or stored. This provision specifies a Class III location where the combustible material is NOT likely to be in suspension in quantities sufficient for ignitable mixtures; why then would it be classified if there is no hazard? Proposal covers locations where ignitable material is suspended or accumulated in or on equipment and other surfaces.
Panel Meeting Action: Reject
Panel Statement: The criteria for Class III locations is ignition, not explosibility.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-18 Log #3864 NEC-P14 **Final Action: Accept in Part**
(500.6(B)(2))

Submitter: Mark Goodman, Jacobs Engineering Group
Recommendation: Add Fine Print Note after the paragraph.
FPN: Carbonaceous dusts that contain more than 8 percent total entrapped volatiles are not necessarily combustible. Testing of specific dust samples, following established ASTM testing procedures, is a method used to identify the combustibility of a specific dust and the need to classify those locations containing that material as Group F.
Substantiation: As currently written as extracted text from NFPA 499, 500.6(B)(2) has been widely interpreted to require that all carbonaceous dusts containing more than 8 percent total entrapped volatiles be identified as a Group F material. This is incorrect as the requirement only applies to “combustible” carbonaceous dusts. There are several factors in addition to the percent of volatiles necessary for a dust to be combustible, such as particle size. This FPN provides the reader with additional information about testing as a method to determine whether a specific dust is combustible and the need (or lack thereof) to classify a location as Group F. ASTM tests Include: ASTM E 1491 Autoignition Temperature of Dust Clouds and ASTM E 2021 Hot Surface Ignition of Dust Layers.
Panel Meeting Action: Accept in Part
Accept only the second sentence of the proposed Fine Print Note so that it reads:
FPN: Testing of specific dust samples, following established ASTM testing procedures, is a method used to identify the combustibility of a specific dust and the need to classify those locations containing that material as Group F.
Panel Statement: The first sentence is not accepted because it conflicts with the Group F definition in NFPA 499, which states that carbonaceous dusts having greater than 8 percent total entrapped volatiles are combustible. However, CMP-14 accepts the fact that testing might show otherwise. This action meets the submitters intent.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-19 Log #2825 NEC-P14 **Final Action: Accept**
(500.7(A))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
500.7 Protection Techniques. Section 500.7(A) through (L) shall be acceptable protection techniques for electrical and electronic equipment in hazardous (classified) locations.
(A) Explosionproof Equipment ~~Apparatus~~. This protection technique shall be permitted for equipment in Class I, Division 1 or 2 locations.
Substantiation: Equipment is a defined term. Apparatus is included within the definition of equipment. Explosionproof equipment is a commonly used term to describe electrical equipment that is explosion protected by use of an explosionproof enclosure. Explosionproof apparatus is not in common use. Both terms are used in various places within the Code. This proposal corrects this inconsistency and is a companion to proposals in 100 and 500.2.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-20 Log #4426 NEC-P14 **Final Action: Accept**
(500.7(K))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
FPN No. 1: Change ANSI/ISA-12.13.01-2003 (IEC 61779-1 through -5 Mod), *Performance Requirements Combustible Gas Detectors* to ANSI/ISA-60079-29-1, *Explosive Atmospheres - Part 29-1: Gas detectors - Performance requirements of detectors for flammable gases*
FPN No. 3: Change ANSI/ISA-RP 12.13.02-2003 (IEC 61779-6 Mod), *Installation, Operation, and Maintenance of Combustible Gas Detection Instruments* to ANSI/ISA-60079-29-2, *Explosive Atmospheres - Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-21 Log #4439 NEC-P14 **Final Action: Accept**
(500.7(K), FPN 4 (New))

Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
FPN No. 4: For further information, see ISA-TR12.13.03, Guide for Combustible Gas Detection as a Method of Protection,
Substantiation: There is currently no guidance on recommended practices for the use of combustible gas detection equipment as a method of protection. It is recommended that a reference to ISA-TR12.13.03 be provided within the text for such recommended practice. The ISA-TR12.13.03 is directly based upon API practices that have been applied for 30+ years in the petroleum industry.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-22 Log #1854 NEC-P14 **Final Action: Reject**
(500.7(K)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: In a building or structure located in or with an opening into a Class 1 Division 2 location where the interior does not contain a source of flammable ~~gas or~~ vapor or liquid, electrical equipment for unclassified locations shall be permitted where identified for the use.
Substantiation: Edit. The provision should include structures not deemed as “buildings”; “gas” is superfluous as it is a vapor. Liquid should be included. Equipment for unclassified locations should be identified for the use so as not to infer this section modifies other provisions of this Code.
Panel Meeting Action: Reject
Panel Statement: The proposal is rejected for the following reasons:
- The terms “gas” and “vapor” are correct. Liquids do not burn; their vapors do.
- The focus of the requirement is on buildings, which are enclosed. Structures may or may not be enclosed.
- Equipment is not identified for use in unclassified locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-23 Log #4297 NEC-P14 **Final Action: Reject**
(500.8, FPN 1)

Submitter: Mindy Wang, Ampco Safety Tools
Recommendation: Add the following new text:
500.8 Equipment.
FPN No. 1: It is important that inspection authorities and users exercise more than ordinary care with regard to installation and maintenance. Non-sparking tools may be needed to control ignition sources in classified locations.
Substantiation: · NFPA 30, Flammable and Combustible Liquids, Chapter 6, section 6.5.1 lists frictional heat or sparks as sources of ignition of flammable vapors and precaution shall be taken to control ignition sources.
· Recognizing the potential for steel tools to be an ignition source in flammable environment, the Occupational Safety & Health Administration (OSHA) provides guidance in booklet 3080 Hand and Power Tools, 2002 revised, “iron and steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools should be used.”
· A few documented incidents related to steel tools in classified locations:
OSHA inspection # 127357804, Employee #1 was working in an infrared flare composition mixing building. He completed installation of a metal vacuum filter table in Bay #1, permanently anchoring it to the concrete floor by drilling holes in the concrete floor, installing concrete anchor bolts, and bolting down the table. Employee #1 then removed the eight anchor bolts from the concrete floor at the old table location by hitting them with a ball peen hammer until they broke. On the last anchor bolt, some residual flare composition on the bolt threads or on the floor ignited due to the impact of the hammer. Employee #1 suffered second- and third-degree burns over 80 percent of his body and later died.
OSHA inspection # 2272953, employees were assigned the job of tending a 100 gallon (water-jacket) reactor kettle of methyl methacrylate in the mixing room. Employee #1 was standing between Kettle #1 and Kettle #2, preparing to check the viscosity of the liquid product, employee#2 was standing 5 feet south of employee#1, asking him how the batch was progressing. Employee#1 used a metal wrench (Visegrips) to pry open the cover of kettle #1. The wrench handle struck the angle iron support for the agitator motor, producing a spark. Employee#2 noticed the spark, which was immediately followed by a massive “Fireball”. Employee#1 and #2 were engulfed in the fireball. Employee#2 came to the area of kettle #1 to assist the other employees and also received injuries. All three employees received first and second degree burns on their face, arms and abdomen. No bonding or grounding was used for the transfer of flammable liquids; nor were non-sparking tools provided.

OSHA violation inspection # 17697327, the employer did not furnish employment and a place of employment which were free from recognized hazards that were causing or likely to cause death or serious physical harm to employees in that employees were exposed to: a) C-5 Process Unit; The metal hand tools being used by employees at the Class I Division 1 and 2 locations at the number 1 reactor were not the non-sparking type. Among other methods, one feasible and acceptable abatement method to correct this hazard is to use bronze non-sparking tools.

Adding proposed text provides additional information to control ignition sources in hazardous locations.

Panel Meeting Action: Reject

Panel Statement: This proposal is addressing an issue of mechanical sources of ignition, which are beyond the scope of the code.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-23a Log #CP1403 NEC-P14 **Final Action: Accept**
(500.8(A)(3))

Submitter: Code-Making Panel 14,

Recommendation: Revise the Fine Print Note to 500.8(A)(3) to read:

FPN: Additional documentation for equipment may include certificates demonstrating compliance with applicable equipment standards, indicating special conditions of use, and other pertinent information. Guidelines for certificates may be found in ANSI/ISA 12.00.02, Certificate Standard for AEx Equipment for Hazardous (Classified) Locations.

Substantiation: The referenced document provides additional information and clarification as to the contents of a certificate.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

WECHSLER, D.: While this action was taken on 500.8(A)(3), the same action also should be taken under sections 505.9 (A)(3) and 506.9(A)(3) as these deal with the same fpn subject materials.

14-24 Log #376 NEC-P14 **Final Action: Accept**
(500.8(B)(2)(b))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise text to read as shown:

"Equipment that is required to be explosionproof shall incorporate seals in accordance with ~~per~~ 501.15(A) or (D) when the wiring methods of 501.10(B) are employed."

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-25 Log #1857 NEC-P14 **Final Action: Reject**
(500.8(B)(3) and (6))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: (3) Where specifically permitted in Articles 501 through 503, equipment or equipment in ~~general-purpose enclosures~~ enclosures identified for use in other than hazardous (classified) locations shall be permitted...(remainder unchanged).

(6) Where flammable gases or liquids flammable ~~liquid produced~~ vapors, ~~combustible liquid produced vapors~~ or combustible dusts are or likely to be present at the same time that their simultaneous presence shall be considered when determining the safe operating temperature of the electrical equipment.

Substantiation: Edit. Liquids are included in the FPN No. 1 and 2 for 500.5(B)(1). "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: CMP-14 rejects the proposal because no substantiation is offered for proposed changes to 500.8(B)(3). In 500.8(B)(6), the proposed changes eliminate an important criteria for combustible liquids.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

NEAGLE, J.: I agree with the panel action. However, the panel statement discussed at the ROP meeting included the following text:

'CMP-14 rejects the proposal because no substantiation is offered for proposed changes to 500.8(B)(3). In 500.8(B)(6), the proposed changes eliminate an important criteria for combustible liquids that have been heated above their flashpoint.'

14-26 Log #3188 NEC-P14 **Final Action: Reject**
(500.8(C)(4))

Submitter: A. W. Ballard, Cooper Crouse-Hinds

Recommendation: Revise the first sentence as follows:

"The marking shall specify the temperature class or operating temperature at a 40°C ambient temperature, or at the higher or lower upper ambient temperature if the equipment is rated and marked for an upper ambient temperature of ~~greater~~ other than 40°C.

Substantiation: Other proposals from this submitter to clarify that the ambient temperatures both inside as well as outside the default range are acceptable for the effective operation of equipment if the range is marked on it. Apparently, the principle is that even if the equipment will not function at 40°C, it should still remain safe and not constitute a source of ignition from high temperatures. This is not at all clear to the user who doesn't know that the marked ambient is for the effective operation, but that the equipment will still be safe at 40°C. Maybe the user thinks that the equipment will operate effectively up to the marked ambient, but will be safe regardless of the ambient.

Panel Meeting Action: Reject

Panel Statement: The substantiation for this proposal does not address all the elements of risk associated with the varying types of equipment covered by these requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-27 Log #3189 NEC-P14 **Final Action: Reject**
(500.8(C)(4))

Submitter: A. W. Ballard, Cooper Crouse-Hinds

Recommendation: Add a new penultimate sentence as follows:

"...shown in Table 500.8(C). Electrical equipment designed for use in the ambient temperature range between –25°C and +40°C shall require no additional ambient temperature marking. Equipment for Class I and Class II..."

Substantiation: This sentence appears in 505.9(D)(1), except that there the lower limit is –20°C, and should be included in Article 500 for consistency.

Panel Meeting Action: Reject

Panel Statement: This proposed new sentence is redundant to the requirement in 500.8(C)(5), as accepted in Proposal 14-28.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-28 Log #3186 NEC-P14 **Final Action: Accept**
(500.8(C)(5))

Submitter: A. W. Ballard, Cooper Crouse-Hinds

Recommendation: Add a new first sentence: "Electrical equipment designed for use in the ambient temperature range between –25°C and +40°C shall require no ~~additional~~ ambient temperature marking."

Substantiation: This clarification in 505.9(D)(1) should be added, without the term "additional", to 500.8(C)(5). See related proposal to 505.9(D)(1).

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-29 Log #3187 NEC-P14 **Final Action: Reject**
(500.8(C)(5))

Submitter: A. W. Ballard, Cooper Crouse-Hinds

Recommendation: Add a new second sentence as follows:

"For equipment rated for a temperature range other than –25°C to +40°C, the marking shall specify the special range of ambient temperatures in degrees Celsius. Either limit of this special range shall be permitted to be inside or outside of the standard range. The marking shall include either the symbol "Ta" or "Tamb."

Substantiation: This paragraph has been interpreted as permitting a special ambient limit to be only outside of the default limits. This has caused difficulties for certain types of temperature-sensitive equipment within an explosion protected enclosure. As an example, explosion proof circuit breakers inside an explosionproof enclosure will not dissipate heat produced as readily as normal circuit breakers inside a sheet metal enclosure. This restricts the number of circuits to prevent nuisance tripping in a 40°C ambient. There is no logic in requiring equipment that will be used inside a building whose year-round temperature will be 24°C to operate effectively at a 40°C ambient. This does not change the requirement that it operate safely in a 40°C ambient.

See companion proposal for 505.9(D)(1).

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-26.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-30 Log #1856 NEC-P14 **Final Action: Reject**
(500.8(C)(6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Fixed ~~general purpose~~ equipment identified for use in other than hazardous (classified) locations, other than fixed luminaires, that is ~~acceptable~~ identified for use in Class 1 Division 2 locations...(remainder unchanged).
Substantiation: General purpose is not defined: does it include or exclude weatherproof equipment, for example, which may be suitable?
Panel Meeting Action: Reject
Panel Statement: The term "general purpose" is commonly used in the electrical industry and does not require further definition. Equipment is not identified for use in "other than hazardous (classified) locations".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

(Note: Sequence 14-31 moved to follow 14-33)

14-32 Log #377 NEC-P14 **Final Action: Accept in Principle**
(500.8(E))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise first sentence as shown:
"All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4 in. taper/foot) ~~(3/4-in. taper per foot)~~."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-33.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-33 Log #2826 NEC-P14 **Final Action: Accept in Principle**
(500.8(E))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(E) Threading. Supply connection entry thread form shall be NPT or metric. ~~All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).~~ Conduit and fittings shall be made wrenchtight to prevent sparking when fault current flows through the conduit system, and to ensure the explosionproof integrity of the conduit system where applicable. Equipment provided with threaded entries for field wiring connections shall be installed in accordance with 500.8(E)(1) or (E)(2). ~~Threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.~~
~~*Exception: For listed explosionproof equipment, factory threaded NPT entries shall be made up with at least 41/2 threads fully engaged.*~~
(1) Equipment Provided with Threaded Entries for NPT Threaded Conduit or Fittings. For equipment provided with threaded entries for NPT threaded conduit or fittings, listed conduit, conduit fittings, or cable fittings shall be used.
All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).
NPT threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.
Exception: For listed explosionproof equipment, factory threaded NPT entries shall be made up with at least 41/2 threads fully engaged.
FPN No. 1: Thread form specifications for male NPT threads are located in ANSI/ASME B1.20.1-1983, *Pipe Threads, General Purpose (Inch)*.
FPN No. 2: Female NPT threaded entries use a modified National Standard Pipe Taper (NPT) thread with thread form per ANSI/ASME B1.20.1-1983, *Pipe Threads, General Purpose (Inch)*. See ANSI/UL 1203, *Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations*
(2) Equipment Provided with Threaded Entries for Metric Threaded Conduit or Fittings. For equipment with metric threaded entries, listed conduit fittings or listed cable fittings shall be used. s Such entries shall be identified as being metric, or listed adapters to permit connection to conduit or NPT-threaded fittings shall be provided with the equipment~~. Adapters~~ and shall be used for connection to conduit or NPT-threaded fittings. ~~Listed cable fittings that have metric threads shall be permitted to be used.~~
Metric threaded entries into explosionproof equipment shall have a class of fit of at least 6g/6H and shall be made up with at least five threads fully engaged for Group C and D, and not less than eight full threads for Group A and Group B.
FPN: Threading specifications for metric threaded entries are located in ISO 965/1-1980, *Metric Screw Threads*, and ISO 965/3-1980, *Metric Screw Threads.*
(3) Unused Openings.
All unused openings shall be closed with listed metal close-up plugs. The plug engagement shall comply with 500.8(E)(1) or 500.8 (E)(2).
Substantiation: This proposal reflects the current practice for gauging and engagement of NPT and metric threaded entries found in the ANSI product standards.
Panel Meeting Action: Accept in Principle
Revise text as follows:
(E) Threading. Supply connection entry thread form shall be NPT or metric. ~~All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).~~ Conduit and fittings shall be made wrenchtight to prevent sparking when fault current flows through the conduit system, and to ensure the explosionproof integrity of the conduit system where applicable. Equipment provided with threaded entries for field wiring connections shall be installed in accordance with 500.8(E)(1) or (E)(2). ~~Threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.~~
~~Exception: For listed explosionproof equipment, factory threaded NPT entries shall be made up with at least 41/2 threads fully engaged.~~
(1) Equipment Provided with Threaded Entries for NPT Threaded Conduit or Fittings. For equipment provided with threaded entries for NPT threaded conduit or fittings, listed conduit, conduit fittings, or cable fittings shall be used.
All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread ~~that provides a taper of 1 in 16 (3/4-in. taper per foot)~~.
NPT threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.
Exception: For listed explosionproof equipment, joints with factory threaded NPT entries shall be made up with at least 4-1/2 threads fully engaged.
FPN No. 1: Thread ~~form~~ specifications for male NPT threads are located in ANSI/ASME B1.20.1-1983, Pipe Threads, General Purpose (Inch).
FPN No. 2: Female NPT threaded entries use a modified National Standard Pipe Taper (NPT) thread with thread form per ANSI/ASME B1.20.1-1983, Pipe Threads, General Purpose (Inch). See ANSI/UL 1203, Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
(2) Equipment Provided with Threaded Entries for Metric Threaded Conduit or Fittings. For equipment with metric threaded entrie~~,~~ listed conduit fittings or listed cable fittings shall be used. ~~s~~ Such entries shall be identified as being metric, or listed adapters to permit connection to conduit or NPT-threaded fittings shall be provided with the equipment~~. Adapters~~ and shall be used for connection to conduit or NPT-threaded fittings. ~~Listed cable fittings that have metric threads shall be permitted to be used.~~
Metric threaded entries into explosionproof equipment shall have a class of fit of at least 6g/6H and shall be made up with at least five threads fully engaged for Group C and D, and not less than eight full threads fully engaged for Group A and Group B.
FPN: Threading specifications for metric threaded entries are located in ISO 965/1-1980, Metric Screw Threads, and ISO 965/3-1980, Metric Screw Threads.
(3) Unused Openings.
All unused openings shall be closed with listed metal close-up plugs. The plug engagement shall comply with 500.8(E)(1) or 500.8 (E)(2).
Panel Statement: The reorganization of this section has been made with modifications for clarity and consistency and incorporates Proposals 14-31 and 14-32.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
NEAGLE, J.: I agree with the panel action and statement. However, the third sentence of 500.8(E)(2) should be revised to read as follows:
'…Metric threaded entries into explosionproof equipment shall have a class of fit of at least 6g/6H and shall be made up with at least five threads fully engaged for Group C and Group D, and at least ~~not less than~~ eight ~~full~~ threads fully engaged for Group A and Group B…'.

14-31 Log #1477 NEC-P14 **Final Action: Accept in Principle**
(500.8(E)(1))

Submitter: Richard A. Janoski, Finleyville, PA
Recommendation: Revise text to read as follows:
Equipment Provided with Threaded Entries for NPT Threaded Conduit or Fittings. For equipment provided with threaded entries for NPT threaded conduit or fittings, the following shall be used or required: listed conduit, conduit fittings, or cable fittings.
Substantiation: Incorrect use of punctuation has created a sentence that is difficult to interpret. The phrase "NPT threaded conduit or fittings," currently ends with a comma. The phrase is then followed by "listed conduit, conduit fittings, or cable fittings." This sentence currently reads as a long list, which it is not. The proposed text separates the code rule from the items that comprise the "approved for use" list.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-33 (Log #2826). CMP 14 points out that the referenced section should be 500.8(E)(1).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-34 Log #4630 NEC-P14 **Final Action: Reject**
(500.8(E)(2))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "identified as being metric" to "marked as being metric."
Substantiation: The use of the word "identified" in this paragraph is almost certainly a misuse of a defined term in Article 100. Identified does not mean marked The point of this rule is to be certain that the end user is quite aware of a different threading style, as would be the case with a marking, or actual adapters can be provided with the equipment. The fact that the equipment may have a cut sheet that indicates its suitability of a particular use (identified per Article 100) does not meet the objective in this case.
Panel Meeting Action: Reject
Panel Statement: The use of the term "identified" in this context does not refer to the equipment and is, therefore, appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-35 Log #146 NEC-P14 **Final Action: Accept in Principle**
(500.8(F))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
(F) ~~Fiber~~ Optical Fiber Cables ~~Assembly~~. ~~Where a fiber optic cable assembly contains conductors that are capable of carrying current, the fiber optic cable assembly~~ Composite and conductive optical fiber cables shall be installed in accordance with the requirements of Articles 500, 501, 502, or 503, as applicable.
FPN: See 770.2 for definitions of optical fiber cables.
Substantiation: The Code should use consistent terminology throughout.
Article 770 definitions:
Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering.
Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors.
Conductive Optical Fiber Cable. These optical fiber cables contain non–current-carrying conductive members such as metallic strength members, metallic vapor barriers, and metallic armor or sheath.
Acceptance of this proposal will result in correlation with Article 770.
Panel Meeting Action: Accept in Principle
(F) ~~Fiber~~ Optical Fiber Cables ~~Assembly~~. Where an ~~fiber~~ optical fiber cable ~~assembly~~ contains conductors that are capable of carrying current (composite optical fiber cable), the ~~fiber~~ optical fiber cable ~~assembly~~ shall be installed in accordance with the requirements of Articles 500, 501, 502, or 503, as applicable.
Panel Statement: The Panel agrees that using common terminology from Article 770 is correct, but the substantiation does not support adding conductive optical cable to Article 500. Also, the Fine Print Note is redundant and is, therefore, not accepted.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 501 — CLASS 1 LOCATIONS

14-36 Log #3352 NEC-P14 **Final Action: Reject**
(501.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
WIRING METHODS. Wiring methods shall comply with 501.10(A) or 501.10(B).
(A) CLASS I DIVISION 1.
GENERAL In Class I Division 1 locations only the wiring methods in (a) through (d) shall be permitted.
(a) threaded rigid metal conduit or threaded steel intermediate metal conduit, with threaded fittings and connections.
Exception: Rigid nonmetallic conduit enclosing an equipment grounding conductor shall be permitted underground where encased in a minimum 50 mm (2 in.) concrete envelope and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to finished grade. Threaded rigid metal conduit or threaded steel intermediate metal conduit with threaded fittings and connections shall be used for not less than the last 600 mm (24 in.) of the underground run to emergency and to the point of connection to an aboveground wiring method or enclosure.
(b) Type MI cable identified for the use and with fittings listed for the location.
(c) In establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons install and maintain the installation. Type MC-HL cable containing, an equipment grounding conductor, with a vapor tight continuous corrugated metal sheath, an overall jacket of identified polymeric material, and provided with fittings listed for the location.
(2) FLEXIBLE CONNECTIONS. Where necessary to employ flexible connections, flexible fittings listed for Class I Division 1 locations containing an equipment grounding conductor or flexible cord or cable in accordance with 501.140 shall be permitted where the length is not longer than necessary.
(3) BOXES and FITTINGS. All boxes, other enclosures and fittings shall be identified for Class I Division 1 locations.
Substantiation: Edit. Threaded fittings and connections should be specified. (See 342.42(A) and 344.42(A).) "Permitted" is not a requirement per 90.5. The reference to 514.8 Exception No. 2 and 515.8(A) are unnecessary. Installation and support of Type MI cable is covered in Article 332. The 24 in. requirement for RMC and IMC should be a minimum. Establishments other than industrial such as governmental should be included; the criteria should be maintenance and supervision, not the type of occupancy. All fittings such as straps and threaded conduit couplings do not have to be listed for Class 1.
The exception for (A)(1) is unnecessary.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation that supporting a problem with the current text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-37 Log #2827 NEC-P14 **Final Action: Accept in Principle**
(501.10(A))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action as it relates to 4.1.1 of the NEC Style Manual concerning references to entire articles.
This action will be considered by the panel as a public comment.
Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
501.10 Wiring Methods. Wiring methods shall comply with 501.10(A) or (B).
(A) Class I, Division 1.
(1) General. In Class I, Division 1 locations, the wiring methods in (a) through (d) shall be permitted.
(a) *Threaded rigid metal conduit or threaded steel intermediate metal conduit.*
Exception: Type PVC conduit and Type RTRC conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less
than 600 mm (24 in.) of cover measured from the top of the conduit to grade. The concrete encasement shall be permitted to be omitted where subject to the provisions of 514.8,
Exception No. 2, and 515.8(A). Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.
(b) *Type MI cable ~~with termination~~ terminated with fittings listed for the location.* Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.

(c) *In industrial establishments with restricted public access,* where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable, listed for use in Class I, Zone 1, or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and ~~provided~~ terminated with ~~termination~~ fittings listed for the application.

FPN: See 330.12 for restrictions on use of Type MC cable.

(d) *In industrial establishments with restricted public access,* where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type ITC-HL cable, listed for use in Class I, Zone 1, or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material and ~~provided~~ terminated with ~~termination~~ fittings listed for the application, and installed in accordance with the provisions of Article 727.

~~FPN: See 727.4 and 727.5 for restrictions on use of Type ITC cable.~~

(2) Flexible Connections. Where necessary to employ flexible connections, as at motor terminals, flexible fittings listed for ~~Class I, Division 1 locations~~ the location or flexible cord in accordance with the provisions of 501.140 terminated with cord connectors listed for the location shall be permitted.

(3) Boxes and Fittings. All boxes and fittings shall be approved for Class I, Division 1.

Substantiation: Cable is *terminated* with fittings, but the fittings are not *provided* with the cable, they are sourced separately. Terminology is made consistent with other portions of the section.

Panel Meeting Action: Accept in Principle

Revise text as follows:

501.10 Wiring Methods. *Wiring methods shall comply with 501.10(A) or (B).*

(A) Class I, Division 1.

(1) General. *In Class I, Division 1 locations, the wiring methods in (a) through (d) shall be permitted.*

(a) Threaded rigid metal conduit or threaded steel intermediate metal conduit.

Exception: Type PVC conduit and Type RTRC conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. The concrete encasement shall be permitted to be omitted where subject to the provisions of 514.8, Exception No. 2, and 515.8(A). Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.

(b) Type MI cable ~~with termination~~ terminated with fittings listed for the location. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.

(c) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable, listed for use in Class I, Zone 1, or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and ~~provided~~ terminated with ~~termination~~ fittings listed for the application.

Type MC-HL cable shall be installed in accordance with the provisions of Article 330.

~~FPN: See 330.12 for restrictions on use of Type MC cable.~~

(d) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type ITC-HL cable, listed for use in Class I, Zone 1, or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material and ~~provided~~ terminated with ~~termination~~ fittings listed for the application, and installed in accordance with the provisions of Article 727.

~~FPN: See 727.4 and 727.5 for restrictions on use of Type ITC cable.~~

(2) Flexible Connections. *Where necessary to employ flexible connections, as at motor terminals, flexible fittings listed for ~~Class I, Division 1 locations~~ the location or flexible cord in accordance with the provisions of 501.140 terminated with cord connectors listed for the location shall be permitted.*

(3) Boxes and Fittings. *All boxes and fittings shall be approved for Class I, Division 1.*

Panel Statement: The panel agrees with the changes made by the submitter and has made additional changes to (c) to align with (d) to clarify that the requirements of Article 330 also apply to the installation of Type MC-HL cable. The panel has made additional changes in (2) to clarify that the type of protection applies to the terminal compartment.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-38 Log #2585 NEC-P14 **Final Action: Reject**
(501.10(A)(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete (A)(1) and substitute:

General. In Class I division 1 locations only the wiring methods in (a) through (d) shall be permitted.

(a) Threaded rigid metal conduit or threaded steel intermediate metal conduit with threaded fittings and connections.

Exception: Rigid nonmetallic conduit containing an equipment grounding conductor shall be permitted where installed underground encased in a concrete envelope not less than 50 mm (2 in.) and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to finished grade. Threaded rigid metal conduit or threaded steel intermediate metal conduit with threaded fittings and connections shall be used for not less than the last 600 mm (24 in.) of the underground run to emergence and the point of connection to the aboveground wiring method or enclosure.

Revise (b) to read as follows: Type MI cable identified for the use and with fittings identified for Class I Division 1 locations.

Revise (c) and (d): In ~~industrial~~ establishments with restricted public access, where the conditions of maintenance and supervision.... (remainder unchanged).

Revise (2): Flexible Connections. Where necessary to employ flexible connections ~~as at motor terminals~~, flexible fittings, listed for Class I division locations, or flexible cord or cable in accordance with 501.140 shall be permitted provided the length is not longer than necessary.

Revise (3) Boxes and Fittings. All boxes, other electrical enclosures and fittings shall be ~~approved~~ listed or identified for Class I division 1 locations.

Substantiation: "Permitted" does not impose a requirement per 90.5. Threaded fittings and connections should be specified (see 342.42(A) and 344.2(A)) The last 24 in. of RMC or IMC should be a minimum not an exact length. The point of connection aboveground may not be a raceway. Boxes and other enclosures (such as conduit bodies) should be identified (listing is one means). All fittings such as straps do not require listing. Establishments that are not industrial such as governmental should be permitted in (c) and (d); type of occupancy should not be a criterion.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. The submitter's substantiation does not support the recommended action.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-39 Log #1855 NEC-P14 **Final Action: Reject**
(501.10(A)(1)(a) Exception)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence: Type PVC conduit and RTRC conduit shall be permitted underground where encased...(remainder unchanged).

Revise penultimate sentence: Threaded rigid metal conduit or threaded ~~steel~~ intermediate metal conduit with threaded fittings shall be used for not less than the last 600 mm (24 in.) of the underground run to the point of emergence ~~or to the point of connection to the aboveground raceway~~.

Substantiation: Present wording does not permit more than 24 in. to the point of emergence and implies the conduit will connect to aboveground raceways, whereas it may terminate in a switchboard or other enclosure, or connect to wiring methods other than raceways. "Threaded rigid metal conduit" does not exclude aluminum; why does IMC have to be steel?

Panel Meeting Action: Reject

Panel Statement: The substantiation erroneously interprets the requirement as limiting the length of the metal conduit to 24 in. The requirement only applies to the last 24 in. of the run. PVC conduit is addressed in 352.10(g), which refers the user to 300.5 and 300.50. The substantiation does not address the recommendation for adding "underground" or "with threaded fittings". The submitter is directed to 342.2 for the definition of IMC and to 344.10(A)(3) for permitted uses of aluminum RMC.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-40 Log #3567 NEC-P14 **Final Action: Reject**
(501.10(A)(1)(a) Exception)

Submitter: James R. Steed, Malcolm Pirnie, Inc.
Recommendation: Revise text to read as follows:
Exception: Type PVC conduit and Type RTRC conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick. ~~and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade.~~ The concrete encasement shall be permitted to be omitted where subject to the provisions of 514.8, Exception No. 2, and 515.8(A). Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the ~~underground~~ encased run to emergence. ~~or to the point of connection to the aboveground raceway.~~ An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.
Substantiation: As written the exception does not allow the use of PVC or RTRC embedded within concrete slabs or walls of buildings with Class I Division 1 or Division 2 rated interior spaces (501.10(B) for Division 2 areas references back to 501.10(A)).
The surface of a concrete slab or wall is the boundary of the rated area, the interior of the slab or wall is not included as part of the rated area.
The reference to “top of the conduit to grade” and “underground run” implies that this exception was originally intended to apply only to exterior locations. However, it is sometimes being interpreted by inspectors in the field as requiring 24” of cover between a PVC or RTRC conduit and a rated area regardless of the location (i.e. under/within a building floor slab) resulting in a failed inspections and construction delays while the issue is discussed.
Panel Meeting Action: Reject
Panel Statement: This exception is specific to underground installations and not applicable to walls or aboveground installations. The 24 in. of cover is essential to maintaining the level of protection.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-41 Log #927 NEC-P14 **Final Action: Reject**
(501.10(A)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
All boxes and fittings shall be ~~approved~~ listed for Class 1 Division 1.
Substantiation: Edit. “Approved” is not necessarily the same as “listed”; 501.30(B)(2), for example, requires listed fittings.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. The panel has previously conducted extensive studies of the use of the terms “approved”, “listed”, and “identified”. “Approved” is the appropriate term within the context of this provision of the code. The substantiation reference of 501.30(B)(2) does not exist.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-42 Log #968 NEC-P14 **Final Action: Reject**
(501.10(A)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
All boxes and fittings, and enclosures shall be ~~approved~~ identified for Class I Division I.
Substantiation: Edit. Enclosures such as cabinets should be included. “Approved” per definition is not necessarily the same as “identified”.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-41.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-43 Log #2828 NEC-P14 **Final Action: Accept in Principle**
(501.10(B)(1))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(B) Class I, Division 2.
(1) General. In Class I, Division 2 locations, the following wiring methods shall be permitted:
(1) All wiring methods permitted in 501.10(A).
(2) Threaded rigid metal conduit, threaded steel intermediate metal conduit.
(3) Enclosed gasketed busways, enclosed gasketed wireways.
(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, ~~or in cable tray systems~~ terminated with fittings listed for the type of protection. ~~PLTC shall be installed in a manner to avoid tensile stress at the termination fittings.~~
(5) Type ITC and Type ITC-ER cable as permitted in 727.4 terminated with fittings listed for the type of protection.
(6) Type MI, MC, MV, or TC cable terminated with ~~termination~~ fittings listed for the type of protection~~, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings~~.
(7) In industrial establishments with restricted public access where the conditions of maintenance and supervision ensure that only qualified persons service the installation and where metallic conduit does not provide sufficient corrosion resistance, listed reinforced thermosetting resin conduit (RTRC), factory elbows, and associated fittings, all marked with the suffix -XW, and Schedule 80 PVC conduit, factory elbows, and associated fittings shall be permitted.
Where seals are required for boundary conditions as defined in 501.15(A)(4), the Division 1 wiring method shall extend into the Division 2 area to the seal, which shall be located on the Division 2 side of the Division 1–Division 2 boundary.
Substantiation: This proposal reflects the current installation requirements of 725.154(D) that in conjunction with a companion proposal to revise 725.154(D) move the Classified location permitted wiring methods into Chapter 5, with the installation requirements for these types of cables retained for all users in 725.154(D). See companion proposal on 725.154(D).
Panel Meeting Action: Accept in Principle
Revise text as follows:
(B) Class I, Division 2.
(1) General. In Class I, Division 2 locations, the following wiring methods shall be permitted:
(1) All wiring methods permitted in 501.10(A).
(2) Threaded rigid metal conduit, threaded steel intermediate metal conduit.
(3) Enclosed gasketed busways, enclosed gasketed wireways.
(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, including ~~or~~ installation in cable tray systems. The cable shall be terminated with listed fittings. ~~PLTC shall be installed in a manner to avoid tensile stress at the termination fittings.~~
(5) Type ITC and Type ITC-ER cable as permitted in 727.4 and terminated with listed fittings.
(6) Type MI, MC, MV, or TC cable, including installation in cable tray systems. The cable shall be terminated with listed fittings. ~~with termination fittings, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings.~~
(7) In industrial establishments with restricted public access where the conditions of maintenance and supervision ensure that only qualified persons service the installation and where metallic conduit does not provide sufficient corrosion resistance, listed reinforced thermosetting resin conduit (RTRC), factory elbows, and associated fittings, all marked with the suffix -XW, and Schedule 80 PVC conduit, factory elbows, and associated fittings shall be permitted.
Where seals are required for boundary conditions as defined in 501.15(A)(4), the Division 1 wiring method shall extend into the Division 2 area to the seal, which shall be located on the Division 2 side of the Division 1–Division 2 boundary.
Panel Statement: The panel has retained the language “in cable tray systems”, which was deleted in the proposal, in items (4) and (6) to permit their use, as provided in other articles in the code. The panel also clarified the language for listed fittings.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
(Note: Sequence 14-44 moved to follow 14-47)

14-47 Log #4902 NEC-P14 **Final Action: Accept**
(501.10(B)(1)(2))

Submitter: Jeremy Neagle, Intertek ETL SEMKO
Recommendation: Delete 501.10(B)(1)(2).
Substantiation: 501,10(B)(1)(1) permits the use of all wiring methods permitted in 501.10(A), which includes threaded rigid metal conduit and threaded steel intermediate metal conduit. There is no need to re-state these wiring methods in 501.10(B)(1)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
(Note: Sequence 14-45 not used)

14-44 Log #4903 NEC-P14 **Final Action: Accept in Principle**
(501.10(B)(1)(6))

Submitter: Jeremy Neagle, Intertek ETL SEMKO
Recommendation: Revise text as follows:
(6) Type MI, MC, MV, or TC cable with termination fittings, ~~or in cable tray systems~~ and installed in a manner to avoid tensile stress at the termination fittings.
Substantiation: Cable tray systems are not a suitable replacement for proper termination fittings at the entry to equipment. the requirements for installation of such cables in trays are covered in other articles.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-43.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-46 Log #4907 NEC-P14 **Final Action: Accept**
(501.10(B)(1)(6))

Submitter: Jeremy Neagle, Intertek ETL SEMKO
Recommendation: Delete Type MI cable from 501.10(B)(1)(6).
Substantiation: 501.10(B)(1)(1) permits the use of all wiring methods permitted in 501.10(A), which includes Type MI cable. There is no need to re-state this wiring method in 501.10(B)(1)(6).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

(Note: Sequence 14-47 moved to follow 14-43)

14-48 Log #2829 NEC-P14 **Final Action: Accept**
(501.10(B)(2))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(2) Flexible Connections. Where provision must be made for limited flexibility, one or more of the following shall ~~also~~ be permitted:
(1) Listed flexible metal fittings.
(2) Flexible metal conduit with listed fittings.
(3) Liquidtight flexible metal conduit with listed fittings.
(4) Liquidtight flexible nonmetallic conduit with listed fittings.
(5) Flexible cord listed for extra-hard usage and terminated ~~provided~~ with listed ~~bushed~~ fittings. A conductor for use as an equipment grounding conductor shall be included in the flexible cord.
Substantiation: Cable is *terminated* with fittings, but the fittings are not *provided* with the cable, they are sourced separately. Terminology is made consistent with other portions of the section.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-49 Log #926 NEC-P14 **Final Action: Reject**
(501.10(B)(2)(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Flexible cord ~~listed~~ identified for extra-hard usage and the application, and provided with ~~listed~~ identified bushed fittings.
Substantiation: Article 400 does not specify listing. Cords should be suitable for the use. Not all are oil or sunlight resistant; some are for electric vehicles.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. The Panel has previously conducted extensive studies of the use of the terms “approved”, “listed”, and “identified”. “Listed” is the appropriate term within the context of this provision of the code.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-50 Log #1792 NEC-P14 **Final Action: Reject**
(501.10(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Nonincendive field wiring shall be permitted using any ~~of the~~ identified wiring methods permitted for unclassified locations.
In (B)(3)(I), add: “or raceways”.
Substantiation: Edit. All wiring methods permitted for unclassified locations may not be suitable. This provision may be deemed to modify “not permitted use”. Nonincendive field wiring should be permitted in separate raceways.
Panel Meeting Action: Reject
Panel Statement: Wiring is not identified for unclassified locations. The proposal is not clear as to where the phrase “or raceways” is to be inserted or for what reason.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
NEAGLE, J.: I agree with the panel action and statement. However, it is noted that the current text of 501.10(B)(3) does not permit the installation of separate nonincendive field wiring circuits in a single raceway using other than multiconductor cables (e.g., discreet conductors). Revise the second paragraph of 501.10(B)(3) as follows:
(Retain first paragraph and FPN).
‘Separate nonincendive field wiring circuits shall be installed in accordance with one of the following:
(1) In separate cables
(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield
(3) In multiconductor cables or raceways, where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)’

14-51 Log #4091 NEC-P14 **Final Action: Accept in Principle**
(501.15)

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: 501.15: Add a new section (G) “Process Connected Equipment”, move all of the existing text under (F)(3) into this section, and then add the following new statement as a new paragraph following the statement “Process-connected equipment that is listed and marked “Dual Seal” shall not require additional process sealing when used within the manufacturer’s ratings”.
In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation secondary seals shall not be required between devices containing a primary seal and conduit or cable seals, where suitable means are provided to address failure of a single component in the device containing the primary seal which could allow the abnormal passage of process fluids into the device.
Substantiation: The revised text provides the needed flexibility required an industrial applications to address unique installations in which some processing conditions may have the potential for seal failures but for which means other than the use of a secondary seal can be used quite effectively to prevent the process fluid from contacting the device electronics. Examples of alternative methods include the use of a short transition section of cable, or provisions of an air-gap.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-60.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-52 Log #1978 NEC-P14 **Final Action: Reject**
(501.15(B)(2) Exception No. 4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise condition (2): The conduit system segment is located entirely in outdoor locations not enclosed by solid walls or structures which impede air circulation.
Substantiation: Outdoor locations may be closed in by walls or structures that affect air circulation.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-53 Log #925 NEC-P14 **Final Action: Reject**
(501.15(C)(6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
The cross sectional area of the conductors permitted in a seal shall not exceed 25 percent of the cross section area of a rigid metal conduit or intermediate metal conduit of the same trade size...”. (remainder unchanged)
Substantiation: Edit. The number of conductors in IMC may vary from RMC.
Panel Meeting Action: Reject
Panel Statement: CMP-14 in writing this requirement intentionally used RMC because the inside diameter is smaller and is, therefore, more conservative.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-54 Log #4631 NEC-P14 **Final Action: Reject**
(501.15(D)(1) Exception)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows:
Cables with twisted pairs of conductors shall not require the separation of individual twisted pairs, and cables with shielding over individual twisted pairs shall not require the removal of the shielding material, provided the termination is by an approved means to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.
Substantiation: The existing wording of this exception fails to take into account the fact that shielding may be applied to each pair individually, or to the entire group of twisted pairs (usually four pairs in the case of common Ethernet cabling, for example) taken collectively. The product listing for this mastic and the installation instructions that come with it only cover shielding on the individual pairs. This submitter has learned that this was the only form the panel considered in writing this part of the exception. If the shielding is applied just under the cable jacket and over the entire group of twisted pairs, that cable (unless flooded and therefore covered in a different part of this section) will be capable of gas migration. This proposal limits the application of this exception to the types of cabling for which this procedure is safe.
Panel Meeting Action: Reject
Panel Statement: The current wording covers this condition regardless of whether a means of sealing is approved. Also, the proposed wording is limited to twisted pairs of cables only, whereas the existing language addresses all types of shielded cables - pairs, triads, quads, etc.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-55 Log #3190 NEC-P14 **Final Action: Reject**
(501.15(D)(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add a new paragraph below the present exception as follows:
"Cables shall be sealed at the point at which they leave the Division 1 location".
Add a new Exception as follows:
"Exception: Where cable is sealed at the termination point."
Substantiation: The present text dates back to when the only cable allowed in Class I, Division 1 had to be in conduit. When MC (now MC-HL) cable was allowed without conduit in the early '90s, no provision was made for boundary seals. This proposal replicates the requirement in 505.16(B)(8) that requires a boundary seal for cable. It also proposes the same exception, which is necessary because there is no other feasible way to seal MC cable except at a termination.
Panel Meeting Action: Reject
Panel Statement: This is already addressed by the termination requirements for Division 1 in 501.15(D)(1).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-56 Log #3191 NEC-P14 **Final Action: Reject**
(501.15(D)(2))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise the last sentence of the Exception to read:
"*For shielded, twisted pair cables...*".
Substantiation: As I recall, the discussion when this exception was added was about shielded, twisted pair cables. There are listed means to seal them properly inside an enclosure. There are, however, cables with twisted pairs or individual conductors with the shielding around the entire bundle. As written, the exception would allow sealing around the shielding of the entire bundle of twisted pairs or individual conductors. I do not think this was envisioned and can not believe such a seal could be properly made.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-54.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-57 Log #4632 NEC-P14 **Final Action: Reject**
(501.15(D)(2) Exception)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise the last sentence to read as follows: "Cables with twisted pairs of conductors shall not require the separation of individual twisted pairs, and cables with shielding over individual twisted pairs shall not require the removal of the shielding material."
Substantiation: The existing wording of this exception fails to take into account the fact that shielding may be applied to each pair individually, or to the entire group of twisted pairs (usually four pairs in the case of common Ethernet cabling, for example) taken collectively. The product listing for this mastic and the installation instructions that come with it only cover shielding on the individual pairs. This submitter has learned that this was the only form the panel considered in writing this part of the exception. If the shielding is applied just under the cable jacket and over the entire group of twisted pairs, that cable (unless flooded and therefore covered in a different part of this section) will be capable of gas migration. This proposal limits the application of this exception to the types of cabling for which this procedure is safe.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-54.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-58 Log #924 NEC-P14 **Final Action: Reject**
(501.15(F)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "approved" to "identified".
Substantiation: Edit. "Identified" is more specific than "approved".
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. The panel has reviewed all of the editorial proposals presented by the submitter and one or more of the following statements apply to the specific proposal,
(1) The panel has previously conducted extensive studies of the use of the terms "approved", "listed", and "identified". The term used in the current text is appropriate within the context of this provision of the code.
(2) The current text is correct. "May" is not subjective, but denotes physical possibility and is the appropriate term. The term "is likely to be" denotes probability, or a greater chance of occurrence.
(3) The word "suitable" as used in this section is not unenforceable and does not create confusion, as indicated in the requirements of the NEC Style Manual. As such, it does not need to be replaced.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-59 Log #4440 NEC-P14 **Final Action: Accept in Principle**
(501.15(F)(3))

Submitter: Eliana Beattie, ISA
Recommendation: Add the following at the end of the section:
"FPN: For construction and testing requirements for dual seal process, connected equipment, refer to ANSI/ISA-12.27.01-2003, Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids. "
Substantiation: FPN provides reference standard for process sealing requirements. This change will make 501.15 agree with the equivalent provisions of 505.16.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-60.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-60 Log #4441 NEC-P14 **Final Action: Accept in Principle**
(501.15(F)(3))

TCC Action: The Technical Correlating Committee directs that the publication date of the ANSI document be included in the text as required by the Manual of Style for NFPA Technical Committee Documents Section 2.3.1.2.4 which requires dates of publication for referenced documents.
In addition, the Technical Correlating directs that the panel revise the meeting action text to comply with the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Eliana Beattie, ISA
Recommendation: Modify the existing text as follows:
Process-connected equipment that is listed and marked "Single Seal" or "Dual Seal" shall not require additional process sealing when used within the manufacturer's ratings.
FPN: For construction and testing requirements for single and dual seal process, connected equipment, refer to ANSI/ISA-12.27.01-2003, Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids.
Substantiation: The provisions of ANSI/ISA-12.27.01 include both construction and performance requirements for single and dual sealed electrical equipment. The additional requirements for single seal equipment include both pressure and temperature cycling, followed by a leakage and burst test.
Panel Meeting Action: Accept in Principle
Delete 501.15(F)(3) and create a new section 501.17 to read:
501.17 Process Sealing This section applies to process connected equipment which includes, but is not limited to, canned pumps, submersible pumps, flow, pressure, temperature, or analysis measurement instruments. A process seal is a device to prevent the migration of process fluids from the designed containment into the external electrical system. One of the following means shall be provided to prevent process fluids from entering the electrical raceway or cable system:
(1) Process connected electrical equipment that incorporates a single process seal, such as single compression seal, diaphragm, or tube to isolate flammable or combustible fluids from entering a conduit or cable system capable of transmitting fluids, shall be provided with an additional means to mitigate a single process seal failure. The additional means may include, but is not limited to the following:
a. A suitable barrier meeting the process temperature and pressure conditions that the barrier will be subjected to upon failure of the single process seal. There shall be a vent or drain between the single process seal and the suitable barrier. Indication of the single process seal failure shall be provided by visible leakage, an audible whistle, or other means of monitoring.
b. A listed Type MI cable assembly, rated at not less than 125 percent of the process pressure and not less than 125 percent of the maximum process temperature (in degrees Celsius), installed between the cable or conduit and the single process seal.
c. A drain or vent located between the single process seal and a conduit or cable seal. The drain or vent shall be sufficiently sized to prevent overpressuring the conduit or cable seal above 6 in. water column (1493 Pa). Indication of the single process seal failure shall be provided by visible leakage, an audible whistle, or other means of monitoring.
(2) Process-connected electrical equipment that is listed and marked "single seal" or "dual seal".
FPN: For construction and testing requirements for process sealing for listed and marked "single seal" or "dual seal" requirements refer to ANSI/ISA-12.27.01, Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids.
Panel Statement: The revised text more clearly states the proposed requirements for process sealing.
Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

COSPOLICH, J.: Revise Panel Meeting Action wording as follows:

In new Section 505.26(1) a., change the wording, "..., an audible whistle,..." to read "..., an audible indication,...".

In new Section 505.26(1) b., change the wording, "...and not less than 125% of the maximum or minimum process temperature (in degrees Celsius),..." to read "...and not less than 125% of the maximum or minimum process temperature (in degrees Celsius),...".

In new Section 505.26(1) c., change the wording, "...above 6 in. water (1493 Pa). Indication of the single process seal failure shall be provided by visible leakage, an audible whistle,..." to read "...above 1493 Pa (6 in. water). Indication of the single process seal failure shall be provided by visible leakage, an audible indication,...".

14-61 Log #1031 NEC-P14 **Final Action: Reject**
(501.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "are likely" and "approved" to "identified".
Substantiation: Edit. "May" is subjective and a term that is to be avoided per the Style Manual. "Approved" is not the same as "identified". "Likely" is defined as a nature or circumstance as to make something probable and is used in many Code sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-62 Log #1030 NEC-P14 **Final Action: Reject**
(501.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "suitable" to "identified".
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-63 Log #1807 NEC-P14 **Final Action: Reject**
(501.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: GROUNDING and BONDING class I DIVISIONS 1 and 2. Metal enclosed wiring and equipment shall be grounded and comply with 502.30(A) and (B).

(A) BONDING. The locknut, double-locknut, and locknut-bushing shall not be permitted as the sole bonding means. Bonding jumpers with identified fittings or other identified means shall be used. Such means of bonding shall apply to all intervening metal raceways, cables, fittings, boxes, and other enclosures and equipment in Class II locations to the point of grounding for service equipment.

Exception: The specific bonding means shall only be required to the point where the grounded conductor (if used) and the grounding electrode conductor are connected on the load side of the building or structure, or separately derived system disconnecting means which includes overcurrent protection.

FPN No change.

Substantiation: Single locknut connections such as commonly used with cable and flexible conduit connectors should be included. Locknuts and bushings should only be prohibited as the sole bonding means. Intervening cables such as Type MI should be included All wiring systems may not include a grounded circuit conductor.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-64 Log #3309 NEC-P14 **Final Action: Reject**
(501.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: <u>Electrical</u> wiring and equipment in Class 1 Division 1 and 2 locations shall be grounded ~~as specified in Article 250~~ ~~and with~~ the requirements in 501.30(A), 501.30(B) <u>shall apply</u>.
Substantiation: Article 250 already applies and has provisions which are alternatives or exceptions to grounding which do not appear to be intended to apply. Many sections simply state "shall be grounded"... Similar requirements worded differently may cause confusion per 3.3.5 of the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63. The substantiation does not provide a reason for adding the word "electrical". Section 4.1.1 of the NEC Style Manual allows references to code articles where additional conditions are specified.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-65 Log #2587 NEC-P14 **Final Action: Reject**
(501.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

TYPES of EQUIPMENT GROUNDING <u>and BONDING CONDUCTORS.</u> Flexible metal conduit<u>,</u> ~~and~~ liquidtight flexible metal conduit <u>and flexible metal fittings</u> shall not be used as the sole ground-fault current path. ~~Where equipment bonding jumpers are installed they shall comply with 250.102.~~ Exception in Class I Division 2 locations, ~~the~~ <u>a wire-type equipment grounding or</u> bonding conductor shall ~~be permitted to be deleted~~ <u>not be required</u> where all of the following conditions are met:

(1) ~~Listed~~ <u>L</u>iquidtight flexible metal conduit 1.8 m (6 ft) or less in length ~~with fittings listed from grounding~~ is used.

(2) Overcurrent protection in the circuit is limited to 10 amperes or less. The load is not a power ~~utilization~~ <u>or lighting</u> load.

Substantiation: Edit. The heading should include bonding conductors addressed in the text. Since the conduit is a grounding and bonding conductor the omission should refer to wire types. The grounding or bonding conductor cannot be deleted unless first installed. Fittings are already required to be listed in the respective articles. "Power" infers a particular type of load such as one that is not lighting or control Section 250.102 already applies, as do other requirements of Article 250, which are not referenced.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-66 Log #3078 NEC-P14 **Final Action: Accept**
(501.30(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(B) Types of Equipment Grounding Conductors. Flexible metal conduit and liquidtight flexible metal conduit shall <u>include an equipment bonding jumper of the wire type, in compliance with 250.102.</u>~~not be used as the sole ground-fault current path. Where equipment bonding jumpers are installed, they shall comply with 250.102.~~
Exception: Text to remain unchanged.
Substantiation: Because many things (such as earth itself) are types of ground fault current paths [250.2], the existing language doesn't really tell the code user what the requirement is. This revised language makes it much clearer.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-67 Log #329 NEC-P14 **Final Action: Reject**
(501.40)

Submitter: Alan Chech, Alan Chech Electrical Seminars
Recommendation: Delete section 501.40.
Substantiation: All multi-wire branch circuits are now required by 210.4(B) to be disconnected simultaneously.
Panel Meeting Action: Reject
Panel Statement: This multi-wire branch circuit requirement must be retained due to its importance. This is directed at prevention of fire and explosion as well as personnel safety, as addressed in 210.4. These two sections are not in conflict.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-68 Log #545 NEC-P14 **Final Action: Reject**
(501.40)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete this section.
~~501.40 Multiwire Branch Circuits.~~
~~In a Class I, Division 1 location, a multiwire branch circuit shall not be permitted.~~
~~*Exception: Where the disconnect device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.*~~
Substantiation: To conform to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors or multiwire branch circuit and applies per 90.3.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-69 Log #569 NEC-P14 **Final Action: Reject**
(501.40)

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Delete text as follows:
~~501.40 Multiwire Branch Circuits.~~
~~In a Class I, Division 1 location, a multiwire branch circuit shall not be permitted.~~
~~*Exception: Where the disconnect device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.*~~
Substantiation: Section 210.4(B) requires all ungrounded conductors of multiwire branch circuits to be provided with a means of simultaneous disconnection at the point where the branch circuit originates. This makes the requirement and Exception in 501.40 unnecessary because Chapters 1-4 have general application.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-70 Log #3210 NEC-P14 **Final Action: Reject**
(501.40)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Delete 501.40.
This is a companion proposal with 502.40, 505.21, and 506.21.
Substantiation: Since 210.4(B) now requires all multiwire branch circuits to "be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates", 501.40 is redundant.
The deletion has been suggested by some, but it will likely be rejected because 210(B) is a requirement for personnel protection and could at some point be changed. The requirement here is for prevention of fire and explosion. In either case, this will get CMP 14 on record.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-71 Log #3675 NEC-P14 **Final Action: Reject**
(501.40)

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Delete 501.40 and its associated exception in its entirety.
Substantiation: 501.40 is redundant as new 2008 210.4(B) does already encompass the intent of 501.40.
210.4(B) Disconnecting Means. "Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates."
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-72 Log #4633 NEC-P14 **Final Action: Reject**
(501.40)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this section.
Substantiation: This section now effectively repeats, without change, the provisions of 210.4(B) that requires simultaneous disconnection for all multiwire branch circuits wherever installed.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-73 Log #2614 NEC-P14 **Final Action: Reject**
(501.40 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
<u>"without the use of handle ties"</u>
Substantiation: For hazardous (classified) areas, reliance should not be on handle ties which can be removed. See 514.11(A).
Panel Meeting Action: Reject
Panel Statement: This provision has been in the code since the 1993 edition and there is no evidence that a problem exists. Also, not all factory-installed handle ties in multi-pole circuit breakers can be removed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-74 Log #1846 NEC-P14 **Final Action: Reject**
(501.40(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: 110.2 and 110.14 are general requirements that already apply.
Panel Meeting Action: Reject
Panel Statement: The proposal references a section that does not exist.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-75 Log #1277 NEC-P14 **Final Action: Reject**
(501.100(B))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Add new text to existing text to read:
(B) Class I, Division 2. In Class I, Division 2 locations, transformers ~~and capacitors~~ shall comply with 450.21 through 450.27. <u>Transformers shall be one of the following:</u>
<u>(1) Identified for Class I, Division 1 or 2 locations.</u>
(2) <u>Of a type that has been tested in order to determine the marked operating temperature or temperature class (T Code).</u>
<u>(3) Marked with the maximum exposed surface temperature, including hotspots of open, dry-type transformer windings. The winding hotspot shall not exceed 80 percent of the ignition temperature in degrees Celsius of the gas or vapor involved.</u>
<u>Capacitors shall comply with 460.2 through 460.28.</u>
Substantiation: There are many instances today where 150 deg. C temperature rise transformers are being installed in hazardous areas. The problem is for example, a 40 deg. C ambient (which is fairly common), plus a 150 deg. C rise on the transformer, plus a 30 deg. C hotspot which typically is allowed, the exposed winding temperature can be 220 deg. C. Transformers like this are being installed in locations that would require a maximum surface temperature of 160 deg. C, (a T3C area) for example, or other areas where the temperature of the transformer is exceeding 80 percent of the ignition temperature of the gas involved. Even though logically an AHJ could use Section 500.8(C) to enforce this violation, it is not readily apparent to some that are applying 501.100 that heat is additive and they need to follow more than just Art. 450. A marking on the transformer would make this easier for design engineers, inspectors, and electricians to apply this section properly. This would also be in line with rules required for heaters and luminaires.
The other part of this proposal is to reference applicable parts of Art. 460 for capacitors, since Art. 450 doesn't really have anything to do with capacitors in Class I, Div. 2 locations.
Panel Meeting Action: Reject
Panel Statement: This submitter's concern is already addressed by 500.8(D)(1).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-76 Log #905 NEC-P14 **Final Action: Reject**
(501.105(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
(B)(1) Exception: ~~General purpose~~ Identified enclosures other than those specified in 501.105(A) shall be permitted... (remainder unchanged)
(B)(2) Exception: ~~General purpose~~ ~~type~~ Identified enclosures other than those specified in 501.105(A) shall be permitted.. (remainder unchanged).
(B)(3), last sentence: ~~General purpose type~~ Identified enclosures other than those specified in 501.105(A) shall be permitted.
(B)(4) ~~General Purpose~~ Other Assemblies. Where an assembly is made up of components for which ~~general purpose~~ enclosures are acceptable as provided in the exceptions for 501.105(B)(1), (2), and (3), a single enclosure shall be acceptable for the assembly... (remainder unchanged).
(B)(5) Fuses. Where ~~general purpose~~ enclosures permitted by 501.105(B)(1) through (B)(4) are used, fuses for overcurrent protection of instrument circuits not likely to be overloaded ~~not subject to overloading in normal~~ use shall be permitted to be ~~mounted~~ installed in ~~general purpose~~ such enclosures if each fuse is ~~preceded with a~~ supplied by a switch or circuit breaker complying with 501.105(B)(1).
(B)(6)(3): The power supply flexible cord or cable does not exceed 900 mm (3 ft) is ~~listed for~~ an extra-hard usage type identified for the application or hard-usage type identified for the application ~~if protected by location~~ and is supplied ~~through~~ by an attachment plug and receptacle of the locking and grounding type. (remainder unchanged).
Substantiation: "General purpose" is not defined; is it intended to prohibit or accept other types which may be suitable such as weatherproof watertight, dusttight, etc.? Article 400 does not specify flexible cords (or cables which may be suitable) to be listed. Flexible cords should be identified for the use such as wet locations, oil, sunlight resistance, and not for electric vehicle charging.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. See also Proposal 14-30.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-77 Log #909 NEC-P14 **Final Action: Reject**
(501.105(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
(B)(1) Exception: ~~General purpose~~ Identified enclosures other than as specified in 501.105(A) shall be permitted if current-interrupting contacts comply with one or more of the following:
(1) No change
(2) No change
(3) No change
(4) "... are a component part of equipment listed for Class I Division 1 or 2.
(B)(2) Exception: ~~General purpose~~ Identified enclosures other than as specified in 501.105(A) shall be permitted (remainder unchanged).
(B)(3) last sentence: ~~General purpose~~ Identified enclosures other than as specified in 501.105(A) shall be permitted.
(B)(4) ~~General Purpose~~ Other Assemblies. Where an assembly is made up of components for which ~~general purpose~~ identified enclosures are ~~acceptable~~ as permitted in 501.105(B)(1), (B)(2), and (B)(3) a single ~~general purpose~~ enclosure shall be ~~acceptable~~ permitted for the assembly....
(B)(5) Fuses. ~~Where~~ Enclosures permitted in 501.105(B)(1) through (B)(4) shall be permitted to contain fuses for overcurrent protection of instrument circuits not likely to be subject to overloading in normal use ~~shall be permitted to be mounted in general purpose enclosures~~ if each such fuse is ~~preceded~~ on the load side of a switch or circuit breaker complying with 501.105(B)(1).
Substantiation: Edit. "General purpose" is not defined; does it include or exclude weatherproof, watertight, and dusttight types? All other "general purpose" types should be identified for the purpose. "Acceptable" is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-76.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-78 Log #902 NEC-P14 **Final Action: Reject**
(501.105(B)(6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Connections. ~~To facilitate replacements p~~Process control instruments shall be permitted to be connected through a flexible cord in accordance with 501.140(B), a locking type and grounding type attachment plug and receptacle, provided all the following conditions apply:
(1) A switch or circuit breaker complying with 501.105(B) is provided that disconnects all ungrounded conductors supplying the receptacle. ~~So that the attachment plug is not depended on to interrupt current.~~
(2) The rated current and voltage of the process control instruments do not exceed 3 amperes ~~at~~ and 120 volts, nominal.
(3) The power supply flexible cord does not exceed 900 mm (3 ft), is of a type ~~listed for~~ identified for extra-hard usage or hard usage and the application, and is supplied by an attachment plug and receptacle of the locking and grounding type.
(4) No change (5) ~~The receptacle carries~~ A permanent and durable label is provided immediately adjacent to the receptacle warning against unplugging under load.
Substantiation: Edit. The purpose of the rule is irrelevant, most provisions do not provide reasons. A circuit breaker should also be suitable for disconnection and its exact function indicated. (B)(6)(2) should clearly relate to instruments and their rated current and voltage. Article 400 does not require listing. Cords should be identified for the use; electric vehicle cable types are not suitable for this use, others may not be suitable for wet or oily environments or sunlight resistance.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-79 Log #2218 NEC-P14 **Final Action: Reject**
(501.115(B)(3))

Submitter: Paul Guidry, Fluor Enterprises, Inc.
Recommendation: Revise as follows:
(3) Fuses. For the protection of motors, appliances, and lamps, other than as provided in 501.115(B)(4), standard plug or cartridge fuses shall be permitted, provided they are:
(1) placed within enclosures identified for the location, or
(2) ~~fuses shall be permitted if they are~~ placed within general-purpose enclosures~~, and~~ if they are of a type in which the operating element is immersed in oil or other approved liquid, or the operating element is enclosed within a chamber hermetically sealed against the entrance of gases and vapors, or
(3) placed within general-purpose enclosures, and the fuse is a nonindicating, filled, current-limiting type and the fuse cannot be removed while energized.
Substantiation: Even though safe work practices dictate that fuses shouldn't normally be removed while energized, there are cases for example, in Class I, Div. 2 locations a light fixture with an in-line fuse may be opened under load because it may be used as a disconnecting means. The fuse may be OK since it is a filled, current limiting type, but there can be an arc when opening the fuseholder which may cause a problem.
The remainder of the changes is suggested to make the section easier to understand instead of one, long, run-on sentence.
Panel Meeting Action: Reject
Panel Statement: The National Electrical Code is an installation code, not a maintenance document or safe work practice. See 90.1(C) of the code. The submitter is directed to NFPA 70E. The submitter is also suggesting a type of construction for the fuse that is impractical to implement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-80 Log #603 NEC-P14 **Final Action: Accept in Principle**
(501.125(B))

Submitter: William G. Lawrence, Jr., S. Yarmouth, MA
Recommendation: Revise text to read as follows:
The exposed surface of space heaters used to prevent condensation of moisture during shutdown periods shall not exceed 80 percent of the ignition temperature in degrees Celsius of the gas or vapor involved when operated at rated voltage, and the maximum surface temperature [based on a 40°C ~~(104°F)~~ or higher marked ambient] shall be permanently marked on a visible nameplate mounted on the motor.
Substantiation: 500.8(B)(5) no longer permits degrees Fahrenheit for ambient temperature marking. Maintaining the °F here is misleading.
500.8(B)(4) specifies that the operating temperature be determined "at a 40°C ambient temperature or at the higher ambient temperature if the equipment is rated and marked for an ambient temperature greater than 40°C." The current wording of 501.125(B) would allow the maximum surface temperature of a space heater on a motor rated and marked for an 85°C ambient to be determined at 40°C. This would result in an unsafe condition as the true surface temperature of the heater would be higher than the marking would indicate.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
The exposed surface of space heaters used to prevent condensation of moisture during shutdown periods shall not exceed 80 percent of the ignition temperature in degrees Celsius of the gas or vapor involved when operated at rated voltage, and the maximum space heater surface temperature [based on a 40°C ~~(104°F)~~ or higher marked ambient] shall be permanently marked on a visible nameplate mounted on the motor.
Panel Statement: The modification made clarifies that the surface temperature marked is that of the space heater, not the motor itself.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-81 Log #3211 NEC-P14 **Final Action: Reject**
(501.130(B)(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: After first sentence, add the following:
"Threaded joints shall be provided with set screws or other effective means to prevent loosening."
Substantiation: This requirement is in (A)(3) for Class I, Division 1 luminaires and should apply to Division 2 luminaires as well.
Panel Meeting Action: Reject
Panel Statement: The substantiation does not state why a set screw is a necessity in a Division 2 location. The equipment requirements for Division 1 locations are more restrictive than for Division 2 locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-82 Log #1838 NEC-P14 **Final Action: Reject**
(501.140)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: FLEXIBLECORDS and PORTABLE POWER CABLE.
(A) Flexible cords and portable power cable shall be permitted:
(1) For connection between ~~portable lighting equipment~~ portable utilization equipment and the fixed portion of their supply circuit where conditions of maintenance and supervision ensure that only qualified persons install and service the installation.
(2) For that portion of the circuit where the fixed wiring methods of 501.10
(A) cannot provide the necessary degree of movement ~~for fixed and mobile utilization equipment~~, and the flexible cord or portable power cable is not likely to be subject to physical damage or destructive conditions or is protected by identified means. ~~location or by a suitable guard from damage and only in industrial establishments where conditions of maintenance and engineering supervision ensure that only qualified persons install and service the installation.~~
(3) No change.
(4) No change.
(B) INSTALLATION. Where flexible cords or portable power cables are used they shall comply with all of the following:
(1) Be type G, G-GC, PPE, S, SE, SEW, SEO, SEOW, SO, SOW, SOO, SOOW, ST, STW, STO, STOW, or STOO, and where applicable, identified for wet locations, oil resistance, and sunlight resistance.
(2) ~~Contain in addition to conductors of the circuit an equipment grounding conductor complying with 400.23.~~
(3) Be connected to terminals and supply conductors in ~~an approved manner~~ accordance with 110.14.
(4) Be ~~supported by clamps or other suitable means~~ installed in such a manner that there is no tension on the terminal connections or be provided with an identified means of strain relief.
(5) Be provided with ~~suitable~~ conduit seals where the flexible cord or portable power cable enters ~~boxes, fittings or~~ enclosures of the explosion-proof type.
Delete exception to (5).
(6) Be of one continuous length.
FPN no change.
Substantiation: Portable power cables should be included. Utilization equipment includes lighting equipment. "Fixed and mobile" is superfluous. Maintenance and supervision should be the criteria, not only for industrial establishments. The proposed type of cords and cables covers the suitable types of Article 400. Equipment grounding conductors are already covered by 400.23 which applies. An "approved" manner is not necessarily the same as 110.14. Seals should be conduit seals, "suitable" is subjective and a term to be avoided per the Style Manual. "Boxes and fittings" is superfluous; covered by "enclosures".
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. In addition, portable power cables are a subset of flexible cords and are, therefore, already covered. CMP-14 points out that this proposal would eliminate the equipment grounding conductor, which is an essential safety feature.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-83 Log #1864 NEC-P14 **Final Action: Reject**
(501.140)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: FLEXIBLE CORDS and CABLES in CLASS 1 and 2 LOCATIONS.
(A) PERMITTED USES. Flexible cords and cables shall be permitted only as follows:
(1) For connection between portable lighting equipment or other portable utilization equipment and or the fixed portion of their supply circuit.
(2) For connections other than permitted in (A) on premises where conditions of maintenance and supervision ensure that only qualified persons install and service the installation and all of the following apply:
(1) The flexible fittings specified in 510.10(A)(2) cannot provide the necessary degree of movement;
(2) The cords or cables are extra-hard usage types identified for the use and sunlight resistant where exposed to direct sunlight;
(3) The cords or cable are provided with identified bushings where entering raceways or other enclosures;
(4) Conduit seals are provided in accordance with 501.15;
(5) The cords or cables contain an equipment grounding conductor;
(6) The cords or cables are not longer than necessary;
(7) The cords or cables are not likely to be subject to physical damage or deteriorating agents; identified means shall be provided to prevent tension on terminal connections.
Substantiation: "Permitted" should be restricted by the word "only". Conditions of maintenance and supervision should be the criteria for permitting cords, not the type of establishment; many commercial establishments meet this criteria. "Engineering supervision" is not specific; is a chemical engineer qualified? Flexible cords and cables other than for portable equipment should be limited to where the flexible fittings of 501.10(A)(2) are not suitable. Article 400 does not require listing. All extra-hard usage may not be suitable (identified) for the use such as Types EV, EVE, EVT, wet locations, oil resistant, or sunlight resistant. Flexible cord and cables should not be longer than necessary.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-82.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-84 Log #3269 NEC-P14 **Final Action: Reject**
(501.140(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
(A) Flexible Cords and Portable Power Cables. On premises where conditions of supervision and maintenance ensure that only qualified persons install and service the installation, flexible cords and cables shall only be permitted as follows:
(1) In accordance with 501.10(A)(2).
(2) The flexible cord or power cable is not likely to be subject to physical damage or is protected by identified means.
(3) For electric submersible pump motors with means for removal without entering the wet-pit. The extension of the flexible cord or power cable within an identified raceway extending from the wet-pit shall be permitted.
(4) For electric mixers that travel into and out of mixing tanks or vats.
(B) Installation. Where flexible cords or power cables are used they shall:
(1) Contain an equipment grounding conductor
(2) Be an extra-hard usage type identified for the use such as wet locations, exposed to oil or direct sunlight.
(3) Be connected to terminals in accordance with 110.14(3).

(4) Be provided with identified strain relief devices or installed so there is no tension on terminal connections.
(5) Be provided with conduit seals in accordance with applicable provisions of 501.15.
(6) Be of continuous lengths.
FPN: No change.
Substantiation: Portable power cables should be included. Conditions of maintenance and supervision should be the criterion, not type of occupancy which has no relevance. Section 501.10(A)(2) is a suitable reference for use. All extra-hard usage cords are not suitable, e.g., EV, EVE, EVT. Section 110.14(3) is more specific that "approved" which only requires acceptance by the AHJ. Present exception for (B)(5) does not appear relevant for nonincendive wiring and 501.105(B)(6) doesn't void seal requirements. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-82.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-85 Log #3192 NEC-P14 **Final Action: Accept**
(501.140(A)(5))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add new text as follows:
"<u>(5) For temporary portable assemblies consisting of receptacles, switches, and other devices that are not considered portable utilization equipment but are individually listed for the location.</u>"
Substantiation: Periodically, manufacturers are asked to furnish portable power carts, as they are sometimes called, for use in Class I hazardous locations. These are typically used by refineries during times of periodic maintenance, called turnarounds. The problem is that the carts themselves don't meet the definition of portable utilization equipment, and so cannot be used to supply power through receptacles to the actual portable utilization equipment because 501.140(B)(5) requires the cord to be of continuous length.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-86 Log #1984 NEC-P14 **Final Action: Reject**
(501.140(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise: (3) Be connected to supply terminals in an approved manner in accordance with 110.14.
Substantiation: Edit. Already covered by 110.14; does not conform to 3.3.5 of the Style Manual and increases bulk of the Code. It may be deemed that "approved manner" (see definition of approved) sanctions connections that may not comply with 110.14.
Panel Meeting Action: Reject
Panel Statement: The submitter provided two alternatives in a single proposal, which does not meet the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
NEAGLE, J.: I agree that the submitter's proposal does not conform with the NFPA Regulations Governing Committee Projects for the reason stated. However, I also agree that 501.140(B)(3) is superfluous text which is already covered by 110.14. This section should be deleted.

14-87 Log #2020 NEC-P14 **Final Action: Reject**
(501.140(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise (B)(3) as follows: Be connected to ~~supply~~ terminals in ~~an approved manner~~ <u>accordance with 110.14</u>.
Substantiation: Already covered by 110.14. "Approved" may sanction connections that do not comply with 110.14. Load terminals should be included in the provision.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-86.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
NEAGLE, J.: I agree that the submitter's proposal does not conform with the NFPA Regulations Governing Committee Projects for the reason stated. However, I also agree that 501.140(B)(3) is superfluous text which is already covered by 110.14. This section should be deleted.

14-88 Log #2830 NEC-P14 **Final Action: Accept**
(501.140(B)(5))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(5) Be <u>terminated with a cord connector or attachment plug listed for the location and be</u> provided with ~~suitable~~ <u>listed</u> seals where the flexible cord enters boxes, fittings, or enclosures <u>required to be</u> ~~of the~~ explosionproof ~~type~~
~~*Exception to (5): Seals shall not be required as provided in 501.10(B) and 501.105(B)(6).*~~
Substantiation: Cord is *terminated* with fittings, but the fittings are not *provided* with the cord, they are sourced separately. This proposal makes clear the intent to terminate the flexible cord with attachment plugs or fittings that comply with consensus safety requirements for such devices, including strain relief and ingress protection.
The exception is removed since neither 501.10(B) or 501.105(B)(6) give specific cord sealing requirements and there is no exception to completing an enclosure that is required to be explosionproof with a seal on the entry.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-89 Log #3193 NEC-P14 **Final Action: Reject**
(501.140(B)(6))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Delete 501.140(B) ~~(6) Be of continuous length.~~
See companion proposal for 501.140(A).
Substantiation: Neither 502.140 nor 503.140 require that flexible cords be of a continuous length. In fact, neither section has two paragraphs, one on permitted uses and one on installation, as does 501.140. Are Class I locations that much more dangerous than Class II or III? It has been commonly thought that CMP 14 didn't want to see "extension cords" in Class I, not even in Division 2. In Canada, connectors are permitted in Class I locations. An IEC standard 309-3 was published years ago that had requirements for connectors for use in hazardous atmospheres. For unknown reasons it was allowed to lapse, but it shows that the rest of the world thinks properly rated connectors are suitable for Class I hazardous locations.
Panel Meeting Action: Reject
Panel Statement: If accepted, this proposal would allow the use of splices in cords. The fact that this provision is not included for Class II and Class III locations is not justification for removing the provision for Class I locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 502— CLASS II LOCATIONS

14-90 Log #4443 NEC-P14 **Final Action: Accept in Principle**
(502)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relative to the requirements for Class II, Division 2.
This action will be considered by the panel as a public comment.
Submitter: Eliana Beattie, ISA
Recommendation: Revise and add new text to read as follows:
(3) <u>Group E</u> ~~**Metal Dusts.**~~ No transformer or capacitor shall be installed. ~~in a location where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present.~~
502.115 (A):
(1) <u>Groups F and G</u> ~~**Type Required.**~~ Switches, circuit breakers, motor controllers, and fuses, including pushbuttons, relays, and similar devices, shall be provided with identified dust-ignitionproof enclosures. <u>Isolating switches containing no fuses shall be permitted to be dusttight.</u>
(2) <u>Group E</u> ~~**Metal Dusts.**~~ ~~In locations where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present,~~ <u>F</u>fuses, switches, motor controllers, and circuit breakers shall have enclosures identified for such locations.
502.120 (A):
(A) Class II, Division 1. In Class II, Division 1 locations, control transformers, solenoids, impedance coils, resistors, and any overcurrent devices or switching mechanisms associated with them shall <u>comply with 502.120 (A) (1) and (A) (2).</u>
<u>(1) Groups F and G: Control transformers, solenoids, impedance coils, resistors, and any overcurrent devices or switching mechanisms associated with them shall be installed in</u> ~~have~~ dust-ignitionproof enclosures <u>for the specific</u> ~~identified for~~ Class II locations.
<u>(2) Group E: Control</u> ~~No control~~ transformer<u>s</u>, impedance coil<u>s</u>, or resistor<u>s</u> shall <u>be installed in enclosures</u> ~~be installed in a location where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present unless provided with an enclosure~~ identified for the specific location.

In 502.120 (B) (2) and (3):

(2) Coils and Windings. Where not located in the same enclosure with switching mechanisms, control transformers, solenoids, and impedance coils shall ~~be provided with tight metal housings without ventilating openings or~~ shall be installed in dusttight enclosures. ~~Effective January 1, 2011, only dusttight enclosures shall be permitted.~~

(3) Resistors. Resistors and resistance devices shall comply with 502.120 (A). ~~have dust-ignitionproof enclosures identified for Class II locations.~~

Exception: Where the maximum normal operating temperature of the resistor will not exceed 120°C.......

In 502.135 (A):

(A) Class II, Division 1. In Class II, Division 1 locations, all utilization equipment shall comply with 502.135 (A) (1) and (A) (2).

(1) Group F and G: Utilization equipment shall be for the specific ~~identified for~~ Class II location~~s~~.

(2) Group E: ~~Where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present, such~~ ~~E~~equipment shall be identified for the specific location.

In 502.150 (A), and (4) and (5), and (B)(3):

(A) Class II, Division 1. In Class II, Division 1 locations, signaling, alarm, remote-control, and communications systems; and meters, instruments, and relays shall comply with 502.150(A)(1) through (A)(4~~5~~).

~~**(4) Combustible, Electrically Conductive Dusts.** Where dusts are of a combustible, electrically conductive nature, all wiring and equipment shall be identified for Class II locations.~~

(4~~5~~) Group E ~~**Metal Dusts.** Where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present,~~ A~~a~~ll apparatus and equipment shall be identified for the specific conditions.

(B) (3) Resistors and Similar Equipment. Resistors, resistance devices, thermionic tubes, rectifiers, and similar equipment shall comply with 502.120 (A) ~~(B)(3)~~.

Substantiation: In 502.100 (3) the text is simply being improved by using the correct Group E and cleaning up the text. As this is already considered as being a Division 1 location, no other changes are needed.

In 502.115 (1) the term "type required" is redundant since what is required is so stated. During the 2008 code cycle an error was made in deleting an isolation disconnect during consideration of metal tight enclosures vs dust-tight. The acceptable condition for use has been reinserted using the NEC defined term for an isolating switch.

In 502.120 the text has been clarified by the correct use of "Group E" and the Group F and G text made consistent with (B) (3).

In 502.120 again the text has been clarified since the effective date has been eliminated with this 2011 document and the text under (3) consolidated back up under 502.120 (A) as indicated.

In 502.135 again the text has been made consistent with the former sections as well as clarified with the use of the dust Group terms.

In 502.150, again the use of Group E was added, this eliminated the need for an item (4). Numbering changes were then needed as indicated.

Panel Meeting Action: Accept in Principle

Revise Article 502 Part III to read:

III. Equipment

502.100 Transformers and Capacitors. (A) Class II, Division 1. In Class II, Division 1 locations, transformers and capacitors shall comply with 502.100(A) (1) through (A)(3).

(1) Containing Liquid That Will Burn. Transformers and capacitors containing a liquid that will burn shall be installed only in vaults complying with 450.41 through 450.48, and, in addition, (1), (2), and (3) shall apply.

(1) Doors or other openings communicating with the Division 1 location shall have self-closing fire doors on both sides of the wall, and the doors shall be carefully fitted and provided with suitable seals (such as weather stripping) to minimize the entrance of dust into the vault.

(2) Vent openings and ducts shall communicate only with the outside air.

(3) Suitable pressure-relief openings communicating with the outside air shall be provided.

(2) Not Containing Liquid That Will Burn. Transformers and capacitors that do not contain a liquid that will burn shall be installed in vaults complying with 450.41 through 450.48 or be identified as a complete assembly, including terminal connections for Class II locations.

(3) ~~Metal Dusts~~ Group E. No transformer or capacitor shall be installed in a Class II, Division 1, Group E location. ~~where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present.~~

(B) Class II, Division 2. In Class II, Division 2 locations, transformers and capacitors shall comply with 502.100(B)(1) through (B)(3).

(1) Containing Liquid That Will Burn. Transformers and capacitors containing a liquid that will burn shall be installed in vaults that comply with 450.41 through 450.48.

(2) Containing Askarel. Transformers containing askarel and rated in excess of 25 kVA shall be as follows:

(1) Provided with pressure-relief vents

(2) Provided with a means for absorbing any gases generated by arcing inside the case, or leave the pressure-relief vents connected to a chimney or flue that will carry such gases outside the building

(3) Have an airspace of not less than 150 mm (6 in.) between the transformer cases and any adjacent combustible material

(3) Dry-Type Transformers. Dry-type transformers shall be installed in vaults or shall have their windings and terminal connections enclosed in tight metal housings without ventilating or other openings and shall operate at not over 600 volts, nominal.

502.115 Switches, Circuit Breakers, Motor Controllers, and Fuses.

(A) Class II, Division 1. In Class II, Division 1 locations, switches, circuit breakers, motor controllers, and fuses, ~~shall comply with 502.115(A)(1) and (A)(2).~~

~~(1) Type Required. Switches, circuit breakers, motor controllers, and fuses,~~ including pushbuttons, relays, and similar devices, shall be provided with enclosures identified for the location ~~dust-ignitionproof enclosures~~.

~~(2) Metal Dusts. In locations where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present, fuses, switches, motor controllers, and circuit breakers shall have enclosures identified for such locations.~~

(B) Class II, Division 2. In Class II, Division 2 locations, enclosures for fuses, switches, circuit breakers, and motor controllers, including pushbuttons, relays, and similar devices, shall be dusttight or otherwise identified for the location.

502.120 Control Transformers and Resistors.

(A) Class II, Division 1. In Class II, Division 1 locations, control transformers, solenoids, impedance coils, resistors, and any overcurrent devices or switching mechanisms associated with them shall be provided with ~~have dust-ignitionproof~~ enclosures identified for the ~~Class II~~ location~~s~~. ~~No control transformer, impedance coil, or resistor shall be installed in a location where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present unless provided with an enclosure identified for the specific location.~~

(B) Class II, Division 2. In Class II, Division 2 locations, transformers and resistors shall comply with 502.120(B)(1) through (B)(3).

(1) Switching Mechanisms. Switching mechanisms (including overcurrent devices) associated with control transformers, solenoids, impedance coils, and resistors shall be provided with enclosures that are dusttight or otherwise identified for the location ~~enclosures~~.

(2) Coils and Windings. Where not located in the same enclosure with switching mechanisms, control transformers, solenoids, and impedance coils shall be provided with enclosures that are ~~tight metal housings without ventilating openings or shall be installed in~~h dusttight or otherwise identified for the location. ~~enclosures. Effective January 1, 2011, only dusttight enclosures shall be permitted.~~

(3) Resistors. Resistors and resistance devices shall have ~~dust-ignitionproof~~ enclosures that are dusttight or otherwise identified for the location ~~enclosures identified for Class II locations~~.

~~Exception: Where the maximum normal operating temperature of the resistor will not exceed 120°C (248°F), nonadjustable resistors or resistors that are part of an automatically timed starting sequence shall be permitted to have enclosures complying with 502.120(B)(2).~~

502.125 Motors and Generators.

(A) Class II, Division 1. In Class II, Division 1 locations, motors, generators, and other rotating electrical machinery shall be in conformance with either of the following:

(1) Identified for the ~~Class II, Division 1~~ location~~s~~

(2) Totally enclosed pipe-ventilated, meeting temperature limitations in 502.5

(B) Class II, Division 2. In Class II, Division 2 locations, motors, generators, and other rotating electrical equipment shall be totally enclosed nonventilated, totally enclosed pipe-ventilated, totally enclosed water-air-cooled, totally enclosed fan-cooled, or dust-ignitionproof for which maximum full-load external temperature shall be in accordance with 500.8(D)(2) for normal operation when operating in free air (not dust blanketed) and shall have no external openings.

Exception: If the authority having jurisdiction believes accumulations of nonconductive, nonabrasive dust will be moderate and if machines can be easily reached for routine cleaning and maintenance, the following shall be permitted to be installed:

(1) Standard open-type machines without sliding contacts, centrifugal or other types of switching mechanism (including motor overcurrent, overloading, and overtemperature devices), or integral resistance devices

(2) Standard open-type machines with such contacts, switching mechanisms, or resistance devices enclosed within dusttight housings without ventilating or other openings

(3) Self-cleaning textile motors of the squirrel-cage type

502.128 Ventilating Piping Ventilating pipes for motors, generators, or other rotating electrical machinery, or for enclosures for electrical equipment, shall be of metal not less than 0.53 mm (0.021 in.) in thickness or of equally substantial noncombustible material and shall comply with all of the following:

(1) Lead directly to a source of clean air outside of buildings

(2) Be screened at the outer ends to prevent the entrance of small animals or birds

(3) Be protected against physical damage and against rusting or other corrosive influences

Ventilating pipes shall also comply with 502.128(A) and (B).

(A) Class II, Division 1. In Class II, Division 1 locations, ventilating pipes, including their connections to motors or to the dust-ignitionproof enclosures for other equipment, shall be dusttight throughout their length. For metal pipes, seams and joints shall comply with one of the following:

(1) Be riveted and soldered
(2) Be bolted and soldered
(3) Be welded
(4) Be rendered dusttight by some other equally effective means

(B) Class II, Division 2. In Class II, Division 2 locations, ventilating pipes and their connections shall be sufficiently tight to prevent the entrance of appreciable quantities of dust into the ventilated equipment or enclosure and to prevent the escape of sparks, flame, or burning material that might ignite dust accumulations or combustible material in the vicinity. For metal pipes, lock seams and riveted or welded joints shall be permitted and tight-fitting slip joints shall be permitted where some flexibility is necessary, as at connections to motors.

502.130 Luminaires. ~~Luminaires shall comply with 502.130(A) and (B).~~

(A) Class II, Division 1. In Class II, Division 1 locations, luminaires for fixed and portable lighting shall comply with 502.130(A)(1) through (A)(4).

(1) Luminaires ~~Fixtures~~. Each luminaire shall be identified for the ~~Class II~~ location~~s~~ and shall be clearly marked to indicate the maximum wattage of the lamp for which it is designed. ~~In locations where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present, luminaires for fixed or portable lighting and all auxiliary equipment shall be identified for the specific location.~~

(2) Physical Damage. Each luminaire shall be protected against physical damage by a suitable guard or by location.

(3) Pendant Luminaires. Pendant luminaires shall be suspended by threaded rigid metal conduit stems, by threaded steel intermediate metal conduit stems, by chains with approved fittings, or by other approved means. For rigid stems longer than 300 mm (12 in.), permanent and effective bracing against lateral displacement shall be provided at a level not more than 300 mm (12 in.) above the lower end of the stem, or flexibility in the form of a fitting or a flexible connector listed for the location shall be provided not more than 300 mm (12 in.) from the point of attachment to the supporting box or fitting. Threaded joints shall be provided with set screws or other effective means to prevent loosening. Where wiring between an outlet box or fitting and a pendant luminaire is not enclosed in conduit, flexible cord listed for hard usage shall be permitted when terminated with a listed cord connector that maintains the protection technique~~,~~ ~~used, and suitable seals shall be provided~~ where the cord enters the luminaire and the outlet box ~~or fitting~~. Flexible cord shall not serve as the supporting means for a luminaire ~~fixture~~.

(4) Supports. Boxes, box assemblies, or fittings used for the support of luminaires shall be identified for Class II locations.

(B) Class II, Division 2. In Class II, Division 2 locations, luminaires shall comply with 502.130(B)(1) through (B)(5).

(1) Portable Lighting Equipment. Portable lighting equipment shall be identified for the ~~Class II~~ location~~s~~. They shall be clearly marked to indicate the maximum wattage of lamps for which they are designed.

(2) Fixed Lighting. Luminaires for fixed lighting~~, where not of a type identified for Class II locations,~~ shall be provided with enclosures that are dusttight or otherwise identified for the location ~~enclosures~~. Each luminaire ~~fixture~~ shall be clearly marked to indicate the maximum wattage of the lamp that shall be permitted without exceeding an exposed surface temperature in accordance with 500.8(D)(2) under normal conditions of use.

(3) Physical Damage. Luminaires for fixed lighting shall be protected from physical damage by suitable guards or by location.

(4) Pendant Luminaires. Pendant luminaires shall be suspended by threaded rigid metal conduit stems, by threaded steel intermediate metal conduit stems, by chains with approved fittings, or by other approved means. For rigid stems longer than 300 mm (12 in.), permanent and effective bracing against lateral displacement shall be provided at a level not more than 300 mm (12 in.) above the lower end of the stem, or flexibility in the form of an identified fitting or a flexible connector shall be provided not more than 300 mm (12 in.) from the point of attachment to the supporting box or fitting. Where wiring between an outlet box or fitting and a pendant luminaire is not enclosed in conduit, flexible cord listed for hard usage shall be permitted when terminated with a listed cord connector that maintains the protection technique ~~used~~. Flexible cord shall not serve as the supporting means for a luminaire ~~fixture~~.

(5) Electric-Discharge Lamps. Starting and control equipment for electric-discharge lamps shall comply with the requirements of 502.120(B).

502.135 Utilization Equipment.

(A) Class II, Division 1. In Class II, Division 1 locations, all utilization equipment shall be identified for the ~~Class II~~ location~~s~~. ~~Where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present, such equipment shall be identified for the specific location.~~

(B) Class II, Division 2. In Class II, Division 2 locations, all utilization equipment shall comply with 502.135(B)(1) through (B)(4).

(1) Heaters. Electrically heated utilization equipment shall be identified for the ~~Class II~~ location~~s~~.

Exception: Metal-enclosed radiant heating panel equipment shall be permitted to be dusttight and marked in accordance with 500.8(C).

(2) Motors. Motors of motor-driven utilization equipment shall comply with 502.125(B).

(3) Switches, Circuit Breakers, and Fuses. Enclosures for switches, circuit breakers, and fuses shall comply with 502.115(B) ~~be dusttight~~.

(4) Transformers, Solenoids, Impedance Coils, and Resistors. Transformers, solenoids, impedance coils, and resistors shall comply with 502.120(B).

OTHER SECTIONS in 502.135 REMAIN UNCHANGED

502.150 Signaling, Alarm, Remote-Control, and Communications Systems and Meters, Instruments, and Relays.

FPN: See Article 800 for rules governing the installation of communications circuits.

(A) Class II, Division 1. In Class II, Division 1 locations, signaling, alarm, remote-control, and communications systems and meters, instruments, and relays shall comply with 502.150(A)(1) through (A)(3~~5~~).

(1) Contacts. Switches, circuit breakers, relays, contactors, fuses and current-breaking contacts for bells, horns, howlers, sirens, and other devices in which sparks or arcs may be produced shall be provided with enclosures identified for the ~~a Class II~~ location.

Exception: Where current-breaking contacts are immersed in oil or where the interruption of current occurs within a chamber sealed against the entrance of dust, enclosures shall be permitted to be of the general-purpose type.

(2) Resistors and Similar Equipment. Resistors, transformers, choke coils, rectifiers, thermionic tubes, and other heat-generating equipment shall be provided with enclosures identified for the ~~Class II~~ location~~s~~.

Exception: Where resistors or similar equipment are immersed in oil or enclosed in a chamber sealed against the entrance of dust, enclosures shall be permitted to be of the general-purpose type.

(3) Rotating Machinery. Motors, generators, and other rotating electrical machinery shall comply with 502.125(A).

~~(4) Combustible, Electrically Conductive Dusts. Where dusts are of a combustible, electrically conductive nature, all wiring and equipment shall be identified for Class II locations.~~

~~(5) Metal Dusts. Where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present, Aall apparatus and equipment shall be identified for the locationspecific conditions.~~

~~(B) Class II, Division 2. In Class II, Division 2 locations, signaling, alarm, remote-control, and communications systems; and meters, instruments, and relays shall comply with 502.150(B)(1) through (B)(4).~~

(4) Contacts. Contacts shall comply with 502.150(A)(1) or ~~contacts shall have tight metal enclosures designed to minimize the entrance of dust and shall have telescoping or tight-fitting covers and no openings through which, after installation, sparks or burning material might escape or~~ shall be installed in enclosures that are dusttight or otherwise identified for the location. ~~dusttight enclosures. Effective January 1, 2011, only dusttight enclosures shall be permitted.~~

Exception: In nonincendive circuits, enclosures shall be permitted to be of the general-purpose type.

(5) Transformers and Similar Equipment. The windings and terminal connections of transformers, choke coils, and similar equipment shall comply with 502.120(B)(2).

(6) Resistors and Similar Equipment. Resistors, resistance devices, thermionic tubes, rectifiers, and similar equipment shall comply with 502.120(B)(3).

(7) Rotating Machinery. Motors, generators, and other rotating electrical machinery shall comply with 502.125(B).

Panel Statement: The panel's rewrites of sections 502.100, 115, 120, 125, 128, 130, 135, and 150 have accomplished the objectives of the submitter. CMP-14 has also revised the text to improve clarity and to remove unnecessary text. The addition of the sentence identifying isolation switches has not been incorporated, as it is already covered by the revised text covering switches.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

WECHSLER, D.: The action taken under 502.100 (3) is not consistent with other sections and uses redundant text. A more correct wording which does agree with the other modified sections should read: " Group E ~~Metal Dusts.~~ No transformer or capacitor shall be installed ~~*in a Class II, Division 1, Group E location*~~." The Italic ~~*in a Class II, Division 1, Group E location*~~ is redundant as this section is under (A) Class II, Division 1 already. Under 502.125 (A) (1) this redundancy was eliminated.

Lastly, the proposal text for 14-90 has missing/incomplete references and is more correctly presented in proposal Log 14-113.

14-91 Log #3872 NEC-P14 **Final Action: Reject**
(502.5)

Submitter: Mike Weitzel, Bechtel

Recommendation: Revise as follows:

502.5 Explosionproof Equipment. Explosionproof equipment and wiring shall not be required and shall ~~not be acceptable in Class II locations unless identified for such locations~~. be listed and marked for use in Class II locations.

Substantiation: There are types of equipment that need to be listed and marked for use in these installations.

Panel Meeting Action: Reject

Panel Statement: This proposal does not add clarity to the existing text. Also, this proposal would require that all explosionproof equipment be constructed and listed for Class II locations.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-92 Log #4097 NEC-P14 **Final Action: Accept in Principle**
(502.5)

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Revise text to read as follows:
502.5 Explosionproof Equipment.
~~Explosionproof equipment and wiring shall not be required and shall not be acceptable in Class II locations unless identified for such locations.~~
Explosionproof equipment because of its design is generally not a replacement for Dust ignitionproof or Dusttight equipment. However in some instances, like locations having both Class I and Class II hazardous area classifications, explosionproof electrical equipment and wiring may be acceptable. Explosionproof equipment and wiring is not required to be installed in a Class II location.
Substantiation: The current text makes it unacceptable to install explosionproof equipment in a Class II location, even if the location is also Class I. The proposed modified text, reinforces the original aspects dealing with explosionproof equipment in Class II locations, but clarifies that in a location having both Class I and Class II materials that it may be acceptable to use explosionproof equipment.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
502.5 Explosionproof Equipment.
Explosionproof equipment and wiring shall not be required and shall not be acceptable in Class II locations unless also identified for such locations.
Panel Statement: The addition of the word "also" meets the intent of the submitter.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-93 Log #4442 NEC-P14 **Final Action: Accept**
(502.6)

Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
502.6 Zone Equipment
Equipment listed and marked in accordance with 506.9(C)(2) for Zone 20 locations shall be permitted in Class II, Division 1 locations for the same dust atmosphere; and with a suitable temperature class.
Equipment listed and marked in accordance with 506.9(C)(2) for Zone 20, 21, or 22 locations shall be permitted in Class II, Division 2 locations for the same dust atmosphere and with a suitable temperature class.
Substantiation: An area classified as a Zone 20 could alternatively be classified as Class II Division 1, therefore the equipment suitable for Zone 20 is acceptable for installation in a Class II Division 1 location.
An area classified as a Zone 22 could alternatively be classified as Class II Division 2, therefore the equipment suitable for Zone 20, Zone 21 or Zone 22 is acceptable for installation in a Class II Division 2 location.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-94 Log #3266 NEC-P14 **Final Action: Reject**
(502.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise the following:
(A) CLASS II DIVISION 1
(1) General. In Class II Division 1 locations only the wiring methods in (1) through (4) shall be permitted.
(1) Threaded rigid metal conduit ~~or~~ and threaded steel intermediate metal conduit with threaded connections.
(2) Type MI cable with termination fittings listed for the location. ~~Type MI cable shall be installed and supported in a manner to avoid stress at the termination fittings.~~
(3) In ~~industrial~~ establishments with limited general public access where the condition of maintenance and supervision ensure that only qualified persons install and service the installation Type MC - HL cable listed for use in Class II Division 1 locations, with a ~~gas/~~vapor tight continuous corrugated metallic sheath, an overall jacket of ~~suitable~~ identified polymeric material, an enclosed equipment grounding conductor(s) in accordance with 250.122 and provided with termination fittings listed for the application, shall be permitted.
(2) Flexible Connections. Where necessary to employ flexible connections they shall not be longer than necessary and one or more of the following shall be used ~~permitted~~.
(1) Listed dustight flexible connectors
(2) Flexible metal conduit ~~with listed fittings~~
(3) Liquidtight flexible metal conduit ~~with listed fittings~~
(4) Liquidtight flexible nonmetallic conduit ~~with listed fittings~~
(5) Extra-hard usage type flexible cord or portable power cable identified for the use and provided with identified bushed fittings where the cord or portable power cable enters boxes, cabinets, or other enclosures.
(3) delete "industrial.
(B) CLASS II DIVISION 2. In Class II Division 2 locations only the following wiring methods shall be permitted:
(1) No change.
(2) Threaded rigid metal conduit and threaded steel intermediate metal conduit with threaded connections, electrical metallic tubing with compression type fittings. Dustight wireways and auxillary gutters.
(3) Type MC or Type MI cable with listed termination fittings.
Substantiation: "Permitted" as presently used does not entail a requirement per 90.5 (B). Threaded connections should be specified for RMC and IMC; (see 342.42 and 344.42 re: threadless fittings) Installation of Type MI cable is covered in Article 332. Flexible connections should not be longer than necessary. Listing for flexible conduits and fittings is already required in the respective articles. Portable power cable should be included. All extra-hard usage type flexible cords may not be suitable for wet or oily locations or exposed to direct sunlight or those designated as electric vehicle cables.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-95 Log #2831 NEC-P14 **Final Action: Accept**
(502.10(A)(2)(5))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(5) Flexible cord listed for extra-hard usage and terminated ~~provided~~ with ~~bushed~~ fittings listed for the location. Where flexible cords are used, they shall comply with 502.140.
FPN: See 502.30(B) for grounding requirements where flexible conduit is used.
Substantiation: Cable is *terminated* with fittings, but the fittings are not *provided* with the cable, they are sourced separately. Terminology is made consistent with other portions of the section.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-96 Log #3923 NEC-P14 **Final Action: Reject**
(502.10(B))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Type RTRC marked with the suffix -XW" to be added.
Substantiation: Type RTRC marked with the suffix –XW were permitted in the NEC 2008 for Class I Division 2. We want it to be included for Class II Division 2 as well. Shouldn't be any engineering arguments against this proposal.
Panel Meeting Action: Reject
Panel Statement: Type RTRC was added to 501.10(B)(7) with very specific restrictions, primarily for protection from corrosion. This proposal does not provide these restrictions. The substantiation does not provide any technical data to show that this wiring method is necessary in a Class II Division 2 location.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-97 Log #2832 NEC-P14 **Final Action: Accept in Principle**
(502.10(B)(1))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(B) Class II, Division 2.
(1) General. In Class II, Division 2 locations, the following wiring methods shall be permitted:
(1) All wiring methods permitted in 502.10(A).
(2) Rigid metal conduit, intermediate metal conduit, electrical metallic tubing, dusttight wireways.
(3) Type MC or MI cable with listed termination fittings.
(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, ~~in cable trays~~ with listed termination fittings.
(5) Type ITC and Type ITC-ER ~~trays~~ with listed termination fittings.~~in cable trays~~, and installed in accordance with the provisions of Article 727.
(6) Type MC, MI, or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, shall be the wiring method employed.
Exception to (6): Type MC cable listed for use in Class II, Division 1 locations shall be permitted to be installed without the spacings required by (6).
Substantiation: This proposal reflects the current installation requirements of 725.154(D) that in conjunction with a companion proposal to revise 725.154(D) move the Classified location permitted wiring methods into Chapter 5, with the installation requirements for these types of cables retained for all users in 725.154(D). See companion proposal on 725.154(D).
Panel Meeting Action: Accept in Principle
Revise text as follows:

(B) Class II, Division 2.

(1) General. In Class II, Division 2 locations, the following wiring methods shall be permitted:

(1) All wiring methods permitted in 502.10(A).

(2) Rigid metal conduit, intermediate metal conduit, electrical metallic tubing, dusttight wireways.

(3) Type MC or MI cable with listed termination fittings.

(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, including ~~or~~ installation in cable tray systems. The cable shall be terminated with listed fittings. ~~PLTC shall be installed in a manner to avoid tensile stress at the termination fittings.~~

(5) Type ITC and Type ITC-ER cable as permitted in 727.4 and terminated with listed fittings.

(6) Type MC, MI, or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, shall be the wiring method employed.

Exception to (6): Type MC cable listed for use in Class II, Division 1 locations shall be permitted to be installed without the spacings required by (6).

Panel Statement: The panel has retained the language "in cable tray systems", which was deleted in the proposal, in items (4) and (5) to permit their use, as provided in other articles in the code. The panel also clarified the language for listed fittings.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-98 Log #1786 NEC-P14 **Final Action: Reject**
(502.10(B)(3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence: Nonincendive field wiring shall be permitted using any ~~of the~~ identified wiring methods permitted for unclassified locations.

In (B)(3)(1), add: "or raceways".

Substantiation: Edit. All wiring methods permitted for unclassified locations may not be suitable. This provision may be deemed to modify "not permitted use". Nonincendive field wiring should be permitted in separate raceways.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-50.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

NEAGLE, J.: I agree with the panel action and statement. However, it is noted that the current text of 502.10(B)(3) does not permit the installation of separate nonincendive field wiring circuits in a single raceway using other than multiconductor cables (e.g., discreet conductors). Revise the second paragraph of 502.10(B)(3) as follows:

(Retain first paragraph and FPN).

'Separate nonincendive field wiring circuits shall be installed in accordance with one of the following:

(1) In separate cables

(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield

(3) In multiconductor cables or raceways, where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)'

14-99 Log #1808 NEC-P14 **Final Action: Reject**
(502.30)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete and substitute: GROUNDING and BONDING class II divisions 1 and 2. Metal enclosed wiring and equipment shall be grounded and comply with 502.30(A) and (B).

(A) BONDING. The locknut, double-locknut, and locknut-bushing shall not be permitted as the sole bonding means. Bonding jumpers with identified fittings or other identified means shall be used. Such means of bonding shall apply to all intervening metal raceways, cables, fittings, boxes, and other enclosures and equipment in Class II locations to the point of grounding for service equipment.

Exception: The specific bonding means shall only be required to the point where the grounded conductor (if used) and the grounding electrode conductor are connected on the load side of the building or structure, or separately derived system disconnecting means which includes overcurrent protection.

FPN No change.

Substantiation: Single locknut connections such as commonly used with cable and flexible conduit connectors should be included. Locknuts and bushings should only be prohibited as the sole bonding means. Intervening cables such as Type MI should be included All wiring systems may not include a grounded circuit conductor.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-36.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-100 Log #3308 NEC-P14 **Final Action: Reject**
(502.30)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: Electrical wiring and equipment in Class II Division 1 and 2 locations shall be grounded ~~as specified in Article 250 and with~~ the requirements in 502.30(A), 502.30(B) shall apply.

Substantiation: Article 250 already applies and has provisions which are alternatives or exceptions to grounding which do not appear to be intended to apply. Many sections simply state "shall be grounded"... Similar requirements worded differently may cause confusion per 3.3.5 of the Style Manual.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-64.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-101 Log #867 NEC-P14 **Final Action: Reject**
(502.30(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

TYPES of EQUIPMENT GROUNDING and BONDING CONDUCTORS. Liquidtight flexible metal shall not be used as the sole ground-fault current path. ~~Where equipment grounding conductors are installed they shall comply with 250.102.~~

Exception: In Class II Division 2 locations the equipment grounding conductors and equipment bonding jumpers shall be permitted to be omitted ~~deleted~~ where all of the following conditions are met:

(1) Listed the Liquidtight flexible metal conduit is 1.8 m (6 ft) or less in length ~~with fittings listed for grounding is used~~.

(2) No change.

(3) No change.

Substantiation: Edit. The heading and text should cover both equipment grounding and bonding conductors. 250.102 already applies unless amended. LTFMC and fittings are already required to be listed by 350.6 which applies unless amended. Something cannot be deleted unless it is first installed.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-36.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-102 Log #1810 NEC-P14 **Final Action: Reject**
(502.30(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete and substitute: BONDING CONDUCTORS. Where equipment grounding conductors are not installed in flexible conduit, bonding conductors for each such conduit shall be installed.

Exception: In Class II Division 2 locations bonding jumpers shall be permitted to be deleted where all the following conditions are met:

(1) Liquidtight flexible metal conduit 1.8 m (6 ft) or less in total length with fittings listed for grounding is used.

(2) Overcurrent protection in the circuit is limited to does not exceed 10 amperes.

(3) The load is not a power or lighting load.

Substantiation: This provision relates primarily to bonding conductors. Something cannot be deleted unless it is first installed. The provision should also include LFNMC permitted in
502.10 (A)(2) The exception should apply to total length involved, not multiple individual lengths interposed in a run of raceway. Reference to 250.102 is superfluous; Article 250 applies unless modified.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-36.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-103 Log #2588 NEC-P14 **Final Action: Reject**
(502.30(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

TYPES of EQUIPMENT GROUNDING and BONDING CONDUCTORS. Flexible metal conduit~~,~~ ~~and~~ liquidtight flexible metal conduit and flexible metal fittings shall not be used as the sole ground-fault current path. ~~Where equipment bonding jumpers are installed they shall comply with 250.102.~~ Exception in Class I I Division 2 locations, ~~the~~ a wire-type equipment grounding or bonding conductor shall ~~be permitted to be deleted~~ not be required where all of the following conditions are met:

(1) ~~Listed~~ Liquidtight flexible metal conduit 1.8 m (6 ft) or less in length ~~with fittings listed from grounding~~ is used.

(2) Overcurrent protection in the circuit is limited to 10 amperes or less. The load is not a power ~~utilization~~ or lighting load.

Substantiation: Edit. The heading should include bonding conductors addressed in the text. Since the conduit is a grounding and bonding conductor the omission should refer to wire types. The grounding or bonding conductor cannot be deleted unless first installed. Fittings are already required to be listed in the respective articles. "Power" infers a particular type of load such as one that is not lighting or control. Section 250.102 already applies, as do other requirements of Article 250, which are not referenced.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-104 Log #3079 NEC-P14 **Final Action: Accept**
(502.30(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(B) Types of Equipment Grounding Conductors. Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type, in compliance with 250.102.~~not be used as the sole ground-fault current path. Where equipment bonding jumpers are installed, they shall comply with 250.102.~~
Exception: Text to remain unchanged.
Substantiation: Because many things (such as earth itself) are types of ground fault current paths [250.2], the existing language doesn't really tell the code user what the requirement is. This revised language makes it much clearer.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-105 Log #546 NEC-P14 **Final Action: Reject**
(502.40)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete this section.
~~502.40 Multiwire Branch Circuits.~~
~~In a Class II, Division 1 location, a multiwire branch circuit shall not be permitted.~~
~~*Exception: Where the disconnected device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.*~~
Substantiation: To conform to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors on multiwire branch circuit and applies per 90.3.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-106 Log #570 NEC-P14 **Final Action: Reject**
(502.40)

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Delete text as follows:
~~502.40 Multiwire Branch Circuits.~~
~~In a Class II, Division 1 location, a multiwire branch circuit shall not be permitted.~~
~~*Exception: Where the disconnect device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.*~~
Substantiation: Section 210.4(B) requires all ungrounded conductors of multiwire branch circuits to be provided with a means of simultaneous disconnection at the point where the branch circuit originates. This makes the requirement and Exception in 502.40 unnecessary because Chapters 1-4 have general application.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-107 Log #3194 NEC-P14 **Final Action: Reject**
(502.40)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Delete 502.40.
This is a companion proposal with 501.40, 505.21, and 506.21.
Substantiation: Since 210.4(B) now requires all multiwire branch circuits to "be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates", 502.40 is redundant.
The deletion has been suggested by some, but I expect it will be rejected because 210(B) is a requirement for personnel protection and could at some point be changed. The requirement here is for prevention of fire and explosion.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-108 Log #3674 NEC-P14 **Final Action: Reject**
(502.40)

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Delete 502.40 and its associated exception in its entirety.
Substantiation: 502.40 is redundant as new 2008 210.4(B) does already encompass the intent of 502.40.
210.4(B) Disconnecting Means. "Each multiwire branch circuit shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates."
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-109 Log #4634 NEC-P14 **Final Action: Reject**
(502.40)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this section.
Substantiation: This section now effectively repeats, without change, the provisions of 210.4(B) that requires simultaneous disconnection for all multiwire branch circuits wherever installed.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-110 Log #2615 NEC-P14 **Final Action: Reject**
(502.40 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
"without the use of handle ties"
Substantiation: For hazardous (classified) areas reliance should not be on handle ties which can be removed. See 514.11(A).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-73.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-111 Log #832 NEC-P14 **Final Action: Reject**
(502.100)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In (A)(I), change "suitable" and "may" to "approved" in two places. In (A)(3), change "may" to "likely to".
Substantiation: Edit. "Suitable" and "may" are terms to be avoided per the Style Manual. "Likely" is a term often used in the Code.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-112 Log #841 NEC-P14 **Final Action: Reject**
(502.100(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(1) CONTAINING FLAMMABLE LIQUID ~~THAT WILL BURN~~
Transformers and capacitors containing a flammable liquid ~~that will burn~~ shall be... (remainder unchanged)
In (1) and (3), change "suitable" to "identified".
Substantiation: Edit. Proposed deletion is superfluous. "Suitable" is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: This provision is intended to apply to any liquid that burns, whether characterized as flammable or combustible.
The word "suitable" as used in (1) and (3) is not unenforceable and does not create confusion, as indicated in the requirements of the NEC Style Manual. As such, it does not need to be replaced.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-113 Log #4092 NEC-P14 **Final Action: Accept in Principle**
(502.100(A)(3) 502.115(A), 502.120(A), 502.135(A), 502.150(A) and (B))

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Make the following revisions as noted:
502.100(3) Group E ~~Metal Dusts~~. No transformer or capacitor shall be installed. ~~in a location where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present.~~

502.115(A):

(1) Groups F and G ~~Type Required~~. Switches, circuit breakers, motor controllers, and fuses, including pushbuttons, relays, and similar devices, shall be provided with identified dust-ignitionproof enclosures. Isolation switches containing no fuses shall be permitted to be dusttight.

(2) Group E ~~Metal Dusts. In locations where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present,~~ Ffuses, switches, motor controllers, and circuit breakers shall have enclosures identified for such locations.

502.120(A):

(A) Class II, Division 1. In Class II, Division 1 locations, control transformers, solenoids, impedance coils, resistors, and any overcurrent devices or switching mechanisms associated with them shall comply with 502.120(A)(1) and (A)(2).

(1) Groups F and G: Control transformers, solenoids, impedance coils, resistors, and any overcurrent devices or switching mechanisms associated with them shall be installed in ~~have~~ dust-ignitionproof enclosures identified for the specific Class II locations.

(2) Group E: Control ~~No control~~ transformers, impedance coils, or resistors shall be installed in enclosures ~~be installed in a location where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present unless provided with an enclosure~~ identified for the specific location.

(2) Coils and Windings. Where not located in the same enclosure with switching mechanisms, control transformers, solenoids, and impedance coils shall ~~be provided with tight metal housings without ventilating openings or~~ shall be installed in dusttight enclosures. ~~Effective January 1, 2011, only dusttight enclosures shall be permitted.~~

(3) Resistors. Resistors and resistance devices shall comply with 502.120(A). ~~have dust ignitionproof enclosures identified for Class II locations.~~

Exception: Where the maximum normal operating temperature of the resistor will not exceed 120°C...".

In 502..135(A):

(A) Class II, Division 1. In Class II, Division 1 locations, all utilization equipment shall comply with 502.135(A)(1) and (A)(2).

(1) Group F and G: Utilization equipment shall be identified for the specific Class II locations.

(2) Group E: ~~Where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present, such~~ Eequipment shall be identified for the specific locations.

In 502.150(A), and (4),(5), and (B)(3):

(A) Class II, Division 1. In Class II, Division 1 locations, signaling, alarm, remote-control, and communications systems; and meters, instruments, and relays shall comply with 502.150(A)(1) through (A)(45).

~~(4) Combustible, Electrically Conductive Dusts. Where dusts are of a combustible, electrically conductive nature, all wiring and equipment shall be identified for Class II locations.~~

(45) Group E ~~Metal Dusts. Where dust from magnesium, aluminum, aluminum bronze powders, or other metals of similarly hazardous characteristics may be present,~~ Aall apparatus and equipment shall be identified for the specific conditions.

(B)(3) Resistors and Similar Equipment. Resistors, resistance devices, thermionic tubes, rectifiers, and similar equipment shall comply with 502.120(A)~~(B)(3).~~

Substantiation: In 502.100(3) the text is simply being improved by using the correct Group E and cleaning up the text. As this is already considered as being a Division 1 location, no other changes are needed.

In 502.115(1) the term "type required" is redundant since what is required is so stated. During the 2008 code cycle an error was made in deleting an isolation disconnect during consideration of metal tight enclosures vs. dust-tight. The acceptable condition for use has been reinserted using the NEC defined term for an isolation switch.

In 502.120 the text has been clarified by the correct use of "Group E" and the Group F and G text made consistent with (B)(3).

In 502.120 again the text has been clarified since the effective date has been eliminated with this 2011 document and the text under (3) consolidated back up under 502.120(A) as indicated.

In 502.135 again the text has been consistent with the former sections as well as clarified with the use of the dust Group terms.

In 502.150, again the use of Group E was added, this eliminated the need for an item (4). Numbering changes were then needed as indicated.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-90.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:

WECHSLER, D.: The action taken under 502.100 (3) is not consistent with other sections and uses redundant text. A more correct wording which does agree with the other modified sections should read: " Group E ~~**Metal Dusts.**~~ No transformer or capacitor shall be installed ~~*in a Class II, Division 1, Group E location*~~." The Italic ~~*in a Class II, Division 1, Group E location*~~ is redundant as this section is under (A) Class II, Division 1 already. Under 502.125 (A) (1) this redundancy was eliminated.

Lastly, the proposal text for 14-90 has missing/incomplete references and is more correctly presented in proposal Log 14-113.

14-114 Log #3195 NEC-P14 **Final Action: Reject**
(502.115(A))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise 502.115(A) as follows:

(A) Class II, Division 1: In Class II, Division 1 locations, switches, circuit breakers, motor controllers, and fuses shall comply with 505.115(A)(1) ~~and (A)(2)~~ through (A)(3).

(1) Type Required. Switches, circuit breakers, motor controllers, and fuses, including pushbuttons, relays, and similar devices~~, shall be provided with identified dust-ignitionproof enclosures~~ that are intended to interrupt current during normal operation or that are installed where combustible dusts of an electrically conductive nature may be present, shall be provided with identified dust-ignitionproof enclosures.

(2) Isolating Switches. Disconnection and isolating switches containing no fuses and not intended to interrupt current shall be provided with dusttight enclosures.

~~(2)~~ (3) Metal Dusts. No change to text.

Substantiation: Proposal 14-25 for the 2008 NEC resulted in changing the requirement for isolating switches from the old "telescoping or close fitting covers..." to dust-ignitionproof enclosures. The substantiation was that the "current requirement permits a construction which would not even be permitted by 502.115(B) in Division 2." Technically, that is correct because over the last several code cycles, the Panel has been eliminating the old text and replacing it with "dusttight." That is what should have been proposed in 502.115(A) and what is now proposed. Since an isolating switch is not intended to be operated under load and, therefore, does not produce an arc, the old text allowed a Division 2 construction that should have been changed to the new Division 2 construction, "dusttight."

Note: The proposed text is the same as that in the 2005 NEC except that in (2) the old text is changed to "dusttight enclosures", and the text on conductive dust is omitted because that is covered by (1).

Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 14-90.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-115 Log #831 NEC-P14 **Final Action: Reject**
(502.115(A)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "are likely to".
Substantiation: Edit. "May" is a term to be avoided per the Style Manual. "Likely" is a term used often in the Code.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-15.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-116 Log #871 NEC-P14 **Final Action: Reject**
(502.130)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "and lampholders" after "luminaries".
Substantiation: Lighting fixtures not classified as luminaries should be included, e.g., portable lighting in (A) and (B).
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-117 Log #2833 NEC-P14 **Final Action: Accept in Principle**
(502.130(A)(3))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(3) Pendant Luminaires. Pendant luminaires shall be suspended by threaded rigid metal conduit stems, by threaded steel intermediate metal conduit stems, by chains with approved fittings, or by other approved means. For rigid stems longer than 300 mm (12 in.), permanent and effective bracing against lateral displacement shall be provided at a level not more than 300 mm (12 in.) above the lower end of the stem, or flexibility in the form of a fitting or a flexible connector listed for the location shall be provided not more than 300 mm (12 in.) from the point of attachment to the supporting box or fitting. Threaded joints shall be provided with set screws or other effective means to prevent loosening.

Where wiring between an outlet box or fitting and a pendant luminaire is not enclosed in conduit, flexible cord listed for hard usage shall be permitted when terminated with a listed cord connector that maintains the type of protection ~~used, and~~ ~~suitable seals~~ ~~shall be provided~~ where the cord enters the luminaire and the outlet box ~~or fitting~~. Flexible cord shall not serve as the supporting means for a ~~fixture~~ luminaire.
Substantiation: This proposal makes clear the intent to terminate the flexible cord with fittings that comply with ANSI requirements for such devices including strain relief and the type of protection.

The reference to a fixture is revised to luminaire.
Panel Meeting Action: Accept in Principle

Accept the proposal, but change "type of protection" to "protection technique".
Panel Statement: In Class II locations, the proper term is "protection technique".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-118 Log #2834 NEC-P14 **Final Action: Accept in Principle**
(502.130(A)(3))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(3) Pendant Luminaires. Pendant luminaires shall be suspended by threaded rigid metal conduit stems, by threaded steel intermediate metal conduit stems, by chains with approved fittings, or by other approved means. For rigid stems longer than 300 mm (12 in.), permanent and effective bracing against lateral displacement shall be provided at a level not more than 300 mm (12 in.) above the lower end of the stem, or flexibility in the form of a fitting or a flexible connector listed for the location shall be provided not more than 300 mm (12 in.) from the point of attachment to the supporting box or fitting. Where wiring between an outlet box or fitting and a pendant luminaire is not enclosed in conduit, flexible cord listed for hard usage shall be permitted when terminated with a listed cord connector that maintains the type of protection. Flexible cord shall not serve as the supporting means for a ~~fixture~~ luminaire.
Substantiation: This proposal makes clear the intent to terminate the flexible cord with fittings that comply with ANSI requirements for such devices including strain relief and the type of protection.

The reference to a fixture is revised to luminaire.
Panel Meeting Action: Accept in Principle

Accept the proposal, but change "type of protection" to "protection technique".
Panel Statement: In Class II locations, the proper term is "protection technique".
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-119 Log #3196 NEC-P14 **Final Action: Accept**
(502.130(A)(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Change last word in paragraph from "fixture" to luminaire."
Substantiation: Change is for consistent use of the term.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-120 Log #3197 NEC-P14 **Final Action: Accept**
(502.130(B)(4))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Change last word in paragraph from "fixture" to "luminaire."
Substantiation: Change is for consistent use of the term.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-121 Log #3198 NEC-P14 **Final Action: Reject**
(502.130(B)(4))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: After second sentence, add the following:

"Threaded joints shall be provided with set screws or other effective means to prevent loosening."
Substantiation: This requirement is in (A(3) for Class II, Division 1 luminaires and should apply to Division 2 luminaires as well.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-81.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-122 Log #907 NEC-P14 **Final Action: Reject**
(502.140)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:

Flexible cords and cables used in Class II locations shall comply with all of the following:

(1) Be extra-hard usage type identified for the purpose.

Exception: Hard usage type flexible cord identified for the purpose shall be permitted in accordance with 502.130(A)(3) and (B)(4).

(2) Contain an equipment grounding conductor

(3) Be connected to terminals in accordance with 110.14.

(4) Be provided with identified means to prevent tension on terminal connections

(5) Be provided with identified means to prevent the entrance of dust where the flexible cords or cables enter enclosures or fittings that are dust-ignition proof.
Substantiation: Flexible cables should be included such as G, GC, W. Article 400 does not require listing. Cords and cables should be suitable for the use such as wet locations, sunlight resistance, exposure to oil, and not electric vehicle cable. Section 400.23 already applies. "Approved" connections are not necessarily the same as 110.14. Support to prevent tension should be by identified means not makeshift methods such as tying or taping. Seals should be identified for the use and required for other than boxes. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-123 Log #2835 NEC-P14 **Final Action: Accept in Principle**
(502.140)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with regard to the final text.

This action will be considered the panel as a public comment.
Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
502.140 Flexible Cords — Class II, Divisions 1 and 2.
Flexible cords used in Class II locations shall comply with all of the following:

(1) Be of a type listed for extra-hard usage

Exception: Flexible cord listed for hard usage as permitted by 502.130(A)(3) and (B)(4).

(2) Contain, in addition to the conductors of the circuit, an equipment grounding conductor complying with 400.23

(3) Be connected to terminals or to supply conductors in an approved manner

(4) Be supported by clamps or by other suitable means in such a manner that there will be no tension on the terminal connections

(5) Be ~~provided~~ terminated with a listed cord connector that maintains the type of protection ~~with suitable seals to prevent the entrance of dust~~ where the flexible cord enters ~~boxes or fittings that are required to be dust-ignitionproof~~ the equipment
Substantiation: This proposal makes clear the intent to terminate the flexible cord with attachment plugs or fittings that comply with consensus safety requirements for such devices.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-117.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-124 Log #3267 NEC-P14 **Final Action: Reject**
(502.140)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
FLEXIBLE CORDS AND PORTABLE POWER CABLES CLASS II DIVISIONS 1 and 2. Flexible cords and portable power cables used as permitted in 502.10(A)(2) shall:
(1) Be identified for the use including sunlight and oil resistance where applicable.
(2) Contain an equipment grounding conductor.
(3) Be connected to terminals in accordance with 110.14(5).
(4) Be provided with identified strain relief devices or installed so there is no tension on terminals.
(5) Be provided with identified means to prevent the entrance of dust where the flexible cords or portable power cables enter boxes, cabinets or other enclosures.
Substantiation: Portable power cables should be included. All hard-usage types specified in 502.10(A)(2) may not be identified (suitable) for the use such as where subject to oil and sunlight, or type EV, EVE, EVT. Reference to 400.23 is superfluous; it already applies. “Suitable” is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. In addition, portable power cables are a subset of flexible cords and are, therefore, already covered.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-125 Log #1983 NEC-P14 **Final Action: Reject**
(502.140(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise: (3) Be connected to supply terminals in an approved manner in accordance with 110.14.
Substantiation: Edit. Already covered by 110.14; does not conform to 3.3.5 of the Style Manual and increases bulk of the Code. It may be deemed that “approved manner” (see definition of approved) sanctions connections that may not comply with 110.14.
Panel Meeting Action: Reject
Panel Statement: The submitter provided two alternatives in a single proposal, which does not meet the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
NEAGLE, J.: I agree that the submitter’s proposal does not conform with the NFPA Regulations Governing Committee Projects for the reason stated. However, I also agree that 502.140(3) is superfluous text which is already covered by 110.14. This section should be deleted.

14-126 Log #2021 NEC-P14 **Final Action: Reject**
(502.140(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise (3) as follows: Be connected to ~~supply~~ terminals in ~~an approved manner~~ <u>accordance with 110.14</u>.
Substantiation: Already covered by 110.14. “Approved” may sanction connections that do not comply with 110.14. Load terminals should be included in the provision.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-125.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
NEAGLE, J.: I agree that the submitter’s proposal does not conform with the NFPA Regulations Governing Committee Projects for the reason stated. However, I also agree that 502.140(3) is superfluous text which is already covered by 110.14. This section should be deleted.

14-127 Log #2836 NEC-P14 **Final Action: Reject**
(502.140(B)(5))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(5) Be <u>terminated with a cord connector or attachment plug listed for the location and be</u> provided with ~~suitable~~ <u>listed</u> seals to prevent the entrance of dust where the flexible cord enters <u>enclosures</u>, boxes or fittings that are required to be dust-ignition-proof.
Substantiation: This proposal makes clear the intent to terminate the flexible cord with attachment plugs or fittings that comply with ANSI requirements for such devices.
Panel Meeting Action: Reject
Panel Statement: The referenced section does not exist.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-128 Log #870 NEC-P14 **Final Action: Reject**
(502.150)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In (A)(1), change “may” to “are likely to” and in the exceptions for (A)(1), (A)(2) and (B)(1) change “the general purpose” to “any identified”.
In (B)(1), change “might” to “are likely to”.
Substantiation: Edit. “May” and “might” involve conjecture and are terms to be avoided per the Style Manual. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections. “General purpose” is not defined and may be construed to prohibit weatherproof or watertight enclosures which though not required may be suitable for the use.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 503 — CLASS III LOCATIONS

14-129 Log #869 NEC-P14 **Final Action: Reject**
(503.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Make the following a fine print note:
Organic material that is carbonized or excessively dry is highly susceptible to spontaneous combustion.
Substantiation: Edit. This as not a rule or conditional statement as in the first sentence and is more appropriate as a fine print note.
Panel Meeting Action: Reject
Panel Statement: The proposal would create a redundancy in 503.5.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-130 Log #4444 NEC-P14 **Final Action: Accept**
(503.6)

Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
<u>**503.6 Zone Equipment**</u>
<u>Equipment listed and marked in accordance with 506.9(C)(2) for Zone 20 locations and with a temperature class of not greater than T120°C (for equipment that may be overloaded) or not greater than T165°C (for equipment not subject to overloading) shall be permitted in Class III, Division 1 locations Equipment listed and marked in accordance with 506.9(C)(2) for Zone 20, 21, or 22 locations and with a temperature class of not greater than T120°C (for equipment that may be overloaded) or not greater than T165°C (for equipment not subject to overloading) shall be permitted in Class III, Division 2 locations</u>
Substantiation: An area classified as a Zone 20 could alternatively be classified as Class III Division 1, therefore the equipment suitable for Zone 20 is acceptable for installation in a Class III Division 1 location.
An area classified as a Zone 22 could alternatively be classified as Class III Division 2, therefore the equipment suitable for Zone 20, Zone 21 or Zone 22 is acceptable for installation in a Class III Division 2 location.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-131 Log #2837 NEC-P14 **Final Action: Accept in Principle**
(503.10(A))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
II. Wiring
503.10 Wiring Methods. Wiring methods shall comply with 503.10(A) or (B).
(A) Class III, Division 1.
(1) In Class III, Division 1 locations, the following wiring method shall be permitted:
(1) rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, dusttight wireways.~~, or~~
(2) Type MC or MI cable with listed termination fittings.
(3) Type MC or MI cable with listed termination fittings.
(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725 with listed termination fittings.
(5) Type ITC and Type ITC-ER cable as permitted in 727.4 with listed termination fittings.
(6) Type MC, MI, or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, shall be the wiring method employed adjacent cables, shall be the wiring method employed.
Exception to (6): Type MC cable listed for use in Class II, Division 1 locations shall be permitted to be installed without the spacings required by (6).
(~~1~~2) Boxes and Fittings. All boxes and fittings shall be dusttight.
(~~2~~3) Flexible Connections. Where necessary to employ flexible connections, one or more of the following shall be permitted:
(1) dusttight flexible connectors,
(2) liquidtight flexible metal conduit with listed fittings,
(3) liquidtight flexible nonmetallic conduit with listed fittings,
(4) Interlocked armor Type MC cable having an overall jacket of suitable polymeric material and provided with termination fittings listed for the location
(5) Flexible cord listed for extra-hard usage and terminated with a listed cord connector suitable for the location.
Where flexible cords are used, they shall be in compliance with 503.140 ~~shall be used~~.
(~~3~~4) Nonincendive Field Wiring. Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations. Nonincendive field wiring systems shall be installed in accordance with the control drawing(s). Simple apparatus, not shown on the control drawing, shall be permitted in a nonincendive field wiring circuit, provided the simple apparatus does not interconnect the nonincendive field wiring circuit to any other circuit.
FPN: Simple apparatus is defined in 504.2. Separate nonincendive field wiring circuits shall be installed in accordance with one of the following:
(1) In separate cables
(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield
(3) In multiconductor cables where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)
(B) Class III, Division 2. In Class III, Division 2 locations, the wiring method shall comply with 503.10(A).
Exception: In sections, compartments, or areas used solely for storage and containing no machinery, open wiring on insulators shall be permitted where installed in accordance with Article 398, but only on condition that protection as required by 398.15(C) be provided where conductors are not run in roof spaces and are well out of reach of sources of physical damage.
Substantiation: This proposal adds additional wiring methods suitable in a Class III location, and aligns the formatting with the structure of other Articles in Chapter 5.
Panel Meeting Action: Accept in Principle
Revise text as follows:
II. Wiring
503.10 Wiring Methods. Wiring methods shall comply with 503.10(A) or (B).
(A) Class III, Division 1.
(1) In Class III, Division 1 locations, the following wiring methods shall be permitted:
(1) Rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, dusttight wireways.~~, or~~
(2) Type MC or MI cable with listed termination fittings.
(3) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725 including installation in cable tray systems. The cable shall be terminated with listed fittings.
(4) Type ITC and Type ITC-ER cable as permitted in 727.4 and terminated with listed fittings.
(5) Type MC, MI, or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, shall be the wiring method employed adjacent cables
Exception to (6): Type MC cable listed for use in Class II, Division 1 locations shall be permitted to be installed without the spacings required by (6).
(~~1~~2) Boxes and Fittings. All boxes and fittings shall be dusttight.
(~~2~~3) Flexible Connections. Where necessary to employ flexible connections, one or more of the following shall be permitted:
(1) Dusttight flexible connectors
(2) Liquidtight flexible metal conduit with listed fittings,
(3) Liquidtight flexible nonmetallic conduit with listed fittings,
(4) Interlocked armor Type MC cable having an overall jacket of suitable polymeric material and provided with termination fittings listed for the location
(5) Flexible cord in compliance with 503.140 ~~shall be used~~
(~~3~~4) Nonincendive Field Wiring. Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations. Nonincendive field wiring systems shall be installed in accordance with the control drawing(s). Simple apparatus, not shown on the control drawing, shall be permitted in a nonincendive field wiring circuit, provided the simple apparatus does not interconnect the nonincendive field wiring circuit to any other circuit.
FPN: Simple apparatus is defined in 504.2. Separate nonincendive field wiring circuits shall be installed in accordance with one of the following:
(1) In separate cables
(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield
(3) In multiconductor cables where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)
(B) Class III, Division 2. In Class III, Division 2 locations, the wiring method shall comply with 503.10(A).
Exception: In sections, compartments, or areas used solely for storage and containing no machinery, open wiring on insulators shall be permitted where installed in accordance with Article 398, but only on condition that protection as required by 398.15(C) be provided where conductors are not run in roof spaces and are well out of reach of sources of physical damage.
Panel Statement: Changes have been made to correlate with similar changes in 502.10.
See Proposal 14-97.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-132 Log #3924 NEC-P14 **Final Action: Reject**
(503.10(B))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Type RTRC marked with the suffix -XW" to be added.
Substantiation: Type RTRC marked with the suffix –XW were permitted in the NEC 2008 for Class I Division 2. We want it to be included for Class III Division 2 as well. Shouldn't be any engineering arguments against this proposal.
Panel Meeting Action: Reject
Panel Statement: Type RTRC was added to 501.10(B)(7) with very specific restrictions, primarily for protection from corrosion. This proposal does not provide these restrictions. The substantiation does not provide any technical data to show that this wiring method is necessary in a Class III location.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-133 Log #864 NEC-P14 **Final Action: Reject**
(503.10(B) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter portion:...where conductors are not run in roof spaces and are ~~well out of reach of sources~~ not likely to be subject to physical damage.
Substantiation: Edit. "Well out of reach" is subjective and vague and doesn't specify from what. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-134 Log #1791 NEC-P14 **Final Action: Reject**
(503.10(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Nonincendive field wiring shall be permitted using any ~~of the~~ identified wiring methods permitted for unclassified locations.
In (B)(3)(I), add: "or raceways".
Substantiation: Edit. All wiring methods permitted for unclassified locations may not be suitable. This provision may be deemed to modify "not permitted use". Nonincendive field wiring should be permitted in separate raceways.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-50. The panel notes that Section 503.10(B)(3) does not exist.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-135 Log #863 NEC-P14 **Final Action: Reject**
(503.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
~~Wiring~~ Metal raceways, metal covered cables, and non-current-carrying metal equipment in Class III Division I and 2 locations shall be grounded. ~~As specified in Article 250~~ and with the following additional requirements in 503.30(A) and (B).
Revise (B):
~~TYPES of~~ EQUIPMENT GROUNDING AND BONDING CONDUCTORS. Liquidtight flexible metal conduit shall not be used as the sole groundfault current path. ~~Where equipment bonding conductors are installed they shall comply with 250.102.~~
Exception: In Class III division 1 and 2 locations an equipment grounding or ~~the~~ equipment bonding conductor shall not be required ~~permitted to be deleted~~ where all of the following conditions are met.
Substantiation: "Wiring" may be construed to apply to conductors, for which grounding is specified elsewhere in the Code. The present wording as to types of equipment grounding conductors does not relate to the rest of the section. The exception should also apply to equipment grounding conductors. 250.102 already applies; something cannot be deleted unless it is first installed.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add anything to the existing provisions of the text. The substantiation is unclear as to what benefit or correction is being applied.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-136 Log #1806 NEC-P14 **Final Action: Reject**
(503.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: GROUNDING and BONDING class I DIVISIONS 1 and 2. Metal enclosed wiring and equipment shall be grounded and comply with 502.30(A) and (B).
(A) BONDING. The locknut, double-locknut, and locknut-bushing shall not be permitted as the sole bonding means. Bonding jumpers with identified fittings or other identified means shall be used. Such means of bonding shall apply to all intervening metal raceways, cables, fittings, boxes, and other enclosures and equipment in Class III locations to the point of grounding for service equipment.
Exception: The specific bonding means shall only be required to the point where the grounded conductor (if used) and the grounding electrode conductor are connected on the load side of the building or structure, or separately derived system disconnecting means which includes overcurrent protection.
FPN No change
Substantiation: Single locknut connections such as commonly used with cable and flexible conduit connectors should be included. Locknuts and bushings should only be prohibited as the sole bonding means. Intervening cables such as Type MI should be included. All wiring systems may not include a grounded circuit conductor.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-137 Log #3307 NEC-P14 **Final Action: Reject**
(503.30)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Electrical wiring and equipment in Class III Division 1 and 2 locations shall be grounded ~~as specified in Article 250~~ and ~~with~~ the requirements in 502.30(A), 502.30(B) shall apply.
Substantiation: Article 250 already applies and has provisions which are alternatives or exceptions to grounding which do not appear to be intended to apply. Many sections simply state "shall be grounded"... Similar requirements worded differently many cause confusion per 3.3.5 of the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63. The substantiation does not provide a reason for adding the word "Electrical". Section 4.1.1 of the NEC Style Manual allows references to code articles where additional conditions are specified.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-138 Log #1816 NEC-P14 **Final Action: Reject**
(503.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: ~~TYPES of~~ EQUIPMENT GROUNDING and BONDING CONDUCTOR. Liquidtight flexible metal conduit shall not be used as the sole ground fault current path. ~~Where equipment bonding conductors are installed they shall comply with 250.102.~~
Exception: In Class III Division 1 and 2 locations ~~the~~ an equipment grounding or bonding conductor jumper shall ~~be permitted to be deleted~~ not be required where all of the following conditions are met: (1) ~~LISTED~~ LIQUIDTIGHT FLEXIBLE METAL CONDUIT 1.8 M (6 FT) OR LESS IN LENGTH ~~WITH FITTINGS LISTED FOR GROUNDING~~ IS USED. (REMAINDER UNCHANGED).
Substantiation: Equipment grounding conductors are appropriate for inclusion. This section relates to installation and omission not types. Section 2.102 already applies unless modified. To delete a bonding jumper, it must be first installed. LFMC AND FITTINGS ARE ALREADY REQUIRED TO BE LISTED PER 350.6.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-139 Log #2586 NEC-P14 **Final Action: Reject**
(503.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
TYPES of EQUIPMENT GROUNDING and BONDING CONDUCTORS. Flexible metal conduit, ~~and~~ liquidtight flexible metal conduit and flexible metal fittings shall not be used as the sole ground-fault current path. ~~Where equipment bonding jumpers are installed they shall comply with 250.102.~~ Exception in Class III Division 1 and 2 locations, ~~the~~ a wire-type equipment grounding or bonding jumper conductor shall ~~be permitted to be deleted~~ not be required where all of the following conditions are met:
(1) ~~Listed~~ Liquidtight flexible metal conduit 1.8 m (6 ft) or less ~~in length with fittings listed from grounding~~ is used.
(2) Overcurrent protection in the circuit is limited to 10 amperes or less. The load is not a power ~~utilization~~ or lighting load.
Substantiation: Edit. The heading should include bonding conductors addressed in the text. Since the conduit is a grounding and bonding conductor the omission should refer to wire types. The grounding or bonding conductor cannot be deleted unless first installed. Fittings are already required to be listed in the respective articles. "Power" infers a particular type of load such as one that is not lighting or control Section 250.102 already applies, as do other requirements of Article 250, which are not referenced.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-140 Log #3080 NEC-P14 **Final Action: Accept in Principle**
(503.30(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(B) Types of Equipment Grounding Conductors. Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type. ~~not be used as the sole ground-fault current path. Where equipment bonding jumpers are installed, they shall comply with 250.102.~~
Exception: Text to remain unchanged.
Substantiation: Because many things (such as earth itself) are types of ground fault current paths [250.2], the existing language doesn't really tell the code user what the requirement is. This revised language makes it much clearer.
Panel Meeting Action: Accept in Principle
Include the reference to 250.102, so that the revised paragraph reads:
(B) Types of Equipment Grounding Conductors. Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type, in compliance with 250.102.~~not be used as the sole ground-fault current path. Where equipment bonding jumpers are installed, they shall comply with 250.102.~~
Exception: Text to remain unchanged.
Panel Statement: The panel has added a reference to 250.102, similar to accepted Proposals 14-66 and 14-104.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-141 Log #1818 NEC-P14 **Final Action: Reject**
(503.128(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Be protected ~~against~~ by identified means where likely to be subject to physical damage, rusting, or other corrosive agents ~~influences~~.
Substantiation: Edit. The provision is not appropriate for installations where damage, rust, or corrosion is not a factor. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-142 Log #862 NEC-P14 **Final Action: Reject**
(503.130(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Luminaires and lampholders for fixed lighting, electric exit signs and other types of electric signs, shall ~~provide~~ be provided with enclosures that are designed to minimize the entrance of fibers/flyings and to prevent the escape of sparks, burning material, or hot metal. Each luminaire, lampholder and electric sign shall be clearly marked... (remainder unchanged).
Revise text of (B):
A luminaire, lampholder, or electric sign that ~~may~~ is likely to be exposed to physical damage shall be identified for the location or protected by ~~a~~ an identified guard.
Substantiation: Suitable lampholders (fixtures) other than luminaries, and electric signs should be included. "May" is a term to be avoided per the Style Manual; "likely" is defined as such a nature or circumstance as to make something probable, and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The current text is correct. "May" is not subjective, but denotes physical possibility and is the appropriate term. The term "is likely to be" denotes probability, or a greater chance of occurrence. See also panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-143 Log #1844 NEC-P14 **Final Action: Reject**
(503.130(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A luminaire (fixture) that ~~may~~ is likely to be exposed to physical damage shall be protected by a ~~suitable~~ identified guard.
Substantiation: Edit. "May" and "suitable" are subjective and terms to be avoided per the Style Manual. "Likely" is defined as such a nature or circumstance as to make something probable and a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-144 Log #1979 NEC-P14 **Final Action: Reject**
(503.130(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A luminaire that ~~may be~~ is likely to be exposed subject to physical damage shall be protected by ~~a suitable~~ an identified guard.
Substantiation: The word "may" includes unforeseeable future conditions. Although "may" and "likely" are possible vague terms per 3.2.1 of the Style Manual, if my proposal for definition of "likely" in Article 100 is accepted, the term, which is used in many sections, will be clear.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-145 Log #861 NEC-P14 **Final Action: Reject**
(503.140)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(1) Be of a type ~~listed~~ identified for extra-hard usage and the application.
(2) No change.
(3) Be connected to terminals in ~~an approved manner~~ accordance with 110.14.
(4) Be supported by clamps or other ~~suitable~~ identified means ~~in such a manner that there will be no~~ to prevent tension on the terminal connections.
(5) Be provided with ~~suitable~~ identified means to prevent the entrance of fibers/flyings where the cord enters ~~boxes~~ enclosures or fittings.
Substantiation: Article 400 does not specify cords to be listed. "Approved" is not necessarily in compliance with 110.14 and may be deemed to modify that section. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any definitive technical substantiation supporting a problem with the current text. The panel has previously conducted extensive studies of the use of the terms "approved", "listed", and "identified". The term used in the current text is appropriate within the context of this provision of the code.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-146 Log #2838 NEC-P14 **Final Action: Accept in Principle**
(503.140)

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
503.140 Flexible Cords — Class III, Divisions 1 and 2.
Flexible cords shall comply with the following:
(1) Be of a type listed for extra-hard usage
(2) Contain, in addition to the conductors of the circuit, an equipment grounding conductor complying with 400.23
(3) Be connected to terminals or to supply conductors in an approved manner
(4) Be supported by clamps or other suitable means in such a manner that there will be no tension on the terminal connections
(5) Be terminated with a cord connector or attachment plug listed for the location ~~provided with suitable means~~ to prevent the entrance of fibers/flyings where the cord enters enclosures, boxes or fittings
Substantiation: This proposal makes clear the intent to terminate the flexible cord with attachment plugs or fittings that comply with ANSI requirements for such devices.
Panel Meeting Action: Accept in Principle
Revise text as follows:
503.140 Flexible Cords — Class III, Divisions 1 and 2.
Flexible cords shall comply with the following:
(1) Be of a type listed for extra-hard usage
(2) Contain, in addition to the conductors of the circuit, an equipment grounding conductor complying with 400.23
(3) Be connected to terminals or to supply conductors in an approved manner
(4) Be supported by clamps or other suitable means in such a manner that there will be no tension on the terminal connections
(5) Be terminated with a listed cord connector that maintains the protection technique or with an attachment plug listed for the location ~~provided with suitable means~~ to prevent the entrance of fibers/flyings where the cord enters enclosures, boxes, or fittings permitted when terminated with a listed cord connector that maintains the type of protection
Panel Statement: The proposed text has been aligned with that of 502.140. See Proposal 14-123.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-147 Log #3268 NEC-P14 **Final Action: Reject**
(503.140)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
FLEXIBLE CORDS AND PORTABLE POWER CABLES CLASS III DIVISIONS 1 and 2. Flexible cords and portable power cables shall comply with the following:
(1) Be extra-hard usage type identified for the use, including sunlight resistance where exposed to direct sunlight.
(2) Contain an equipment grounding conductor.
(3) Be connected to terminals in accordance with 110.14(5).
(4) Be provided with identified strain relief devices or installed so there is no tension on terminal connections.
(5) Be provided with identified means to prevent the entrance of fibers/flyings where the flexible cords or portable power cables enter boxes, cabinets, or other enclosures.
Substantiation: Portable power cables should be included. The extra-hard usage types should be identified for the purpose, since all are not suitable (wet locations, oil resistance, type EV, EVE, EVT). Reference to 110.14(5) is specific; "approved" is not necessarily the same as "identified". Reference to 400.23 is superfluous; already applies. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-124.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-148 Log #1982 NEC-P14 **Final Action: Reject**
(503.140(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise: (3) Be connected to supply terminals in an approved manner in accordance with 110.14.
Substantiation: Edit. Already covered by 110.14; does not conform to 3.3.5 of the Style Manual and increases bulk of the Code. It may be deemed that "approved manner" (see definition of approved) sanctions connections that may not comply with 110.14.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-86.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-149 Log #2022 NEC-P14 **Final Action: Reject**
(503.140(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or revise (3) as follows: Be connected to ~~supply~~ terminals in an ~~approved manner~~ accordance with 110.14.
Substantiation: Already covered by 110.14. "Approved" may sanction connections that do not comply with 110.14. Load terminals should be included in the provision.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-86.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-150 Log #1845 NEC-P14 **Final Action: Reject**
(503.140(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: 110.2 and 110.14 are general requirements that already apply and are more comprehensive. "Approved" does not necessarily incorporate those requirements.
Panel Meeting Action: Reject
Panel Statement: The referenced section does not exist.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-151 Log #860 NEC-P14 **Final Action: Reject**
(503.155(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In (A) change "acceptable" to "identified".
Revise (B): Contact conductors shall be located or guarded so as to be ~~inaccessible to other than~~ accessible only to authorized personnel and shall be protected where likely to be subject to physical damage or ~~against~~ accidental contact ~~with foreign objects~~.
Substantiation: "Acceptable" is subjective and a term to be avoided per the Style Manual. Since the definition of accessible (as applied to wiring methods) is capable of being exposed or not permanently closed in, "inaccessible" may imply contact conductors may be closed in by the structure. Protection should be required where likely to be subject to physical damage or accidental contact, whether by persons or objects. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
The word "acceptable" as used in this section is not unenforceable and does not create confusion, as indicated in the requirements of the NEC Style Manual. As such, it does not need to be replaced.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 504 — INTRINSICALLY SAFE SYSTEMS

14-152 Log #4427 NEC-P14 **Final Action: Accept**
(504.1)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Change ANSI/ISA-RP 12.06.01-2003, *Wiring Methods for Hazardous (Classified) Locations Instrumentation – Part 1: Intrinsic Safety* to ANSI/ISA-RP12.06.01-2003, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation – Part 1: Intrinsic Safety*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the title of the referenced documents.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-153 Log #859 NEC-P14 **Final Action: Reject**
(504.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Already covered by 90.3.
Panel Meeting Action: Reject
Panel Statement: This statement is needed to emphasize the fact that intrinsically safe systems are still subject to the other provisions of the code, including those in Chapter 5.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-154 Log #1460 NEC-P14 **Final Action: Reject**
(504.10(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence of first paragraph: ~~General purpose~~ Identified enclosures of any type shall be permitted for intrinsically safe apparatus.
Substantiation: Edit. General purpose is not defined; does it include or exclude weatherproof, watertight, dusttight, explosionproof, etc., which may not be deemed general purpose.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 14-30.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-155 Log #2839 NEC-P14 **Final Action: Accept**
(Table 504.10(B))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise table as follows:

Table 504.10(B) Assessment for T4 Classification According to Component Size and Temperature

Total Surface Area Excluding Lead Wires	Requirement for T4 Classification ~~(Based on 40°C Ambient Temperature)~~
<20 mm²	Surface temperature ≤275°C
≥20 mm² ≤10 cm²	Surface temperature ≤200°C
≥20 mm²	Power not exceeding 1.3 W*

*Based on 40°C Ambient Temperature. Reduce to 1.2 W with an ambient of 60°C or 1.0 W with 80°C ambient temperature.
Substantiation: The 40°C ambient temperature limit in Table 504.10(B) applies only to temperature classifications determined solely on available power. For determination of temperature based on component size, the ambient temperature is included in the formula for determining the maximum surface temperature.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-156 Log #284 NEC-P14 **Final Action: Accept**
(504.10(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "equation".
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression, which follows in the section.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-157 Log #908 NEC-P14 **Final Action: Reject**
(504.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Any ~~of the~~ identified wiring methods ~~suitable for unclassified locations~~ including those covered by Chapter 7 and Chapter 8 shall be permitted for installing intrinsically safe ~~apparatus~~ systems.
Substantiation: Edit. Wiring methods should be identified for the use. "Suitable" is a term to be avoided per the Style Manual. Article 504 is titled Intrinsically Safe Systems not "apparatus", which may be deemed to apply to equipment other than the wiring methods.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-158 Log #4635 NEC-P14 **Final Action: Accept in Principle**
(504.30(A)(2))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows:
Conductors of intrinsically safe circuits shall be secured so that any conductor that might come loose from a terminal cannot come in contact with another terminal. The conductors shall be separated from conductors of nonintrinsically safe circuits by one of the methods in (1) through (4).
Delete (5).
Substantiation: Item (5) is problematic because the syntax of this rule places it as one of five options to achieve the system separation requirement. This "option" is to tie the intrinsically safe conductors down so that if they fall out of a terminal, they cannot come in contact with any other terminal. If read as an option, and that is what the literal text says, then any degree of intermingling within the enclosure would be acceptable as long as the ends are tied down. This is completely inconsistent with every other provision in 504.30, and obviously a mistake. It seems quite clear that this is not a fifth option, but rather an additional basic requirement, as it was in the 2005 NEC, and it should continue to be applied in this way. This proposal relocates it as part of the parent text, and also removes a Style Manual issue regarding the use of "following" instead of actual citations.
Panel Meeting Action: Accept in Principle
Delete (5) and revise the submitter's proposed text to read:
"Conductors of intrinsically safe circuits shall be secured so that any conductor that might come loose from a terminal is unlikely to ~~cannot~~ come in contact with another terminal. The conductors shall be separated from conductors of nonintrinsically safe circuits by one of the methods in (1) through (4).
Panel Statement: The panel agrees with the intent of this proposal, but has replaced the word "cannot" since it presents an impractical requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-159 Log #1014 NEC-P14 **Final Action: Accept in Principle**
(504.30(A)(2)(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
All conductosr shall be secured or arranged so that any conductor that ~~might~~ becomes ~~loose~~ detached from a terminal cannot come in contact with another terminal.
Substantiation: Edit. The provision should apply where the conductor becomes detached, not loose, since a loose connection is not necessarily detached. FPN No. 1 indicates an arrangement not securement.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-158.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-160 Log #2840 NEC-P14 **Final Action: Accept**
(504.30(B))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(B) From Different Intrinsically Safe Circuit Conductors.
The clearance between two terminals for connection of field wiring of different intrinsically safe circuits shall be at least 6 mm (0.25 in.) unless this clearance is permitted to be reduced by the control drawing. Different intrinsically safe circuits ~~shall be in separate cables or~~ shall be separated from each other by one of the following means:
(1) The conductors of each circuit are within a grounded metal shield.
(2) The conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.).
Exception: Unless otherwise identified.
~~(3) The clearance between two terminals for connection of field wiring of different intrinsically safe circuits shall~~
~~be at least 6 mm (0.25 in.) unless this clearance is permitted to be reduced by the control drawing.~~
Substantiation: The clearance between the two terminals must be satisfied in addition to the separation between the conductors.
Satisfying the clearance requirement between the two field wiring terminals does not satisfy the intent of separating the conductors for the different intrinsically safe circuits. It is proposed that the words "shall be in separate cables or" be removed because having the circuits in separate cables does not necessarily provide the same level of separation as required by Items (1) and (2).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-161 Log #4636 NEC-P14 **Final Action: Accept in Principle**
(504.30(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows:
The clearance between two terminals for connection of field wiring of different intrinsically safe circuits shall be at least 6 mm (0.25 in.) unless the clearance is permitted to be reduced by the control drawing. Different intrinsically safe circuits shall be in separate cables or shall be separated from each other in accordance with (1) or (2)
Delete (3).
Substantiation: Item (3) is problematic because the syntax of this rule places it as one of three options to achieve the system separation requirement. This "option" is to space the intrinsically safe conductor terminations by at least ¼ in. unless otherwise covered in the control drawing. If read as an option, and that is what the literal text says, then any style of intermingling within a common cable jacket would be acceptable as long as the terminations are separated. This is completely inconsistent with every other provision in 504.30, and obviously a mistake. It seems quite clear that this is not a third option, but rather an additional basic requirement. This proposal relocates it as part of the parent text, and also removes a Style Manual issue regarding the use of "following" instead of actual citations.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 14-160.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-162 Log #4428 NEC-P14 **Final Action: Accept**
(504.50)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
(A) Change ANSI/ISA-RP 12.06.01-2003, *Wiring Methods for Hazardous (Classified) Locations Instrumentation – Part 1: Intrinsic Safety* to ANSI/ISA-RP12.06.01-2003, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation – Part 1: Intrinsic Safety*
(B) Change ANSI/ISA RP 12.06.01-2003,*Wiring Methods for Hazardous (Classified) Locations Instrumentation* - Part 1: Intrinsic Safety to ANSI/ISA-RP12.06.01-2003, *Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation – Part 1: Intrinsic Safety*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the titles of the referenced documents.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-163 Log #3229 NEC-P14 **Final Action: Reject**
(504.50(C))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 5-102 which was "Accepted in Principle" by Code-Making Panel 5.

This action shall be considered by the panel as a public comment.
Submitter: Mark R. Hilbert, State of New Hampshire
Recommendation: Revise as follows:
(C) Connection to Grounding Electrodes. Where connections to a grounding electrode is required, the grounding electrode shall be as specified in 250.52(A)(1), (A)(2), (A)(3), and (A)(4) and shall comply with 250.30(A)~~(7)~~(4). Sections 250.52(A)(5), (A)(7), and (A)(8) shall not be used if any of the electrodes specified in 250.52(A)(1), (A)(2), (A)(3), or (A)(4) are present.
Substantiation: This proposal is being submitted as part of a series of proposals addressing a revision of 250.30. The subsection referencing grounding electrodes will be changed to 250.30(A)(4) as part of this revision.
Panel Meeting Action: Reject
Panel Statement: This proposal asks to amend 504.50(C) based on another proposal that has not yet been accepted.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-164 Log #1459 NEC-P14 **Final Action: Reject**
(504.60(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "in accordance with 250.100".
Substantiation: Edit. Reference is unnecessary; that section applies unless modified.
Panel Meeting Action: Reject
Panel Statement: The reference to 250.100 is necessary, since it deals specifically with hazardous (classified) locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-165 Log #3199 NEC-P14 **Final Action: Reject**
(504.70)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise text to read as follows:
"...501.15, 502.15, and 505.16~~, and 506.16~~ shall...".
Substantiation: The scope of Article 504 includes Class I, II, and III locations. It does not include Zones 20, 21, and 22.
Panel Meeting Action: Reject
Panel Statement: Article 506 specifically refers to the requirements of Article 504.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-166 Log #1817 NEC-P14 **Final Action: Reject**
(504.80(B) and Exception No. 2 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "exposed" between "entire" and length" in the second sentence
Add: Exception No. 2: Color coding specified in 504.80(C) shall be permitted in lieu of labels.
Substantiation: Labels should only be required where wiring is exposed. Where color coding is provided per 504.80(C), labels should not be necessary.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-167 Log #1815 NEC-P14 **Final Action: Reject**
(504.80(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Intrinsically safe circuit conductors shall be identified by one or more of the following means:
1. Light blue colored insulation where no other conductors on the premises have light blue colored insulation.
2. Tagging or other approved means at every point identification where the conductors are accessible.
Substantiation: There is no provision that requires any specific identification of conductors other than identification provisions in other articles. Present wording permits but doesn't require a color; 404.80(B) only requires identification of the wiring method.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36. In addition, the proposal also omits the requirements for cable trays, raceways, and junction boxes.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 505 — CLASS I, ZONE 0, 1 AND 2 LOCATIONS

14-168 Log #4087 NEC-P14 **Final Action: Reject**
(505)

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Delete "Class I" before "Zone" in all of Article 505 and in the following other sections:
500.1 FPN No. 2, Definition "Electrical and Electronic Equipment FPN, 500.2 definition of unclassified locations, 501.1 FPN, 501.5, 501.10(c) and (d).
Substantiation: The term "Class I, as included when the zone methodology was initially added to the NEC to improve understanding when the zone concept was first introduced to provide added clarification that the Zones all addressed flammable gases, vapors, etc. Zone 0, zone 1 and zone 2 are now clearly understood and there is no need to continue to carry along this redundant label. Additionally making this change would better harmonize Article 506 since it does not use Class II before its zone naming convention.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 9 Negative: 5
Explanation of Negative:
BRIESCH, E.: This proposal should be rejected. Class I was included when Article 505 was added to the 1996 NEC to be consistent with Article 500 which defines gases and vapors as Class I. When Article 506 was introduced, since it included both dusts (Class II) and fibers and flyings (Class III), including a Class became problematic. It was, therefore, omitted. The submitter hasn't even stated that a problem exists with the inclusion of Class I, only that it is redundant. Acceptance of this proposal will require revisions of all product standards and installation documents such as NFPA 30, 33 and 497 that reference Class I, Zone locations. It will also require manufacturers to revise their product markings to remove the Class I. It is a burdensome change that provides no benefit to users of the Code.
COSPOLICH, J.: "Class I" wording should remain. Having "Class I" appear on labeling and listings clearly distinguishes American from European Zone equipment. This helps to prevent confusion if all one sees is "Zone 0, Zone 1, or Zone 2" markings for the more widely used Class I equipment and does not understand AEx versus EEx versus ATEX markings. Maintaining Class I also coordinates with American equipment standards and markings.
GOODMAN, M.: The removal of the "Class I" before "Zone" is detrimental to the code and will add confusion with respect to the marking of products and proper application. "Class I" establishes the equipment in accordance with the NEC requirements vs. the requirements of other standards. The literally hundreds of text changes are not warranted or required as there is nothing technically incorrect or unsafe with the current language. Additionally, the impacts on equipment marking are significant and would lead to inconsistent marking (with and without "Class I") that would make identification of "suitable" equipment impossible. The submitters claim that "Class I" is a "redundant label" is unfounded, unsubstantiated, and incorrect.
KUCZKA, J.: NEMA does not agree that the concept is clearly understood and the Class I designation should be retained when referring to Zones 0, 1, and 2.
WIRFS, M.: I agree with the Explanations of Negative Votes submitted by Mr. Briesch, Mr. Cospolich, Mr. Goodman, and Mr. Kuczka.

14-169 Log #4429 NEC-P14 **Final Action: Accept**
(505.2)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Encapsulation "m" FPN No. 1: Change ANSI/ISA-60079-18 (12.23.01)-2005, *Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations, Type of Protection – Encapsulation "m"* to ANSI/ISA-60079-18 (12.23.01)-2009, *Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection – Encapsulation "m"*
Flameproof "d" FPN: Change ANSI/ISA-60079-1 (12.22.01)-2005, *Electrical Apparatus for Use in Class I, Zone 1 and 2 Hazardous (Classified) Locations, Type of Protection – Flameproof "d"* to ANSI/ISA-60079-1 (12.22.01)-2008, *Explosive Atmospheres, Part 1: Equipment protection by flameproof enclosures "d"*
Increased Safety "e" FPN: Change ANSI/ISA-60079-7 (12.16.01)-2002, *Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations, Type of Protection – Increased Safety "e"* to ANSI/ISA-60079-7 (12.16.01)-2008, *Explosive Atmospheres, Part 7: Equipment protection by increased safety "e"*

Intrinsic Safety "i" FPN No. 1: Change ANSI/ISA-60079-11 (12.02.01)-2002, *Electrical Apparatus for Use in Class I, Zones 0, 1 and 2 Hazardous (Classified) Locations – Intrinsic Safety "i"* to ANSI/ISA-60079-11 (12.02.01)-2009, *Explosive Atmospheres, Part 11: Equipment protection by intrinsic safety "i"*

Oil Immersion "o" FPN: Change ANSI/ISA-60079-6 (12.26.01)-1998, *Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations, Type of Protection – Oil Immersion "o"* to ANSI/ISA-60079-6 (12.00.05)-2009, *Explosive Atmospheres, Part 6: Equipment protection by oil immersion "o"*

Powder Filling "q" FPN: Change ANSI/ISA-60079-5 (12.25.01)-1998, *Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection – Powder Filling "q"* to ANSI/ISA-60079-5 (12.00.04)-2009, *Explosive Atmospheres, Part 5: Equipment protection by powder filling "q"*

Pressurization "p" FPN: Change ANSI/ISA-60079-2 (12.04.01)-2004, *Electrical Apparatus for Explosive Gas Atmospheres – Part 2: Pressurized Enclosures "p"* to ANSI/ISA-60079-2 (12.04.01)-2009, *Explosive Atmospheres, Part 2: Equipment protection by pressurized enclosures "p"*

Type of Protection "n" FPN: Change ANSI/ISA-60079-15 (12.12.02)-2003, *Electrical Apparatus for Use in Class I, Zone 2 Hazardous (Classified) Locations: Type of Protection "n"* to ANSI/ISA-60079-15 (12.12.02)-2008, *Electrical Apparatus for Use in Class I, Zone 2 Hazardous (Classified) Locations: Type of Protection "n"*

Substantiation: Change format to match actual ISA standards title.

Panel Meeting Action: Accept in Part

Accept only the titles of the referenced documents.

Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-170 Log #4446 NEC-P14 **Final Action: Reject**
(505.2)

Submitter: Eliana Beattie, ISA

Recommendation: Revise text to read as follows:

FPN No. 1: See ANSI/UL 913-1997, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Hazardous Locations*; ANSI/ISA-60079-11 (12.02.01)-2009, *Explosive Atmospheres, Part 11: Equipment protection by intrinsic safety "i"* ~~*Electrical Apparatus for Use in Class I, Zones 0, 1 and 2 Hazardous (Classified) Locations — Intrinsic Safety "i"*~~; and ANSI/UL 60079-11, *Explosive Atmospheres, Part 11: Equipment protection by intrinsic safety "i"* ~~*Electrical Apparatus for Explosive Gas Atmospheres — Part II: Intrinsic Safety "i."*~~

FPN No. 2: Intrinsic safety is designated type of protection "ia" for use in Zone 0 locations. Intrinsic safety is designated type of protection "ib" for use in Zone 1 locations. Intrinsic safety is designated type of protection "ic" for use in Zone 2 locations.

FPN No. 3: Intrinsically safe associated apparatus, designated by [ia] ~~or~~ [ib] or [ic], is connected to intrinsically safe apparatus ("ia" ~~or~~ "ib," or "ic" respectively) but is located outside the hazardous (classified) location unless also protected by another type of protection (such as flameproof).

Substantiation: The new edition of ANSI/ISA-60079-11 introduces an extension of the intrinsic safety concept for use in Zone 2. This is designated "ic" and "[ic]". This protection technique uses a similar philosophy to that used for "ia" and "ib" except that the concept does not apply any faults and is very similar to the existing Nonincendive technique that is already permitted by the Code.

Panel Meeting Action: Reject

Panel Statement: The panel agrees with the concept of the proposal but cannot accept it because the standard involved has not been published.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

MASSEY, L.: Assuming that the subject standard is published prior to the publication of the 2011 edition of the NEC,the panel should approve this proposal.

14-171 Log #4430 NEC-P14 **Final Action: Accept**
(505.4)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.

Submitter: Eliana Beattie, ISA

Recommendation: Revise text to read as follows:

(A) FPN and (B) FPN No. 2: Change ANSI/ISA-TR (12.24.01)-1998 (IEC 60079-10 Mod), *Recommended Practice for Classification of Locations for Electrical Installations Classified as Class I, Zone 0, Zone 1, or Zone 2* to ANSI/ISA-TR12.24.01-1998 (IEC 60079-10 Mod), *Recommended Practice for Classification of Locations for Electrical Installations Classified as Class I, Zone 0, Zone 1, or Zone 2*

(B) FPN No. 7: Change ANSI/ISA-60079-0 (12.00.01)-2005, *Electrical Apparatus for Use in Class I, Zones 0 and 1 Hazardous (Classified) Locations: General Requirements* to ANSI/ISA-60079-0 (12.00.01)-2005, *Electrical Apparatus for Use in Class I, Zones 0, 1, and 2 Hazardous (Classified) Locations: General Requirements*

Substantiation: Change format to match actual ISA standards title.

Panel Meeting Action: Accept in Part

Accept only the titles of the referenced documents.

Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-172 Log #2841 NEC-P14 **Final Action: Accept**
(505.4(B))

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.

Recommendation: Revise text as follows:

(B) Reference Standards. Important information relating to topics covered in Chapter 5 may be found in other publications.

FPN No. 1: It is important that the authority having jurisdiction be familiar with recorded industrial experience as well as with standards of the National Fire Protection Association (NFPA), the American Petroleum Institute (API), the Instrumentation, Systems, and Automation Society (ISA), and the International Electrotechnical Commission (IEC) that may be of use in the classification of various locations, the determination of adequate ventilation, and the protection against static electricity and lightning hazards.

FPN No. 2: For further information on the classification of locations, see NFPA 497-2008, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*. ANSI/API RP 505-1997, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, or Zone 2*; ANSI/ISA-TR (12.24.01)-1998 (IEC 60079-10 Mod), *Recommended Practice for Classification of Locations for Electrical Installations Classified as Class I, Zone 0, Zone 1, or Zone 2*; IEC 60079-10-1995, *Electrical Apparatus for Explosive Gas Atmospheres, Classification of Hazardous Areas*; and *Model Code of Safe Practice in the Petroleum Industry, Part 15: Area Classification Code for Petroleum Installations*, IP 15, The Institute of Petroleum, London.

FPN No. 3: For further information on protection against static electricity and lightning hazards in hazardous (classified) locations, see NFPA 77-2007, *Recommended Practice on Static Electricity*; NFPA 780-2004, *Standard for the Installation of Lightning Protection Systems*; and API RP 2003-1998, *Protection Against Ignitions Arising Out of Static Lightning and Stray Currents*.

FPN No. 4: For further information on ventilation, see NFPA 30-2007, *Flammable and Combustible Liquids Code*, and ANSI/API RP 505-1997, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1,or Zone 2*.

FPN No. 5: For further information on electrical systems for hazardous (classified) locations on offshore oil and gas producing platforms, see ANSI/API RP 14FZ-2000, *Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1, and Zone 2 Locations*.

FPN No. 6: For further information on the installation of electrical equipment in hazardous (classified) locations in general, see IEC 60079-14-1996, *Electrical apparatus for explosive gas atmospheres — Part 14: Electrical installations in explosive gas atmospheres (other than mines)*, and IEC 60079-16-1990, *Electrical apparatus for explosive gas atmospheres — Part 16: Artificial ventilation for the protection of analyzer(s) houses*.

FPN No. 7: For further information on application of electrical equipment in hazardous (classified) locations in general, see ANSI/ISA-60079-0 (12.00.01)-2005, *Electrical Apparatus for Use in Class I, Zones 0 and 1, Hazardous (Classified) Locations: General Requirements*; ANSI/ISA- 12.01.01-1999, *Definitions and Information Pertaining to Electrical Apparatus in Hazardous (Classified) Locations*; and ANSI/UL 60079-0, *Electrical Apparatus for Explosive Gas Atmospheres — Part 0: General Requirements*.

Substantiation: NFPA 497 is an additional source of information regarding Classification of Class I, Zone areas.

This proposal reflects the current practice for gauging and engagement of NPT and metric thread forms found in the product standards referenced in the fine print note.

Panel Meeting Action: Accept in Principle

Accept text verbatim, except:

- Change IEC 60079-10 to IEC 60079-10-1
- Delete dates of referenced document.s

Panel Statement: The panel has corrected the designation of the IEC document and has deleted publication dates of referenced documents in accordance with Proposal 14-6a.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-173 Log #1069 NEC-P14 **Final Action: Reject**
(505.5(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second paragraph:
Rooms and areas containing ammonia refrigeration systems that are provided equipped with ~~adequate mechanical~~ electrically powered ventilation systems that prevent accumulation of vapor or gases ~~may be classified as "unclassified" locations~~ shall be permitted to be unclassified, provided an approved audible or visual means or both, is provided at an approved location to indicate when the ventilation system is not functioning.
Substantiation: "Mechanical" ventilation implies louvers, roof mounted nonelectrical wind turbines and the like. "Adequate" is a term to be avoided per the Style Manual. There should be a means to indicate malfunction of the ventilation system.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-174 Log #1776 NEC-P14 **Final Action: Reject**
(505.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Article 505 requires equipment connection and installation that ~~ensures~~ provides for safe performance under normal conditions of proper use and maintenance.
Substantiation: Edit. "Ensure" is defined as sure or certain which cannot be applied for an abnormal condition that may result from physical damage, fire, earthquake and other occurrences.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-175 Log #3201 NEC-P14 **Final Action: Accept in Principle**
(505.7(D) (New))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add a new D as follows:
"**(D) Simultaneous Presence of Flammable Gases and Combustible Dusts or Fibers/Flyings.** Where flammable gases, combustible dusts, or fibers/flyings are or may be present at the same time, the simultaneous presence shall be considered during the selection and installation of the electrical equipment and the wiring methods, including the determination of the safe operating temperature of the electrical equipment."
Substantiation: There is no provision for "simultaneous presence" in Class I zone areas and there needs to be such a provision. This paragraph is in 506.6(D) and should be included in Article 505 for consistency. 500.8(C)(4) ties Class I (Divisions only since Class I Zones stand alone in Article 505) to Class II (Divisions only since 506 is not called Class II). And 506.6(D) ties Zones 20, 21, and 22 to Class I Zones. But, nothing ties Class I Zones to Class II Divisions, a situation not precluded by Reclassification Permitted 505.7(C) or 506.6(C). This addition would allow areas previously classified as Class I, Division x and Class II, Division y simultaneously to reclassify the Class I, Division x as Class I, Zone x, which may be useful.
Panel Meeting Action: Accept in Principle
Accept the text, but designate the paragraph as "(E)", not "(D)".
Panel Statement: Paragraph 505.7(D) already exists.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-176 Log #4431 NEC-P14 **Final Action: Accept**
(505.8)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Change ANSI/ISA-60079-0 (12.00.01)-2005, *Electrical Apparatus for Use in Class I, Zones 0 and 1 Hazardous (Classified) Locations, General Requirements* to ANSI/ISA-60079-0 (12.00.01)-2009, *Electrical Apparatus for Use in Class I, Zones 0, 1, and 2 Hazardous (Classified) Locations, General Requirements*
(K) FPN No. 2: Change ISA-RP12.13.02-2003 (IEC 61779-6 Mod), *Installation, Operation, and Maintenance of Combustible Gas Detection Instruments* to ANSI/ISA-60079-29-2, *Explosive Atmospheres - Part 29-2: Gas detectors - Selection, installation, use and maintenance of detectors for flammable gases and oxygen*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the titles of the referenced documents.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-177 Log #4445 NEC-P14 **Final Action: Accept**
(505.8(G)(H), (I))

Submitter: Eliana Beattie, ISA
Recommendation: Revise 505.8(G) to read:
(G) Encapsulation "m". This protection technique shall be permitted for equipment in Class I, Zone 0, Zone 1, or Zone 2 locations for which it is identified.
FPN: See Table 505.9(C)(2)(4) for the descriptions of subdivisions for encapsulation.
Delete 505.8(H) and 505.8(I) and renumber section accordingly.
Substantiation: For consistency of format, items 505.8(H) and 505.8(I) have been removed and 505.8(G) has been revised to include all levels of protection for protection technique "m". This is consistent with the format used for Intrinsic Safety and Type of protection "n".
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-178 Log #4447 NEC-P14 **Final Action: Accept**
(505.8(K))

Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
FPN No. 3: For further information, see ISA-TR12.13.03, Guide for Combustible Gas Detection as a Method of Protection,
Substantiation: There is currently no guidance on recommended practices for the use of combustible gas detection equipment as a method of protection. It is recommended that a reference to ISA-TR12.13.03 be provided within the text for such recommended practice. The ISA-TR12.13.03 is directly based upon API practices that have been applied for 30+ years in the petroleum industry.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-179 Log #4448 NEC-P14 **Final Action: Accept**
(505.9(C)(2))

Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
FPN No.4: EPL (or Equipment Protection Level) may appear in the product marking. The EPLs are designated as G for Gas, D for Dust or M for Mining, and then followed by a letter (a,b,c) to give the user a better understanding as to whether the equipment provides either (a) a "very high", (b) "high", or (c) "enhanced" level of protection against ignition of an explosive atmosphere. For example, an AEx d IIC T4 motor (which is suitable by protection concept for application in Zone 1) may additionally be marked with the EPL of "Gb" to indicate that it was provided with a "high" level of protection such as AEx d IIC T4 Gb.
Substantiation: Our US Standards development process follows that of the IEC. EPLs were introduced into the IEC standards in 2006, and have now been introduced into ANSI/ISA-60079-0 and ANSI/UL 60079-0. The fine print note is to alert users that this additional marking may be present on products. This additional marking in no way affects any of the required marking.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-180 Log #4449 NEC-P14 **Final Action: Accept**
(505.9(C)(2))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
FPN No. 4: Equipment installed outside a Class I, Zone 0, electrically connected to equipment located inside Class I, Zone 0 may be marked Class I Zone 0/1. The "/" indicates that equipment contains a separation element and can be installed at the boundary between a Class I Zone 0 and a Class I Zone 1 location. See ANSI/ISA-60079-26, Electrical Apparatus for Use in Class I, Zone 0 Hazardous (Classified) Locations.
Substantiation: ANSI/ISA-60079-26, Electrical Apparatus for Use in Class I, Zone 0 Hazardous (Classified) Locations introduces new marking which is not identified in any of the other "zone" standards but which could appear on products in the US market, but the Code does not recognize these and without some explanation this could lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-181 Log #4450 NEC-P14 **Final Action: Reject**
(505.9(C)(2))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Electrical equipment of types of protection "e," "m," "ma," "mb," "px," "py," "pz," or "q" shall be marked Group II. Electrical equipment of types of protection "d," "ia," "ib," "ic" "[ia]," ~~or~~ "[ib]" or "[ic]" shall be marked Group IIA, IIB, or IIC, or for a specific gas or vapor. Electrical equipment of types of protection "n" shall be marked Group II unless it contains enclosed-break devices, nonincendive components, or energy-limited equipment or circuits, in which case it shall be marked Group IIA, IIB, or IIC, or a specific gas or vapor. Electrical equipment of other types of protection shall be marked Group II unless the type of protection utilized by the equipment requires that it be marked Group IIA, IIB, or IIC, or a specific gas or vapor.
Substantiation: The new edition of ANSI/ISA-60079-11 introduces an extension of the intrinsic safety concept for use in Zone 2. This is designated "ic" and "[ic]". This protection technique uses a similar philosophy to that used for "ia" and "ib" except that the concept does not apply any faults and is very similar to the existing nonincendive technique that is already permitted by the Code.
Panel Meeting Action: Reject
Panel Statement: The panel agrees with the concept of the proposal but cannot accept it because the standard involved has not been published.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MASSEY, L.: Assuming that the subject standard is published prior to the publication of the 2011 edition of the NEC,the panel should approve this proposal.

14-182 Log #4459 NEC-P14 **Final Action: Reject**
(Table 505.9(C)(2)(4))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:

Table 505.9(C)(2)(4) Types of Protection Designation

Designation	Technique	Zone*
d	Flameproof enclosure	1
db	Flameproof enclosure	1
e	Increased safety	1
eb	Increased safety	1
ia	Intrinsic safety	0
ib	Intrinsic safety	1
ic	Intrinsic safety	2
[ia]	Associated apparatus	Unclassified **
[ib]	Associated apparatus	Unclassified **
[ic]	Associated apparatus	Unclassified **
m	Encapsulation	1
ma	Encapsulation	0
mb	Encapsulation	1
nA	Nonsparking equipment	2
nAc	Nonsparking equipment	2
nC	Sparking equipment in	
	which the contacts are	
	suitably protected	
	other than by restricted	
	breathing enclosure	2
nCc	Sparking equipment in	
	which the contacts are	
	suitably protected	
	other than by restricted	
	breathing enclosure	2
nR	Restricted breathing enclosure	2
nRc	Restricted breathing enclosure	2
o	Oil immersion	1
ob	Oil immersion	1
px	Pressurization	1
pxb	Pressurization	1
py	Pressurization	1
pyb	Pressurization	1
pz	Pressurization	2
pzc	Pressurization	2
q	Powder filled	1
qb	Powder filled	1

*Does not address use where a combination of techniques is used.
**Associated apparatus is permitted to be installed in a hazardous (classified) location if suitably protected using another type of protection.

Substantiation: Changes to the NEC are proposed to align with the changes in the product standard.
The marking in IEC 60079-0 has been revised to show alternative designations for some of the types of protection. The US adoption, ANSI/ISA-60079-0 – ANSI/UL 60079-0 has maintained these alternate designations. The change to the NEC is proposed to maintain alignment with the product standard.
As an alternate to the existing marking, the lower case letter indicating the "Equipment Protection Level" is added to the type of protection where it does not already exist. For example, with Intrinsic Safety "ia" for Equipment Protection Level "a" already exists in the type of protection
Panel Meeting Action: Reject

Panel Statement: The panel agrees with the concept of the proposal but cannot accept it because the standard involved has not been published.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MASSEY, L.: Assuming that the subject standard is published prior to the publication of the 2011 edition of the NEC,the panel should approve this proposal.

14-183 Log #604 NEC-P14 **Final Action: Accept**
(505.9(D)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with regard to the accepted language in Proposal 14-184.
This action will be considered by the panel as a public comment.
Submitter: William G. Lawrence, Jr., S. Yarmouth, MA
Recommendation: Revise text to read as follows:
(1) Temperature Classifications. Equipment shall be marked to show the operating temperature or temperature class referenced to a 40°C ~~(104°F)~~ ambient, or at the higher ambient temperature if the equipment is rated and marked for an ambient temperature of greater than 40°C. The temperature class, if provided, shall be indicated using the temperature class (T Code) shown in Table 505.9(D)(1).
Electrical equipment designed for use in the ambient temperature range between -20°C and +40°C shall require no additional ambient temperature marking.
Electrical equipment that is designed for use in a range of ambient temperatures other than -20°C to +40°C is considered to be special; and the ambient temperature range shall then be marked on the equipment, including either the symbol “Ta” or “Tamb” together with the special range of ambient temperatures, in degrees Celsius.
~~Electrical equipment suitable for ambient temperatures exceeding 40°C (104°F) shall be marked with both the maximum ambient temperature and the operating temperature or temperature class at that ambient temperature.~~
Substantiation: The 3rd paragraph no longer permits degrees Fahrenheit for ambient temperature marking. Maintaining the °F here is misleading. **505.9(D)(1)** currently indicates that for equipment with a rated ambient temperature of greater than 40°C, the equipment shall be marked with a temperature class for the 40°C ambient, AND a temperature class for the higher ambient. This is not consistent with 500.8(B)(4) where this is an “OR” situation, not an “AND”. Employing the same text as in Article 500 to expand the requirement in the 1st paragraph should resolve the confusion. The existing 4th paragraph can then be deleted.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-184 Log #3202 NEC-P14 **Final Action: Accept**
(505.9(D)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with regard to the accepted language in Proposal 14-183.
This action will be considered by the panel as a public comment.
Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: In the second paragraph delete “additional” so that it reads:
“Electrical equipment designed for use in the ambient temperature range between –20°C and +40°C shall require no ~~additional~~ ambient temperature marking.”
Substantiation: There is no other marking related to ambient, so “additional” is not necessary.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-185 Log #3203 NEC-P14 **Final Action: Reject**
(505.9(D)(1))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise the fourth paragraph as follows:
“Electrical equipment suitable for ambient temperatures ~~exceeding~~ other than 40°C (104°F) shall be marked with both the maximum ambient temperature and the operating temperature or temperature class at the ambient temperature.
Substantiation: Other proposals from this submitter are intended to clarify that the ambient temperatures both inside as well as outside the default range are acceptable for the effective operation of equipment if the range is marked on it. Apparently, the principle is that even if the equipment will not function at 40°C, it should still remain safe and not constitute a source of ignition from high temperatures. This is not at all clear to the user who doesn’t know that the marked ambient is for the effective operation, but that the equipment will still be safe at 40°C. Maybe the user thinks that the equipment will operate effectively up to the marked ambient, but will be safe regardless of the ambient.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-26.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-186 Log #3204 NEC-P14 **Final Action: Reject**
(505.9(D)(1))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add a new sentence at the end of the penultimate paragraph as follows:
“Electrical equipment that is designed for use in a range of ambient temperatures other than –20°C to +40°C is considered to be special; and the ambient temperature range shall than be marked on the equipment, including either the symbol “Ta” or “Tamb” together with the special range of ambient temperatures, in degrees Celsius. Either limit of this special range shall be permitted to be inside or outside of the standard range.
Substantiation: This paragraph has been interpreted as permitting a special ambient limit to be only outside of the default limits. This has caused difficulties for certain types of temperature-sensitive equipment within an explosion protected enclosure. As an example, flameproof, encapsulated circuit breakers inside a Type “e” enclosure will not dissipate heat produced as readily as normal circuit breakers inside a sheet metal enclosure. This restricts the number of circuits to prevent nuisance tripping in a 40°C ambient. There is no logic in requiring equipment that will be used inside a building whose year-round temperature will be 24°C to operate effectively at a 40°C ambient. This does not change the requirement that it operate safely in a +40°C ambient.
See companion proposal for 500.8(C)(5).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-26.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-187 Log #378 NEC-P14 **Final Action: Accept in Principle**
(505.9(E))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise first sentence as shown:
“All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 ($^3/_4$ in. taper/foot) ~~(3/4-in. taper per foot)~~.”
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 14-188.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-188 Log #2842 NEC-P14 **Final Action: Accept**
(505.9(E))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered since it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
This action will be considered by the panel as a public comment.
Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(E) Threading. Supply connection entry thread form shall be NPT or metric. ~~All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).~~ Conduit and fittings shall be made wrenchtight to prevent sparking when fault current flows through the conduit system, and to ensure the explosionproof integrity of the conduit system where applicable. Equipment provided with threaded entries for field wiring connections shall be installed in accordance with 500.8(E)(1) or (E)(2). ~~Threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.~~
~~*Exception: For listed explosionproof or flameproof equipment, factory threaded NPT entries shall be made up with at least 41/2 threads fully engaged.*~~
(1) Equipment Provided with Threaded Entries for NPT Threaded Conduit or Fittings. For equipment provided with threaded entries for NPT threaded conduit or fittings, listed conduit, conduit fittings, or cable fittings shall be used.
All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).
NPT threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.
Exception: For listed explosionproof equipment, factory threaded NPT entries shall be made up with at least 41/2 threads fully engaged.
FPN No. 1: Thread form specifications for NPT threads are located in ANSI/ASME B1.20.1-1983, *Pipe Threads, General Purpose (Inch).*

FPN No. 2: Female NPT threaded entries use a modified National Standard Pipe Taper (NPT) thread with thread form per ANSI/ASME B1.20.1-1983, *Pipe Threads, General Purpose (Inch)*. See ANSI UL/ISA 60079-1 *Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Flameproof Enclosures "d"*.

(2) Equipment Provided with Threaded Entries for Metric Threaded Conduit or Fittings. For equipment with metric threaded entries, listed conduit fittings or listed cable fittings shall be used. s Such entries shall be identified as being metric, or listed adapters to permit connection to conduit or NPT-threaded fittings shall be provided with the equipment~~. Adapters~~ and shall be used for connection to conduit or NPT-threaded fittings. ~~Listed cable fittings that have metric threads shall be permitted to be used.~~

Metric threaded entries into explosionproof equipment shall have a class of fit of at least 6g/6H and be made up with at least five threads fully engaged for Group C and D, and not less than eight full threads for Group A and Group B.

FPN: Threading specifications for metric threaded entries are located in ISO 965/1-1980, *Metric Screw Threads*, and ISO 965/3-1980, *Metric Screw Threads*

(3) Unused Openings.

All unused openings shall be closed with close-up plugs listed for the location and shall maintain the type of protection. The plug engagement shall comply with 500.8(E)(1) or 500.8(E)(2).

Substantiation: This proposal reflects the current practice for gauging and engagement of NPT and metric thread forms found in the product standards referenced in the fine print note.

Panel Meeting Action: Accept in Principle

Revise text as follows:

(E) Threading. Supply connection entry thread form shall be NPT or metric. ~~All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).~~ Conduit and fittings shall be made wrenchtight to prevent sparking when fault current flows through the conduit system and to ensure the explosionproof integrity of the conduit system where applicable. Equipment provided with threaded entries for field wiring connections shall be installed in accordance with 505.9(E)(1) or (E)(2). ~~Threaded entries into explosionproof equipment shall be made up with at least five threads fully engaged.~~

~~*Exception: For listed explosionproof or flameproof equipment, factory threaded NPT entries shall be made up with at least 41/2 threads fully engaged.*~~

(1) Equipment Provided with Threaded Entries for NPT Threaded Conduit or Fittings. For equipment provided with threaded entries for NPT threaded conduit or fittings, listed conduit, conduit fittings, or cable fittings shall be used.

All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread.

NPT threaded entries into explosionproof or flameproof equipment shall be made up with at least five threads fully engaged.

Exception: For listed explosionproof or flameproof equipment, factory threaded NPT entries shall be made up with at least 4-1/2 threads fully engaged.

FPN No. 1: Thread ~~form~~ specifications for male NPT threads are located in ANSI/ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*.

FPN No. 2: Female NPT threaded entries use a modified National Standard Pipe Taper (NPT) thread with thread form per ANSI/ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*. See ANSI UL/ISA 60079-1 *Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Flameproof Enclosures "d"*.

(2) Equipment Provided with Threaded Entries for Metric Threaded Conduit or Fittings. For equipment with metric threaded entries, listed conduit fittings or listed cable fittings shall be used. s Such entries shall be identified as being metric, or listed adapters to permit connection to conduit or NPT-threaded fittings shall be provided with the equipment~~. Adapters~~ and shall be used for connection to conduit or NPT-threaded fittings. ~~Listed cable fittings that have metric threads shall be permitted to be used.~~

Metric threaded entries into explosionproof or flameproof equipment shall have a class of fit of at least 6g/6H and be made up with at least five threads fully engaged for Groups C, D, IIB, or IIA and not less than eight threads fully engaged for Groups A, B, IIC, or IIB + H2.

FPN: Threading specifications for metric threaded entries are located in ISO 965/1, *Metric Screw Threads*, and ISO 965/3, *Metric Screw Threads*

(3) Unused Openings.

All unused openings shall be closed with close-up plugs listed for the location and shall maintain the type of protection. The plug engagement shall comply with 505.9(E)(1) or 505.9(E)(2).

Panel Statement: The reorganization of this section has been made with modifications for clarity and consistency and aligns with Proposal 14-33.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-189 Log #145 NEC-P14 **Final Action: Accept in Principle**
(505.9(F))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal. The panel did not indicate whether it accepted the proposed FPN or not.

This action will be considered by the panel as a public comment.

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(F) ~~Fiber~~ Optical Fiber Cables ~~Assembly~~. ~~Where a fiber optic cable assembly contains conductors that are capable of carrying current, the fiber optic cable assembly~~ Composite and conductive optical fiber cables shall be installed in accordance with 505.15 and 506.15 as applicable.

FPN: See 770.2 for definitions of optical fiber cables.

Substantiation: The Code should use consistent terminology throughout.

Article 770 definitions:

Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering.

Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors.

Conductive Optical Fiber Cable. These optical fiber cables contain non–current-carrying conductive members such as metallic strength members, metallic vapor barriers, and metallic armor or sheath.

Acceptance of this proposal will result in correlation with Article 770.

Panel Meeting Action: Accept in Principle

(F) ~~Fiber~~ Optical Fiber Cables ~~Assembly~~. Where an ~~fiber~~ optical fiber cable ~~assembly~~ contains conductors that are capable of carrying current (composite optical fiber cable), the ~~fiber~~ optical fiber cable ~~assembly~~ shall be installed in accordance with the requirements of Articles 505.15 and 505.16.

Panel Statement: See panel statement on Proposal 14-35. The panel notes that the second referenced section was in error in the original proposal; this has been corrected.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-190 Log #1015 NEC-P14 **Final Action: Reject**
(505.15(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

In (B)(1)(b)(c) insert "likely to be" between "not" and "subject".

Revise (f) Type PVC conduit and RTRC shall be permitted underground where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to finish grade. Threaded rigid metal conduit or threaded steel intermediate metal conduit with threaded fittings shall be used for not less than the last 600 mm (24 in.) of the underground run to emergence. ~~Or to the point of connection to the aboveground wiring~~.

Substantiation: "Underground" should be specified in the first sentence to correlate with "grade" and "underground" in the second sentence. Literal wording does not permit more than 24 in. of RMC or IMC for the last portion of the run. "To emergence" is the determining requirement whether or not above ground connection is to a raceway, cabinet, or box. "Above ground raceway" implies the underground run cannot terminate in a pole, box, or cabinet. All extensions aboveground have to comply with applicable provisions.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-39.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-191 Log #2843 NEC-P14 **Final Action: Accept in Principle**
(505.15(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action as it relates to 4.1.1 of the NEC Style Manual concerning references to entire articles.

This action will be considered by the panel as a public comment.

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.

Recommendation: Revise text as follows:

(B) Class I, Zone 1.

(1) General. In Class I, Zone 1 locations, the wiring methods in (B)(1)(a) through (B)(1)(f) shall be permitted.

(a) All wiring methods permitted by 505.15(A).

(b) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation,
and where the cable is not subject to physical damage, Type MC-HL cable listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and terminated ~~provided~~ with ~~termination~~ fittings listed for the application.

FPN: See 330.12 for restrictions on use of Type MC cable.

(c) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation,

and where the cable is not subject to physical damage, Type ITC-HL cable, listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material and terminated ~~provided~~ with ~~termination~~ fittings listed for the application.

FPN: See 727.4 and 727.5 for restrictions on use of Type ITC cable.

(d) Type MI cable terminated with ~~termination~~ fittings listed for Class I, Zone 1 or Division 1 locations. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.

(e) Threaded rigid metal conduit, or threaded steel intermediate metal conduit.

(f) Type PVC conduit and Type RTRC conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.

(2) Flexible Connections. Where necessary to employ flexible connections, flexible fittings listed for Class I, Zone 1 or Division 1 locations or flexible cord in accordance with the provisions of 505.17 terminated with a listed cord connector that maintains the type of protection shall be permitted.

Substantiation: Cable is *terminated* with fittings, but the fittings are not *provided* with the cable, they are sourced separately. Terminology is made consistent with other portions of the section.

Panel Meeting Action: Accept in Principle

Revise text as follows:

(B) Class I, Zone 1.

(1) General. In Class I, Zone 1 locations, the wiring methods in (B)(1)(a) through (B)(1)(f) shall be permitted.

(a) All wiring methods permitted by 505.15(A).

(b) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation,

and where the cable is not subject to physical damage, Type MC-HL cable listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and terminated ~~provided~~ with ~~termination~~ fittings listed for the application. Type MC-HL cable shall be installed in accordance with the provisions of Article 330.

~~FPN: See 330.12 for restrictions on use of Type MC cable.~~

(c) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation,

and where the cable is not subject to physical damage, Type ITC-HL cable, listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material and terminated ~~provided~~ with ~~termination~~ fittings listed for the application. Type ITC-HL cable shall be installed in accordance with the provisions of Article 727.

~~FPN: See 727.4 and 727.5 for restrictions on use of Type ITC cable.~~

(d) Type MI cable terminated with ~~termination~~ fittings listed for Class I, Zone 1 or Division 1 locations. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.

(e) Threaded rigid metal conduit, or threaded steel intermediate metal conduit.

(f) Type PVC conduit and Type RTRC conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.

(2) Flexible Connections. Where necessary to employ flexible connections, flexible fittings listed for Class I, Zone 1 or Division 1 locations or flexible cord in accordance with the provisions of 505.17 terminated with a listed cord connector that maintains the type of protection of the terminal compartment shall be permitted.

Panel Statement: The panel agrees with the changes made by the submitter and has made additional changes to (b) to clarify that the requirements of Article 330 also apply to the installation of Type MC-HL cable. The panel has also made additional changes to (c) to clarify that the requirements of Article 727 also apply to the installation of Type ITC-HL cable. The panel has made additional changes in (2) to clarify that the type of protection applies to the terminal compartment.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-192 Log #1778 NEC-P14 **Final Action: Reject**
(505.15(B)(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: In Class I Zone 1 locations, only the wiring methods in (B)(1)(a) through (B)(1)(f) shall be permitted.

Substantiation: Edit. Present wording does not exclude other wiring methods. 90.5(B) states "permitted" describes actions or options that are allowed but not require. 230.43, for example, specifically limits wiring methods as do other sections.

Panel Meeting Action: Reject

Panel Statement: The addition of the word "only" does not add to the clarity of the code language nor is it required to restrict other wiring methods.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-193 Log #1068 NEC-P14 **Final Action: Reject**
(505.15(B)(1)(b) and (c))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Insert "likely to be" between "not" and "subject".

Substantiation: It is difficult to determine that something is not subject to damage. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-36.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-194 Log #4323 NEC-P14 **Final Action: Reject**
(505.15(B)(2))

Submitter: Robert L. Seitz, Artech Engineering

Recommendation: Add to end of the paragraph:

Armored TC-ER cable as described in 336.10 and 336.100 shall be permitted to be employed as a flexible connection for distances not to exceed 10 meters between end devices and utilization equipment and a termination enclosure.

Substantiation: Allowance that a braided armor TC-ER cable is acceptable for flexible connection in Class I, Zone 1 areas would improve the choice of flexible connections that might be made in Zone 1 areas. TC cables are already permitted to be installed in Class I, Zone 2 areas. Extra hard usage cord can now be used for flexible connection in Class I, Zone 1 areas. The addition of an armored TC-ER cable for a limited length of 10 meters would allow a flexible connection to be made between utilization equipment and a termination point that is necessarily (by location and construction) greater than 6 ft apart. 10 meters was selected as reasonable to accommodate a 6 ft jump of the tray that would be used on both ends, which would then leave a cable tray length of 6 meters or about 20 feet would allow bridging distance that might exist around installed equipment. The flexible connection would than be able to be disconnected and moved out of the way during equipment change out or servicing. A companion proposal has been submitted for 336.100 to permit a braided armor for TC.

Panel Meeting Action: Reject

Panel Statement: The type of cable and its construction is not currently permitted by 336.100.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-195 Log #2844 NEC-P14 **Final Action: Accept in Principle**
(505.15(C))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.

Recommendation: Revise text as follows:

(C) Class I, Zone 2.

(1) General. In Class I, Zone 2 locations, the wiring methods in (C)(1)(a) through (C)(1)(h) shall be permitted.

(a) All wiring methods permitted by 505.15(B).

(b) Types MI, MC, MV, or TC cable terminated with ~~termination~~ fittings listed for the type of protection~~, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings~~.

Single conductor Type MV cables shall be shielded or metallic armored.

(c) Type ITC and Type ITC-ER cable as permitted in 727.4 terminated with fittings listed for the type of protection.

(d) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, ~~or in cable tray systems~~ terminated with fittings listed for the type of protection. ~~PLTC shall be installed in a manner to avoid tensile stress at the termination fittings.~~

(e) Enclosed gasketed busways, enclosed gasketed wireways.

(f) Threaded rigid metal conduit, threaded steel intermediate metal conduit.

(g) In industrial establishments with restricted public access where the conditions of maintenance and supervision ensure that only qualified persons service the installation

and where metallic conduit does not provide sufficient corrosion resistance, listed reinforced thermosetting resin conduit (RTRC), factory elbows, and associated fittings, all marked with the suffix -XW, and Schedule 80 PVC conduit, factory elbows, and associated fittings shall be permitted. Where seals are required for boundary conditions as defined in 505.16(C)(1)(b), the Zone 1 wiring method shall extend into the Zone 2 area to the seal, which shall be located on the Zone 2 side of the Zone 1–Zone 2 boundary.

(h) Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations.

Nonincendive field wiring systems shall be installed in accordance with the control drawing(s). Simple apparatus, not shown on the control drawing, shall be permitted in
a nonincendive field wiring circuit, provided the simple apparatus does not interconnect the nonincendive field wiring circuit to any other circuit.

FPN: Simple apparatus is defined in 504.2.

Separate nonincendive field wiring circuits shall be installed in accordance with one of the following:

(1) In separate cables

(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield

(3) In multiconductor cables where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)

(2) Flexible Connections. Where provision must be made for limited flexibility, flexible metal fittings, flexible metal conduit with listed fittings, liquidtight flexible metal conduit
with listed fittings, liquidtight flexible nonmetallic conduit with listed fittings, or flexible cord in accordance with the provisions of 505.17 terminated with a listed cord connector that maintains the type of protection shall be permitted.

FPN: See 505.25(B) for grounding requirements where flexible conduit is used.

Substantiation: This proposal reflects the current installation requirements of 725.154(D) that in conjunction with a companion proposal to revise 725.154(D) move the Classified location permitted wiring methods into Chapter 5, with the installation requirements for these types of cables retained for all users in 725.154(D). See companion proposal on 725.154(D).

Panel Meeting Action: Accept in Principle

Revise text as follows:

(C) Class I, Zone 2.

(1) General. In Class I, Zone 2 locations, the following wiring methods shall be permitted,

(a) All wiring methods permitted by 505.15(B).

(b) Types MI, MC, MV, or TC cable including installation in cable tray systems. The cable shall be terminated with listed fittings. ~~with termination fittings, or in cable tray systems and installed in a manner to avoid tensile stress at the termination fittings~~.

Single conductor Type MV cables shall be shielded or metallic armored.

(c) Type ITC and Type ITC-ER cable as permitted in 727.4 and terminated with listed fittings.

(d) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, including ~~or~~ installation in cable tray systems. The cable shall be terminated with listed fittings. ~~PLTC shall be installed in a manner to avoid tensile stress at the termination fittings.~~

(e) Enclosed gasketed busways, enclosed gasketed wireways.

(f) Threaded rigid metal conduit, threaded steel intermediate metal conduit.

(g) In industrial establishments with restricted public access where the conditions of maintenance and supervision ensure that only qualified persons service the installation and where metallic conduit does not provide sufficient corrosion resistance, listed reinforced thermosetting resin conduit (RTRC), factory elbows, and associated fittings, all marked with the suffix -XW, and Schedule 80 PVC conduit, factory elbows, and associated fittings shall be permitted. Where seals are required for boundary conditions as defined in 505.16(C)(1)(b), the Zone 1 wiring method shall extend into the Zone 2 area to the seal, which shall be located on the Zone 2 side of the Zone 1–Zone 2 boundary.

(h) Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations.

Nonincendive field wiring systems shall be installed in accordance with the control drawing(s). Simple apparatus, not shown on the control drawing, shall be permitted in a nonincendive field wiring circuit, provided the simple apparatus does not interconnect the nonincendive field wiring circuit to any other circuit.

FPN: Simple apparatus is defined in 504.2.

Separate nonincendive field wiring circuits shall be installed in accordance with one of the following:

(1) In separate cables

(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield

(3) In multiconductor cables where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)

(2) Flexible Connections. Where provision must be made for limited flexibility, flexible metal fittings, flexible metal conduit with listed fittings, liquidtight flexible metal conduit with listed fittings, liquidtight flexible nonmetallic conduit with listed fittings, or flexible cord in accordance with the provisions of 505.17 terminated with a listed cord connector that maintains the type of protection of the terminal compartment shall be permitted.

FPN: See 505.25(B) for grounding requirements where flexible conduit is used.

Panel Statement: The panel has retained the language "in cable tray systems", which was deleted in the proposal, in items (b) and (d) to permit their use, as provided in other articles in the code. The panel also clarified the language for listed fittings. The panel has made additional changes in (2) to clarify that the type of protection applies to the terminal compartment.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-196 Log #4904 NEC-P14 **Final Action: Accept**
(505.15(C)(1)(b))

Submitter: Jeremy Neagle, Intertek ETL SEMKO

Recommendation: Delete Type MI cable from 505.15.(c)(1)(b).

Substantiation: 505.15(C)(1)(a) permits the use of all wiring methods permitted in 505.15(B), which includes Type MI cable. There is no need to re-state this wiring method in 505.15(C)(1)(b).

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-197 Log #4906 NEC-P14 **Final Action: Accept in Principle**
(505.15(C)(1)(b))

Submitter: Jeremy Neagle, Intertek ETL SEMKO

Recommendation: Revise text as follows:

(b) Types MI, MC, MV, or TC cables with termination fittings, ~~or in cable tray systems~~ and installed in a manner to avoid tensile stress at the termination fittings. Single conductor Type MV cables shall be shielded or metallic armored.

Substantiation: Cable tray systems are not a suitable replacement for proper termination fittings at the entry into equipment. The requirements for installation of such cables in trays are covered in other articles.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 14-195.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

(Note: Sequence 14-197a moved to follow 14-198)

14-198 Log #4451 NEC-P14 **Final Action: Reject**
(505.15(C)(1)(h))

Submitter: Eliana Beattie, ISA

Recommendation: Revise text to read as follows:

(h) ~~Nonincendive field wiring~~ Intrinsic safety type of protection "ic" shall be permitted using any of the wiring methods permitted for unclassified locations. ~~Nonincendive field wiring systems~~ Intrinsic safety type of protection "ic" systems shall be installed in accordance with the control drawing(s). Simple apparatus, not shown on the control drawing, shall be permitted in ~~a nonincendive field wiring circuits~~ an intrinsic safety type of protection "ic" circuit, provided the simple apparatus does not interconnect the ~~nonincendive field wiring circuits~~ intrinsic safety type of protection "ic" systems to any other circuit.

FPN: Simple apparatus is defined in 504.2.

Separate ~~nonincendive field wiring circuits~~ intrinsic safety type of protection "ic" systems shall be installed in accordance with one of the following:

(1) In separate cables

(2) In multiconductor cables where the conductors of each circuit are within a grounded metal shield

(3) In multiconductor cables where the conductors of each circuit have insulation with a minimum thickness of 0.25 mm (0.01 in.)

Substantiation: The new edition of ANSI/ISA-60079-11 introduces an extension of the intrinsic safety concept for use in Zone 2. This is designated "ic" and "[ic]". This protection technique uses a similar philosophy to that used for "ia" and "ib" except that the concept does not apply any faults and is very similar to the existing nonincendive technique that is already permitted by the Code. This technique is not intended to replace nonincendive field wiring as this will still be permitted for use in Zones under 509.9(C)(1).

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 14-170.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-197a Log #CP1404 NEC-P14 **Final Action: Accept**
(505.15(C)(1)(f).)

Submitter: Code-Making Panel 14,

Recommendation: Delete 505.15(C)(1)(f).

Substantiation: 505.15(C)(1)(a) permits all of the wiring methods permitted in 505.15(B), which includes threaded rigid metal conduit and threaded steel intermediate metal conduit. There is no need to restate these wiring methods in 505.15(C)(1)(f).

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-199 Log #4322 NEC-P14 **Final Action: Reject**
(505.15(C)(2))

Submitter: Robert L. Seitz, Artech Engineering
Recommendation: Revise to read:
Where necessary to employ flexible connections, flexible fittings listed for Class I, Zone 1 or Division 1 locations, or flexible cord in accordance with the provisions of 505.17 shall be permitted. <u>Additionally armored TC-ER cable as permitted in 336.10 may be used.</u>
Substantiation: Clarification that TC-ER cable is acceptable for flexible connection in Class I, Zone 2 areas would improve the choice of flexible connections that might be made. TC cables are already permitted to be installed in Class I, Zone 2 areas.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-194.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-200 Log #3205 NEC-P14 **Final Action: Reject**
(505.15(C)(3))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add a new 505.15(C)(3) as follows:
"(3) Boxes and Fittings. Boxes and fittings shall not be required to be explosion protected unless they contain apparatus that may produce arcs, sparks or high temperatures (temperatures exceeding 80% of the autoignition temperature of the gas or vapor involved) that are considered to be an ignition source in normal operation. Such apparatus includes, but is not limited to, switches, circuit breakers, motor controllers, fuses, variable frequency drives, alarm bells and horns, relays, GFCIs, AFCIs, and resistors.
Substantiation: There is nothing in Article 505 similar to 501.10(B)(4). This has led end users and others to think that all boxes and fittings for use in Zone 2 must be identified for such.
Panel Meeting Action: Reject
Panel Statement: The proposal as written would permit equipment that is not listed as required by 505.20.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-201 Log #306 NEC-P14 **Final Action: Reject**
(505.16(B)(7))

Submitter: Leslie Zabel, ConocoPhillips Alaska, Inc.
Recommendation: Revise text to read as follows:
505.16(B)(7) Cables Entering Enclosures. Cable seals shall be provided for each cable entering flameproof or explosionproof enclosures. The seal shall comply with 505.16(D).
<u>*Exception:* Cables entering an enclosure where such switches, circuit breakers, fuses, relays, or resistors comply with one of the following:</u>
<u>(1) Are enclosed within a chamber hermetically sealed against the entrance of gases or vapors.</u>
<u>(2) Are immersed in oil.</u>
<u>(3) Are enclosed within a factory-sealed explosion proof chamber located within the enclosure, identified for the location, and marked "factory sealed" or equivalent, unless the entry is metric designator 53 (trade size 2) or larger. Factory-sealed enclosures shall not be considered to serve as a seal for another adjacent explosionproof enclosure that is required to have a cable seal.</u>
Substantiation: When using MC-HL cable to connect factory sealed equipment, we are required to use cable seals. This is unnecessarily adding to installation costs of equipment that is already sealed against gas intrusion. This exception is currently used for conduit and should be expanded to include cables.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-202 Log #3206 NEC-P14 **Final Action: Accept in Principle**
(505.16(C)(1)(b))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add to end of paragraph as follows:
"<u>Conduits shall be sealed to minimize the amount of gas or vapor within the Zone 2 portion of the conduit from being communicated to the conduit beyond the seal. Such seals shall not be required to be explosionproof but shall be identified for the purpose of minimizing passage of gases under normal operating conditions and shall be accessible.</u>"
Substantiation: This text was added to Article 501 in the 2002 NEC, but was not added to Article 505.
Panel Meeting Action: Accept in Principle
Revise the proposed text as follows:
"<u>Conduits shall be sealed to minimize the amount of gas or vapor within the Zone 2 portion of the conduit from being communicated to the conduit beyond the seal. Such seals shall not be required to be flameproof or explosionproof but shall be identified for the purpose of minimizing passage of gases under normal operating conditions and shall be accessible.</u>"
Panel Statement: The panel agrees with the proposed text, but has added "flameproof" to be consistent with other sections.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
(Note: Sequence 14-203 moved to follow 14-204)

14-204 Log #4452 NEC-P14 **Final Action: Accept in Principle**
(505.16(E)(3))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered since it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
In addition, the Technical Correlating directs that that panel revise the meeting action text to comply with the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
Modify the existing text as follows:
Process-connected equipment that is listed and marked <u>"Single Seal" or</u> "Dual Seal" shall not require additional process sealing when used within the manufacturer's ratings.
FPN: For construction and testing requirements for <u>single and</u> dual seal process, connected equipment, refer to ANSI/ISA-12.27.01-2003, Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids.
Substantiation: The provisions of ANSI/ISA-12.27.01 include both construction and performance requirements for single and dual sealed electrical equipment. The additional requirements for single seal equipment include both pressure and temperature cycling, followed by a leakage and burst test.
Panel Meeting Action: Accept in Principle
Delete 505.16(E)(3) and create a new section 505.26 to read:
505.26 Process Sealing This section applies to process connected equipment which includes, but is not limited to, canned pumps, submersible pumps, flow, pressure, temperature, or analysis measurement instruments. A process seal is a device to prevent the migration of process fluids from the designed containment into the external electrical system. One of the following means shall be provided to prevent process fluids from entering the electrical raceway or cable system:
(1) Process connected electrical equipment that incorporates a single process seal, such as single compression seal, diaphragm, or tube to isolate flammable or combustible fluids from entering a conduit or cable system capable of transmitting fluids, shall be provided with an additional means to mitigate a single process seal failure. The additional means may include, but is not limited to the following:
a. A suitable barrier meeting the process temperature and pressure conditions that the barrier will be subjected to upon failure of the single process seal. There shall be a vent or drain between the single process seal and the suitable barrier. Indication of the single process seal failure shall be provided by visible leakage, an audible whistle, or other means of monitoring.
b. A listed Type MI cable assembly, rated at not less than 125% of the process pressure and not less than 125% of the maximum process temperature (in degrees Celsius), installed between the cable or conduit and the single process seal.
c. A drain or vent located between the single process seal and a conduit or cable seal. The drain or vent shall be sufficiently sized to prevent overpressuring the conduit or cable seal above 6 in. water column (1493 Pa). Indication of the single process seal failure shall be provided by visible leakage, an audible whistle, or other means of monitoring.
(2) Process-connected electrical equipment that is listed and marked "single seal" or "dual seal".
FPN: For construction and testing requirements for process sealing for listed and marked "single seal" or "dual seal" requirements refer to ANSI/ISA-12.27.01, Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids.
Panel Statement: The revised text more clearly states the proposed requirements for process sealing.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
COSPOLICH, J.: Revise Panel Meeting Action wording as follows:
In new Section 505.26(1) a., change the wording, "..., an audible whistle,..." to read "..., an audible indication,...".
In new Section 505.26(1) b., change the wording, "...and not less than 125% of the maximum or minimum process temperature (in degrees Celsius),..." to read "...and not less than 125% of the maximum or minimum process temperature (in degrees Celsius),...".
In new Section 505.26(1) c., change the wording, "...above 6 in. water (1493 Pa). Indication of the single process seal failure shall be provided by visible leakage, an audible whistle,..." to read "...above 1493 Pa (6 in. water). Indication of the single process seal failure shall be provided by visible leakage, an audible indication,...".

14-203 Log #4432 NEC-P14 **Final Action: Accept**
(505.16(E)(3), FPN 2)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Change ANSI/ISA-12.27.01-2003, *Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids* to ANSI/ISA-12.27.01-2003, *Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids.*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the title of the referenced documents and incorporate the reference in the FPN of new section 505.26.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents. CMP-14 has incorporated the reference in the FPN in the new section 505.26. See panel action and statement on Proposal 14-204.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-205 Log #3207 NEC-P14 **Final Action: Reject**
(505.17)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Revise as follows:
(A) Permitted Uses. Flexible cord shall be permitted:
(1) For connection between portable lighting equipment or other portable utilization equipment and the fixed portion of their supply circuit.
(2) For that portion of the circuit where the fixed wiring methods of 501.10(A) cannot provide the necessary degree of movement for fixed and mobile electrical utilization equipment and the flexible cord is protected by location or by a suitable guard from damage and only in an industrial establishment where conditions of maintenance and engineering supervision ensure that only qualified persons install and service the installation.
(3) For electric submersible pumps with means for removal without entering the wet-pit. The extension of the flexible cord within a suitable raceway between the wet-pit and the power source shall be permitted.
(4) For electric mixers intended for travel into and out of open-type mixing tanks or vats.
<u>(5) For temporary portable assemblies consisting of receptacles, switches, and other devices that are not considered portable utilization equipment but are individually listed for the location.</u>
(B) Installation. Where flexible cords are used, the cords shall comply with all of the following:
(1) Be of a type listed for extra-hard usage
(2) Contain, in addition to the conductors of the circuit, an equipment grounding conductor complying with 400.23
(3) Be connected to terminals or to supply conductors in an approved manner
(4) Be supported by clamps or by other suitable means in such a manner that there is no tension on the terminal connections
(5) Be provided with suitable seals where the flexible cord enters boxes, fittings, or enclosures of the explosionproof type
Exception to (5): ~~Seals shall not be required as provided in 501.105(B)(6).~~
~~(6) Be of continuous length~~
FPN: See ~~501.20~~ <u>505.23</u> for flexible cords exposed to liquids having a deleterious effect on the conductor insulation.
Substantiation: The intent of this proposal is to make 505.17 appear the same as 501.140. For clarity, the text from 501.40 is not underlined; the text of proposals for 501.140(A) and (B) and 505.23 are <u>underlined</u> or ~~struckthrough~~.
See substantiation for proposals for 501.140(A) and (B) and 505.23.
Panel Meeting Action: Reject
Panel Statement: The panel agrees with the concept provided by the submitter however the recommendation uses the incorrect referenced text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-206 Log #2845 NEC-P14 **Final Action: Accept**
(505.17(5))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(5) Be <u>terminated with a listed cord connector that maintains the type of protection</u> ~~provided with listed seals~~ where the flexible cord enters boxes, fittings, or enclosures that are required to be explosionproof or flameproof
~~Exception to (5): As provided in 505.16~~
Substantiation: This proposal makes clear the intent to terminate the flexible cord with fittings that comply with ANSI requirements for such devices including strain relief and the type of protection.
The exception is removed since 505.16 has no specific cord sealing requirements and there is no exception to completing the explosionproof or flameproof enclosure with a seal on the entry.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-207 Log #897 NEC-P14 **Final Action: Reject**
(505.18(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "are likely to".
Substantiation: Edit. "May" is subjective and a term to be avoided per the Style Manual. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-15.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-208 Log #896 NEC-P14 **Final Action: Reject**
(505.19)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "uninsulated" in the heading and text.
Substantiation: Edit. Superfluous; the definition of exposed (as applied to live parts) applies to parts that are not suitably insulated.
Panel Meeting Action: Reject
Panel Statement: See panel statement in Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-209 Log #547 NEC-P14 **Final Action: Reject**
(505.21)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete this section:
~~505.21 Multiwire Branch Circuits.~~
~~In a Class I, Zone 1 location, a multiwire branch circuit shall not be permitted.~~
~~*Exception: Where the disconnect device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.*~~
Substantiation: To conform to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors or multiwire ranch circuit and applies per 90.3.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-210 Log #571 NEC-P14 **Final Action: Reject**
(505.21)

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Delete text as follows:
~~505.21 Multiwire Branch Circuits.~~
~~In a Class I, Zone 1 location, a multiwire branch circuit shall not be permitted.~~
~~*Exception: Where the disconnect device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.*~~
Substantiation: Section 210.4(B) requires all ungrounded conductors of multiwire branch circuits to be provided with a means of simultaneous disconnection at the point where the branch circuit originates. This makes the requirement and Exception in 505.21 unnecessary because Chapters 1-4 have general application.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-211 Log #3208 NEC-P14 **Final Action: Reject**
(505.21)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Delete 505.21.
This is a companion proposal with 501.40, 502.40, and 506.21.
Substantiation: Since 210.4(B) now requires all multiwire branch circuits to "be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates", 505.21 is redundant.
The deletion has been suggested by some, but I expect it will be rejected because 210(B) is a requirement for personnel protection and could at some point be changed. The requirement here is for prevention of fire and explosion.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-212 Log #2616 NEC-P14 **Final Action: Reject**
(505.21 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add text as follows:
<u>"without the use of handle ties"</u>
Substantiation: For hazardous (classified) areas reliance should not be on handle ties which can be removed. See 514.11(A).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-73.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-213 Log #3209 NEC-P14 **Final Action: Reject**
(505.23 (New))

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Add new 505.23 as follows:
<u>505.23 Conductor Insulation, Class I, Zones 1 and 3. Where condensed vapors or liquids may collect on, or come in contact with, the insulation on conductors, such insulation shall be of a type identified for use under such conditions; or the insulation shall be protected by a sheath of lead or by other approved means.</u>
Substantiation: The requirement is in 501.20 and should also appear in Article 505.
Panel Meeting Action: Reject
Panel Statement: This text already appears in 505.18(B). The panel notes that this proposal should refer to Zones 1 and 2, not 1 and 3.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-214 Log #895 NEC-P14 **Final Action: Reject**
(505.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of first paragraph:
~~Grounding and bonding shall comply with Article 250.~~ <u>Metal raceways, cables and noncurrent-carrying metal parts of electrical equipment shall be grounded and also comply with the requirements of 505.25(A) and (B).</u>
Revise (B):
TYPES OF EQUIPMENT GROUNDING ~~and BONDING~~ CONDUCTORS. Flexible metal conduit and flexible liquidtight metal conduit shall ~~not be used as the sole ground-fault current path~~ <u>be installed with equipment grounding or bonding conductors</u>. ~~Where equipment bonding conductors are installed they shall comply with Article 250.~~
Exception: In class II zone 2 locations ~~the~~ <u>an equipment grounding conductor</u> or equipment bonding conductor shall <u>not</u> be <u>required</u> ~~permitted to be deleted~~ where all the following conditions are met:
Substantiation: Bonding should be included in the heading since the text covers them. Equipment grounding conductors should be noted in the exception. Since there is no specific requirement for a bonding jumper in the text "shall be permitted to be deleted" is irrelevant; something cannot be deleted unless it is first installed but may be "omitted".
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-215 Log #2718 NEC-P14 **Final Action: Reject**
(505.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first paragraph:
Grounding and bonding shall comply with <u>applicable provisions</u> of Article 250 and the requirements in 505.25(A) and (B).
Substantiation: Edit. Reference should not be made to an entire article per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: Section 4.1.1 of the NEC Style Manual allows references to code articles where additional conditions are specified.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-215a Log #CP1405 NEC-P14 **Final Action: Accept**
(505.25(B))

Submitter: Code-Making Panel 14,
Recommendation: Revise text to read as follows:
(B) Types of Equipment Grounding Conductors. Flexible metal conduit and liquidtight flexible metal conduit shall <u>include an equipment bonding jumper of the wire type, in compliance with 250.102</u> ~~not be used as the sole ground-fault current path. Where equipment bonding jumpers are installed, they shall comply with 250.102~~.
Retain existing exception.
Substantiation: This proposal correlates the equipment grounding conductor requirements in Article 505 with changes made to those in Articles 501, 502, and 503 by Proposals 14-40, 14-66, and 14-140 respectively.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 506 — ZONE 20, 21, AND 22 LOCATIONS FOR COMBUSTIBLE DUSTS, FIBERS, AND FLYINGS

14-216 Log #4093 NEC-P14 **Final Action: Reject**
(506)

Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Delete the entire chapter and under 502 make provisions to permit the use of Zone 22, Group III B equipment to be used in Class II, Division 2 locations.
502.6 Zone equipment.
Equipment listed and marked for use in Zone 20, 21 or 22 locations, with (1) Symbol "AEx", (2) using a recognized Protection Technique defined under Article 500, 3) a Temperature classifications, marked as a temperature value, in degrees C, preceded by T, and 4) ambient temperature, shall be permitted in Class II, Division 2 locations for the same combustible dust atmosphere and with a suitable temperature class.
Substantiation: Article 506 was initially added to the NEC to provide harmonization with the IEC combustible dust zone methodology. Over the last two code cycles more information has been added to make the Article usable. However given the recent concerns with combustible dust explosions and the fact that this Article is in direct conflict with both NFPA 499 and positions taken by CMP in the past regarding the combustible dust groups, it appears that retaining this article is counterproductive and could in fact result in unsafe installations.
The specific issues are that Article 506 was based upon IEC 61241-xx in which combustible dusts included not only combustible metal dusts, chemical and agricultural dusts, but also ignitable fibers and flyings. Three combustible dust groups were established within the IEC, using conductivity as the basis for two of these groups, Group IIIC and IIIB. The IIIC may mirror Group E, while IIIB that of Groups F and G. The third group is IIIA for the fibers.
Article 506 does not address combustible metallic dusts per scope 506.1. Fibers under the Division methodology are addressed as Class III, a separate Article in 503.
Prior to the 1981 edition of the National Electrical Code (NEC) (1979 and prior editions), all Group E dusts (metal dusts such as aluminum, magnesium, and their commercial alloys) and Group F dusts (carbonaceous dusts such as carbon black, charcoal, or coke dusts having more than 8 percent total volatile materials) were considered to be electrically conductive. As a result, areas containing Group E or Group F dusts were all classified Division 1, as required by the definition of a Class II, Division 1 location. It was only possible to have a Division 2 location for Group G dusts.
The 1984 edition of the NEC eliminated Group F altogether. Carbonaceous dusts with resistivity of less than 10^5 ohm/cm were considered conductive and were classified as Group E. Carbonaceous dusts with resistivity of 10^5 ohm/cm or greater were considered nonconductive and were classified as Group G. This reclassification allowed the use of Group G, Division 2 electrical equipment for many carbonaceous materials.
The 1987 edition of the NEC reinstated Group F because the close tolerances in Group E motors necessary for metal dusts are unnecessary for conductive carbonaceous dusts, and the low temperature specifications in Group G equipment necessary for grain, flour, and some chemical dusts are unnecessary

for nonconductive carbonaceous dusts. This imposed an unwarranted expense on users.

This change allowed the use of Group F, Division 2 electrical equipment for carbonaceous dust with a resistivity greater than 10^5 ohm/cm.

The overall problem with this work was that the resistivity value, a number that related to the dust's ability to conduct an electric current, was not a constant and varied considerably based on dust particle size and extent of oxidation, the moisture content, voltage applied, temperature, and test apparatus and technique. No standardized test method for the resistivity value considering long term environmental effects has been devleoped. Finally, the resisitivity value is not directly related to the explosion hazard.

Since the basic condition of conductivity has been rejected by both NEC CMP-14 and the NFPA EECA Committee in NFPA 499, there seems to be no valid reason to retain Article 506.

Panel Meeting Action: Reject

Panel Statement: The submitter's substantiation is incorrect. Conductivity is not used as a criterion for classification of combustible dusts in the NEC.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

WECHSLER, D.: The action should have been to accept this proposal as the submitter provides a technically correct summary which while brief supports the need to delete Article 506.

Article 506 was added to the NEC to harmonize with the IEC combustible dust zone methodology. However somewhere between our history past with our best intensions and the current development of the IEC Zone 20-22 standards, the US hazardous area classification system for dusts is on the verge of being corrupted by a nightmare of conflicting terms and requirements.

To understand this problem we need to look at an IEC zone document and since one was suggested under ROP 14-228, we will use the proposed 60079-0 standard as a guide. Recall that there is an IEC 60079-0 version of this standard as well as a US 60079-0 Mod standard; wherein the US '79-0 mod' when accepted, is considered to represent the US acceptable standard with deviations.

In the IEC 79-0, the following scope statement exists:

"This part of IEC 60079 specifies the general requirements for construction, testing and marking of electrical equipment and Ex components intended for use in explosive atmospheres."

The US Mod version reads as follows with the cross-out being removed text from the standard and the underlined being added texts:

This ~~part of IEC 60079~~ standard specifies the general requirements for construction, testing and marking of electrical equipment and Ex components intended for use in explosive atmospheres. Explosive atmospheres are identified by the National Electrical Code®, ANSI/NFPA 70 as hazardous (classified) locations and include the following specified locations:

· Class I, Zone 0
· Class I, Zone 1
· Class I, Zone 2
· Zone 20
· Zone 21
· Zone 22

As can be seen the US Mod version with "Zone 20, 21 and Zone 22 methodology includes the hazardous area classification assessment and equipment protection schemes. While the equipment protection schemes are quite basic; keep the dust out of the enclosure, the handling of the hazardous area classification should be of concern to all US users, inspectors, installers and designers.

In both the IEC and US Mod version of 79-0, the following definition exists:

dust

generic term including both combustible dust and combustible flyings

Neither the US NEC nor NFPA 499 address dust in this manner. In the NEC, combustible dust is addressed as a Class II material in Article 502. Combustible dust is also addressed in NFPA 499.

Combustible flyings are not defined in the NEC nor in NFPA 499. The NEC in Article 503 does address ignitible fibers/flyings as Class III materials.

The submitter provided quite an extensive summary dealing with the issue of combustible dust groups and within that context, conductivity as a basis for the groups was mentioned. The Panel comment implies that the submitter was not correct.

Again, from the IEC 79-0 document consider the following definitions:

3.11.1.1

conductive dust

combustible dust with electrical resistivity equal to or less than 103 Ω.m

NOTE IEC 61241-2-2 contains the test method for determining the electrical resistivity of dusts.

3.11.1.2

non-conductive dust

combustible dust with electrical resistivity greater than 103 Ω.m

The US 79-0 Mod reflects the following revisions to these definitions:

3.11.1.1

conductive dust

~~combustible dust with electrical resistivity equal to or less than 10^3 Ω.m~~ metal dust

~~NOTE IEC 61241-2-2 contains the test method for determining the electrical resistivity of dusts.~~

3.11.1.2

non-conductive dust

~~combustible dust with electrical resistivity greater than 10^3 Ω.m~~ dust other than metal dust

If the terms 'conductive' and 'non-conductive' dust still resides in the US Mod, and if in fact CMP-14 takes action to reference this US 79-0 Mod (NEC Log 14-228), is it really incorrect to make the statement that the Zone 20, 21, 22 system does in fact use conductivity as a basis for its groups?

As an added source of confusion, should there be a reference standard dealing with a requirement which is not a requirement in the referring standard document? For example, the proposed US Mod IEC standard contains 'metal' dust requirements, but metal dusts are excluded from Article 506.

The IEC 79-0 also provides in Section 4.3 a defined group, Group III. For purposes of understanding the following is the 4.3 text (note the underlined portion is that from the US 79-0 Mod):

Group III

Electrical equipment of Group III is intended for use in places with an explosive dust atmosphere other than mines susceptible to firedamp.

Electrical equipment of Group III is subdivided according to the nature of the explosive dust atmosphere for which it is intended.

Group III subdivisions:

· IIIA: combustible flyings
· IIIB: non-conductive dust
· IIIC: conductive dust

NOTE 1 Equipment marked IIIB is suitable for applications requiring Group IIIA equipment. Similarly, equipment marked IIIC is suitable for applications requiring Group IIIA or Group IIIB equipment.

NOTE 2 The 2008 NEC does not recognize the identification of locations or equipment as "Group IIIA, IIIB, or IIIC", but identifies equipment suitable for Zone 20, 21, or 22 by the use of equipment marking where a "D" is appended to the type of protection, for example "iaD" and no separate differentiation is made of combustible dusts or ignitable fibers.

The Group III subdivisions are in fact "Groups" and these Groups do not agree with Article 500 for the NEC Article 502 Class II materials groups or for the NEC Article 503 Class III materials.

Additionally, the NFPA Standards Council ruled that it was the responsibility of NFPA 499 and not the NEC CMP-14 to define material groups. Thus Article 506 should not have any groups which have not been defined by the NFPA 499 Committee.

This then brings up the question of Article 506. First, what is Article 506 addressing? According to the Article 506 scope, "This article covers the requirements for the zone classification system as an alternative to the division classification system covered in Article 500, Article 502, and Article 503 for electrical and electronic equipment and wiring for all voltages in Zone 20, Zone 21, and Zone 22 hazardous (classified) locations where fire and explosion hazards may exist due to combustible dusts or ignitible fibers/flyings. Combustible metallic dusts are not covered by the requirements of this article."

Please examine the evidence presented.

Article 506 specifically excludes combustible metallic dusts, in its current form.

Article 506 uses the un-defined term "ignitible fibers/flyings" and does not mention the IEC term "combustible flyings".

Article 506 contains references to IEC US Mod standards which have been revised to address groups that are not in agreement with either the current NEC or NFPA 499. Additionally these same standards address conductive dusts and non-conductive dusts, which as indicated in the submitter's statement were not supported by the NEC or NFPA 499.

The US House of Representatives is currently considering a new Legislative Bill, HR 849, to address worker protection against combustible dust explosions and fires. The bill considers an emergency to exist. It cites the tragic results from the Feb. 7, 2008 Imperial Sugar dust explosion in which 14 workers killed and more than 60 others were seriously injured. This bill also summarizes the Chemical Safety and Hazard Investigation Board (CSB). The CSB identified loss of life and serious injuries from more than 280 combustible dust incidents between 1980 and 2005. It also concluded that combustible dusts are a serious hazard in American industry.

Given this as background, we cannot tolerate providing conflicting information in our standards. Until a working group can resolve Article 506 and its references with other aspects of the US Electrical Code, which really include a need to focus not equipment, but on hazardous (classified) location assessments, Article 506 needs to be pulled from the NEC.

14-217 Log #4433 NEC-P14 **Final Action: Accept**
(506.1)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Change ANSI/ISA-61241-10 (12.10.05)-2004, *Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Classification of Zone 20, Zone 21, and 22 Hazardous (Classified) Locations (IEC 61241-10 Mod)* to ANSI/ISA-61241-10 (12.10.05)-2004, *Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Classification of Zone 20, Zone 21, and 22 Hazardous (Classified) Locations.*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the title of the referenced documents.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-218 Log #4453 NEC-P14 **Final Action: Reject**
(506.1)

Submitter: Eliana Beattie, ISA
Recommendation: Delete text to read as follows:
Remove the following text from the first paragraph:
~~Combustible metallic dusts are not covered by the requirements of this article.~~
Substantiation: By introduction in another proposal, material groups have been introduced to allow the differentiation of metal dusts from non-metallic dusts, fibers and flyings.
Panel Meeting Action: Reject
Panel Statement: Acceptance of this proposal was contingent upon acceptance of Proposal 14-228. Proposal 14-228 was rejected.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MASSEY, L.: Assuming that the subject standard is published prior to the publication of the 2011 edition of the NEC,the panel should approve this proposal.

14-219 Log #4094 NEC-P14 **Final Action: Accept**
(506.2)

TCC Action: The Technical Correlating Committee directs that the number, title and edition of the document from which this extract is taken be listed at the end of the extract in accordance with the NEC Style Manual 4.3.2.3.
This action will be considered by the panel as a public comment.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add the following new definition under 506.2:
<u>Combustible dust. Any finely divided solid material that is 420 microns (0.017 in.) or smaller in diameter (material passing a U.S. No. 40 Standard Sieve) and presents a fire or explosion hazard when dispersed and ignited in air.</u>
Substantiation: For many different reasons, the definition for combustible dust has been changed in a number of other NFPA documents. This change eliminates the dust size and creates confusion with the NEC and NFPA 499 considerations of a dust. For example, in NFPA 654, a combustible dust is now defined as: "Combustible Dust. A combustible particulate solid that presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape." Inclusion of the proper historic definition for combustible dust upon which these NEC Articles and NFPA 499 are based will retain this important term without adding confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
OFFERDAHL, D.: The definition of combustible dust is covered in NFPA 499 which is reference in 500.4 (B). The classification of the area should be determined by professionals using NFPA 499. Once that is completed it is required to be documented in accordance with 500.4 (A) This process take place before the inspector or electrician gets involved. Placing the definition in 500.2 could create confusion that there is enough information that the electrician or inspector can classify the area. In result placing undue pressure from the user to have the area classify as a class 2 area or even worse to unclassified the area. If accepted at all, this proposal should be placed in 500.5c as a fine print note. Placing the definition as a fine print note would achieve the recommendations that submitter proposes. In addition enforces the fact that the responsibly of classification of the area is the responsibly of the owner or user.

14-220 Log #4434 NEC-P14 **Final Action: Accept**
(506.2)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.
Submitter: Eliana Beattie, ISA
Recommendation: Reviser text to read as follows:
Nonincendive Circuit FPN, Nonincendive Equipment FPN, Nonincendive Field Wiring Apparatus FPN: Change ANSI/ISA-12.12.01-2000, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations* to ANSI/ISA-12.12.01-2007, *Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations*
Protection by Encapsulation "mD" FPN No. 1: Change ISA-61241-18 (12.10.07)-2006, *Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation "mD"* to ANSI/ISA-61241-18 (12.10.07)-2006, *Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation "mD"*
Protection by Enclosure "tD" FPN: Change ISA-61241-0 (12.10.02), *Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – General Requirements (IEC 61241-0 Mod),* and ISA 61241-1 (12.10.03), *Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Enclosure "tD" (IEC 61241-1 Mod)* to ANSI/ISA-61241-0 (12.10.02)-2006, *Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – General Requirement* and ANSI/ISA 61241-1-(12.10.03)-2006, *Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Enclosure "tD"*
Protection by Intrinsic Safety "iD" FPN: Change ISA-61241-11 (12.10.06), *Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations* – Protection by Intrinsic Safety "iD" to ANSI/ISA-61241-11 (12.10.04), *Electrical Apparatus for Use in Zone 20, Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety "iD"*
Protection by Pressurization "pD" FPN: Change ISA-61241-2 (12.10.04), *Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization "pD"* to ANSI/ISA-61241-2 (12.10.06), *Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization "pD"*
Substantiation: Change format to match actual ISA standards title.
Panel Meeting Action: Accept in Part
Accept only the titles of the referenced documents.
Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-221 Log #4454 NEC-P14 **Final Action: Accept**
(506.2)

TCC Action: The Technical Correlating Committee directs that the number, title and edition of the document from which this extract is taken be listed at the end of the extract in accordance with NEC Style Manual 4.3.2.3.
The action will be considered by the panel as a public comment.
Submitter: Eliana Beattie, ISA
Recommendation: Add the following new definition under 506.2:
<u>**Combustible dust.** Any finely divided solid material that is 420 microns (0.017 in) or smaller in diameter (material passing a U.S. No. 40 Standard Sieve) and presents a fire or explosion hazard when dispersed and ignited in air.</u>
Substantiation: This definition is extracted from NFPA 499. The definition for combustible dust has been changed in a number of other NFPA documents. This change eliminates the dust size and creates confusion with the NEC and NFPA 499 considerations of a dust. For example, in NFPA 654, a combustible dust is now defined as: "Combustible Dust. A combustible particulate solid that presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape." Inclusion of the proper historic definition for combustible dust upon which these NEC Articles and NFPA 499 are based will retain this important term without adding confusion.
Panel Meeting Action: Accept
Panel Statement: See panel action on Proposal 14-219.
Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

OFFERDAHL, D.: The definition of combustible dust is covered in NFPA 499 which is reference in 500.4(B). The classification of the area should be determined by professionals using NFPA 499. Once that is completed it is required to be documented in accordance with 500.4(A) This process take place before the inspector or electrician gets involved. Placing the definition in 500.2 could create confusion that there is enough information that the electrician or inspector can classify the area. In result placing undue pressure from the user to have the area classify as a class 2 area or even worse to unclassified the area. If accepted at all, this proposal should be placed in 500.5c as a fine print note. Placing the definition as a fine print note would achieve the recommendations that submitter proposes. In addition enforces the fact that the responsibly of classification of the area is the responsibly of the owner or user.

14-222 Log #4435 NEC-P14 **Final Action: Accept**
(506.4(B))

Submitter: Eliana Beattie, ISA

Recommendation: Revise text to read as follows:

Change ISA, International Society for Measurement and Control, to ISA, the International Society of Automation.

Substantiation: Update to new ISA name.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-223 Log #4436 NEC-P14 **Final Action: Accept**
(506.5(1), FPN No. 1, 506.5(2), FPN No. 1, and 506.5(3), FPN No. 1)

TCC Action: The Technical Correlating Committee directs that this proposal be reported as "Accept" since, as modified by the panel, it violates the Manual of Style for NFPA Technical Committee Documents section 2.3.1.2.4 which requires dates of publication for referenced documents.

Submitter: Eliana Beattie, ISA

Recommendation: Revise text to read as follows:

Change ANSI/ISA-61241-10 (12.10.05)-2004, *Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Classification of Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations (IEC61241-10 Mod)* to ANSI/ISA-61241-10 (12.10.05)-2004, *Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Classification of Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations.*

Substantiation: Change format to match actual ISA standards title.

Panel Meeting Action: Accept in Part

Accept only the title of the referenced documents.

Panel Statement: CMP-14 has taken action, in accordance with Panel Proposal 14-6a, to delete publication dates for referenced documents.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-224 Log #1039 NEC-P14 **Final Action: Reject**
(506.5(A) and (B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentences:

(A) Locations shall be classified on the basis of the properties of the combustible dust or ignitable fibers/flyings that ~~may~~ <u>are likely to</u> be present, and the likelihood that a combustible concentration or quantity is present.

(B) Zone 20, Zone 21, and Zone 22 locations are those in which combustible or ignitable fibers/flyings ~~may~~ are or <u>likely to be</u> present in quantities ~~sufficient~~ that can produce explosions or ignitable mixtures.

Substantiation: Edit. "May" and "sufficient" are terms to be avoided per the Style Manual. Sections 506.5(2) and (3) and many other sections use the terms "likely" and "not likely".

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-58.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-225 Log #1038 NEC-P14 **Final Action: Reject**
(506.5(B)(3)(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise latter portion:

"...and ~~effective safeguards against~~ <u>approved means are provided to indicate</u> ventilation failure ~~are provided~~.

Substantiation: Edit. What means can prevent ventilation failure due to operation of an overcurrent device or power outage?

Panel Meeting Action: Reject

Panel Statement: A question is not a form of substantiation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-226 Log #2183 NEC-P14 **Final Action: Accept**
(506.5(B)(3), FPN 2)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and correlate with the action taken on Proposal 14-227.

This action will be considered by the panel as a public comment.

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

FPN No. 2: Zone 22 locations usually include outlets from bag filter vents, because in the event of a malfunction there can be emission of combustible mixtures; locations near equipment that has to be opened at infrequent intervals or equipment that from experience can easily form leaks where, due to pressure above atmospheric, dust will blow out; pneumatic equipment, flexible connections that can become damaged, etc.; storage locations for bags containing dusty product, since failure of bags can occur during handling, causing dust leakage; and locations where controllable dust layers are formed that are likely to be raised into explosive dust –air mixtures. Only if the layer is removed by cleaning before hazardous dust–air mixtures can be formed is the area <u>designated unclassified</u> ~~designated non-hazardous~~.

Substantiation: The code has made an effort over the last few cycles to replace the term "non-hazardous" with "unclassified". This proposal is intended to assist that effort.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-227 Log #3003 NEC-P14 **Final Action: Accept**
(506.5(B)(3), FPN 2)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and correlate with the action taken on Proposal 14-226.

This action will be considered by the panel as a public comment.

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

FPN No. 2: Zone 22 locations usually include outlets from bag filter vents, because in the event of a malfunction there can be emission of combustible mixtures; locations near equipment that has to be opened at infrequent intervals or equipment that from experience can easily form leaks where, due to pressure above atmospheric, dust will blow out; pneumatic equipment, flexible connections that can become damaged, etc.; storage locations for bags containing dusty product, since failure of bags can occur during handling, causing dust leakage; and locations where controllable dust layers are formed that are likely to be raised into explosive dust–air mixtures. Only if the layer is removed by cleaning before hazardous dust–air mixtures can be formed is the area <u>unclassified</u> ~~designated non-hazardous~~.

Substantiation: The code has made effort over the last few cycles to replace the term "non-hazardous" with "unclassified". This proposal is intended to assist that effort.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

OFFERDAHL, D.: This proposal should have been accepted. 514.8 Exception 2 in pertains to the non-metallic raceway buried 2 feet below the earth. This underground installation comply with articles 352.10, 353.10 and 355.10 as well as Articles 352.100 353.100 and 355.100 listing the construction specification of these wiring method and UL product standards rigid nonmetallic underground conduit, plastic (eazx) reinforced thermosetting resin conduit (dzkt).

14-228 Log #4455 NEC-P14 **Final Action: Reject**
(506.6)

Submitter: Eliana Beattie, ISA
Recommendation: Add the following and renumber the sections which follow as needed:
506.6 Group III Materials. Group III shall be subdivided into Subdivisions IIIC, IIIB, and IIIA, as noted in 505.6(A), (B), and (C).
FPN: Group I is intended for use in describing atmospheres that contain firedamp (a mixture of gases, composed mostly of methane, found underground, usually in mines). This *Code* does not apply to installations underground in mines. See 90.2(B). Group II is intended for places with an explosive gas atmosphere other than mines. Group III is intended for places with an explosive dust atmosphere other than mines.
(A) Subdivision IIIC. Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, or other combustible dusts whose particle size, abrasiveness, and conductivity present similar hazards in the use of electrical equipment.
(B) Subdivision IIIB. Atmospheres containing either
1) combustible carbonaceous dusts that have more than 8 percent total entrapped volatiles (see ASTM D3175-07, *Standard Test Method for Volatile Matter in the Analysis Sample for Coal and Coke*, for coal and coke dusts) or that have been sensitized by other materials so that they present an explosion hazard. Coal, carbon black, charcoal, and coke dusts are examples of carbonaceous dusts, or
2) combustible dusts not included in Group IIIC, including flour, grain, wood, plastic, and chemicals.
FPN No. 1: For additional information on IIIB and IIIC, see NFPA 499-2008, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*.
FPN No. 2: The explosion characteristics of air mixtures of dust vary with the materials involved. For designations IIIC and IIIB, the classification involves the tightness of the joints of assembly and shaft openings to prevent the entrance of dust in the dust-ignitionproof enclosure, the blanketing effect of layers of dust on the equipment that may cause overheating, and the ignition temperature of the dust. It is necessary, therefore, that equipment be identified not only for the class but also for the specific group of dust that will be present.
FPN No. 3: Certain dusts may require additional precautions due to chemical phenomena that can result in the generation of ignitible gases. See ANSI C2-2007, *National Electrical Safety Code*, Section 127A, Coal Handling Areas.
(C) Subdivision IIIA. Atmospheres containing ignitable flyings and fibers.
506.~~6~~ 7 Special Precaution.
Substantiation: The original adoptions of the IEC standards did not include dust groups; the current adoption differentiates among metal dusts, non metal dusts, fibers and flyings. Dust group definitions have been added to address changes made within US adoptions of the IEC standards.
Panel Meeting Action: Reject
Panel Statement: The panel cannot accept the proposal because the standard involved has not been published.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MASSEY, L.: Assuming that the subject standard is published prior to the publication of the 2011 edition of the NEC,the panel should approve this proposal.
WECHSLER, D.: See my Explanation of Negative Vote on Proposal 14-216.

14-229 Log #4456 NEC-P14 **Final Action: Accept**
(506.8(E), (F))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:
Revise 506.8(E) to read:
(E) Protection by Encapsulation ~~“maD”~~”mD”. This protection technique shall be permitted for equipment in Zone 20, Zone 21, and Zone 22 locations for which it is identified.
FPN: See Table 506.9(C)(2)(2) for the descriptions of subdivisions for encapsulation.
Delete 506.8(F)
Substantiation: For consistency of format, item 506.8(F) has been removed and 506.8(E) has been revised to include all levels of protection for protection technique “mD”. This is consistent with the format used for Protection by Intrinsic Safety “iD”.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-230 Log #4458 NEC-P14 **Final Action: Reject**
(Table 506.9(C)(2)(2))

Submitter: Eliana Beattie, ISA
Recommendation: Revise text to read as follows:

Table 506.9(C)(2)(2) Types of Protection Designation

Designation	Technique	Zone*
iaD	Protection by intrinsic safety	20
ia	Protection by intrinsic safety	20
ibD	Protection by intrinsic safety	21
ib	Protection by intrinsic safety	21
[iaD]	Associated apparatus	Unclassified **
[ia]	Associated apparatus	Unclassified **
[ibD]	Associated apparatus	Unclassified **
[ib]	Associated apparatus	Unclassified **
maD	Protection by encapsulation	20
ma	Protection by encapsulation	20
mbD	Protection by encapsulation	21
mb	Protection by encapsulation	21
pD	Protection by pressurization	21
p	Protection by pressurization	21
pb	Protection by pressurization	21
tD	Protection by enclosures	21
ta	Protection by enclosures	21
tb	Protection by enclosures	21
tc	Protection by enclosures	22

*Does not address use where a combination of techniques is used.
**Associated apparatus is permitted to be installed in a hazardous (classified) location if suitably protected using another type of protection.

FPN: The “D” suffix on the type of protection designation was employed prior to the introduction of Group IIIA, IIIB, and IIIC; which is now used to distinguish between the type of protection employed for Group II (Gases) or Group III (Dusts).
Substantiation: The change to the NEC is proposed to maintain alignment with the product standard.
The marking in IEC 60079-0 has been revised to supersede IEC 61241-0 and to replace the current marking of “D” with a Group “III” designation. The US adoption, ANSI/ISA-60079 – ANSI/UL 60079-0 has introduced this marking. It should be noted that the IEC adoption of designations of Groups IIIA, IIIB, and IIIC was based on a US proposal.
As was done for explosive gas atmospheres, the marking in IEC 60079-0 has been revised to show alternative designations for some of the types of protection. The US adoption, ANSI/ISA-60079 – ANSI/UL 60079-0 has maintained these alternate designations. The change to the NEC is proposed to maintain alignment with the product standard. As an alternate to the existing marking, the lower case letter indicating the “Equipment Protection Level” is added to the type of protection where it does not already exist. For example, with Intrinsic Safety “ia” for Equipment Protection Level “a” already exists in the type of protection.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 14-228.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MASSEY, L.: Assuming that the subject standard is published prior to the publication of the 2011 edition of the NEC,the panel should approve this proposal.

14-231 Log #4457 NEC-P14 **Final Action: Accept**
(506.9(C)(5))

Submitter: Eliana Beattie, ISA
Recommendation: Add new text to read as follows:
FPN No.1: EPL (or Equipment Protection Level) may appear in the product marking. The EPLs are designated as G for Gas, D for Dust or M for Mining, and then followed by a letter (a,b,c) to give the user a better understanding as to whether the equipment provides either (a) a “very high”, (b) “high”, or (c) “enhanced” level of protection against ignition of an explosive atmosphere. For example a AEx pb IIIB T165 °C motor (which is suitable by protection concept for application in Zone 21) may additionally be marked with the EPL of “Db”. AEx p IIIB T165 °C Db.
Substantiation: Our US Standards development process parallels that of the IEC. EPLs were introduced into the IEC standard, and are being introduced into ANSI/ISA-60079-0 and ANSI/UL 60079-0.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-232 Log #379 NEC-P14 **Final Action: Accept in Principle**
(506.9(E))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise first sentence as shown:
“All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4 in. taper/foot) ~~(3/4-in. taper per foot)~~.”
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept in Principle
Revise 506.9(E) to read:
(E) Threading. Supply connection entry thread form shall be NPT or metric. ~~All NPT threads referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread that provides a taper of 1 in 16 (3/4-in. taper per foot).~~ Conduit and fittings shall be made wrenchtight to prevent sparking when the fault current flows through the conduit system and to ensure the integrity of the conduit system. Equipment provided with threaded entries for field wiring connections shall be installed in accordance with 506.9(E)(1) or (E)(2).
(1) Equipment Provided with Threaded Entries for NPT Threaded Conduit or Fittings. For equipment provided with threaded entries for NPT threaded conduit or fittings, listed conduit fittings, or cable fittings shall be used. All NPT threaded conduit and fittings referred to herein shall be threaded with a National (American) Standard Pipe Taper (NPT) thread.
FPN: Thread specifications for NPT threads are located in ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch).
(2) Equipment Provided with Threaded Entries for Metric Threaded Conduit or Fittings. For equipment with metric threaded entries listed conduit fittings or listed cable fittings shall be used.~~, such~~ Such entries shall be identified as being metric, or listed adapters to permit connection to conduit or NPT-threaded fittings shall be provided with the equipment~~. Adapters~~ and shall be used for connection to conduit or NPT-threaded fittings. ~~Listed cable fittings that have metric threads shall be permitted to be used.~~ Metric threaded entries shall be made up with at least five threads fully engaged.
(3) Unused Openings. All unused openings shall be closed with listed metal close-up plugs. The plug engagement shall comply with 506.9(E)(1) or 506.9(E)(2).
Panel Statement: The panel action correlates with previous actions taken on Proposals 14-188 and 14-33.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-233 Log #147 NEC-P14 **Final Action: Accept in Principle**
(506.9(F))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
(F) ~~Fiber~~ Optical Fiber Cables ~~Assembly~~. ~~Where a fiber optic cable assembly contains conductors that are capable of carrying current, the fiber optic cable assembly~~ Composite and conductive optical fiber cables shall be installed in accordance with 506.15 and 506.15, applicable.
FPN: See 770.2 for definitions of optical fiber cables.
Substantiation: The Code should use consistent terminology throughout.
Article 770 definitions:
Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering.
Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors.
Conductive Optical Fiber Cable. These optical fiber cables contain non–current-carrying conductive members such as metallic strength members, metallic vapor barriers, and metallic armor or sheath.
Acceptance of this proposal will result in correlation with Article 770.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(F) ~~Fiber~~ Optical Fiber Cables ~~Assembly~~. Where an ~~fiber~~ optical fiber cable ~~assembly~~ contains conductors that are capable of carrying current (composite optical fiber cable), the ~~fiber~~ optical fiber cable ~~assembly~~ shall be installed in accordance with the requirements of Articles 506.15 and 506.16.
Panel Statement: See panel statement on Proposal 14-35. The panel notes that the second referenced section was in error in the original proposal; this has been corrected.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-234 Log #2846 NEC-P14 **Final Action: Accept in Principle**
(506.15(A))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action as it relates to 4.1.1 of the NEC Style Manual concerning references to entire articles.
This action will be considered by the panel as a public comment.
Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
506.15 Wiring Methods. Wiring methods shall maintain the integrity of the protection techniques and shall comply with 506.15(A), (B), or (C).
(A) Zone 20. In Zone 20 locations, the wiring methods in (1) through (5) shall be permitted.
(1) Threaded rigid metal conduit or threaded steel intermediate metal conduit.
(2) Type MI cable terminated with fittings listed for the location. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.
Exception: MI cable and fittings listed for Class II, Division 1 locations are permitted to be used.
(3) In industrial establishments with limited public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation,
Type MC-HL cable, listed for use in Zone 20 locations, with a gas/vaportight continuous corrugated metallic sheath and overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and ~~provided with termination~~ terminated with fittings listed for the application, shall be permitted.
Exception: Type MC-HL cable and fittings listed for Class II, Division 1 locations ~~are~~ shall be permitted to be used.
FPN: See 330.12 for restrictions on use of Type MC cable.
(4) Fittings and boxes shall be identified for use in Zone 20 locations.
Exception: Boxes and fittings listed for Class II, Division 1 locations ~~are~~ shall be permitted to be used.
(5) Where necessary to employ flexible connections, liquidtight flexible metal conduit with listed fittings, liquidtight flexible nonmetallic conduit with listed fittings, or flexible cord listed for extra-hard usage and provided with listed fittings shall be used. Where flexible cords are used, they shall also comply with 506.17. Where flexible connections are subject to oil or other corrosive conditions, the insulation of the conductors shall be of a type listed for the condition or shall be protected by means of a suitable sheath.
Exception: Flexible conduit and flexible conduit and cord fittings listed for Class II, Division 1 locations ~~are~~ shall be permitted to be used.
FPN: See 506.25 for grounding requirements where flexible conduit is used.
Substantiation: Cable is *terminated* with fittings, but the fittings are not *provided* with the cable, they are sourced separately. Terminology is made consistent with other portions of the section.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
506.15 Wiring Methods. Wiring methods shall maintain the integrity of the protection techniques and shall comply with 506.15(A), (B), or (C).
(A) Zone 20. In Zone 20 locations, the following wiring methods shall be permitted,
(1) Threaded rigid metal conduit or threaded steel intermediate metal conduit.
(2) Type MI cable terminated with fittings listed for the location. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.
Exception: MI cable and fittings listed for Class II, Division 1 locations are permitted to be used.
(3) In industrial establishments with limited public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable, listed for use in Zone 20 locations, with a gas/vaportight continuous corrugated metallic sheath and overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and ~~provided with termination~~ terminated with fittings listed for the application, shall be permitted. Type MC-HL cable shall be installed in accordance with the provisions of Article 330.
Exception: Type MC-HL cable and fittings listed for Class II, Division 1 locations ~~are~~ shall be permitted to be used.
~~FPN: See 330.12 for restrictions on use of Type MC cable.~~
(4) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is not subject to physical damage,

Type ITC-HL cable, listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material and terminated with fittings listed for the application. Type ITC-HL cable shall be installed in accordance with the provisions of Article 727.

(5 ~~4~~) Fittings and boxes shall be identified for use in Zone 20 locations.

Exception: Boxes and fittings listed for Class II, Division 1 locations ~~are~~ shall be permitted to be used.

(6 ~~5~~) Where necessary to employ flexible connections, liquidtight flexible metal conduit with listed fittings, liquidtight flexible nonmetallic conduit with listed fittings, or flexible cord listed for extra-hard usage and provided with listed fittings shall be used. Where flexible cords are used, they shall also comply with 506.17 and shall be terminated with a listed cord connector that maintains the type of protection of the terminal compartment. Where flexible connections are subject to oil or other corrosive conditions, the insulation of the conductors shall be of a type listed for the condition or shall be protected by means of a suitable sheath.

Exception: Flexible conduit and flexible conduit and cord fittings listed for Class II, Division 1 locations ~~are~~ shall be permitted to be used.

FPN: See 506.25 for grounding requirements where flexible conduit is used.

Panel Statement: The panel agrees with the changes made by the submitter and has made additional changes to (3) to clarify that the requirements of Article 330 also apply to the installation of Type MC-HL cable. The panel has also added (4) for the installation of Type ITC-HL cable. The panel has renumbered (4) and (5) to (5) and (6), respectively. The panel has made additional changes in (new) (6) to clarify that the type of protection used for the terminal compartment must be maintained.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

NEAGLE, J.: I agree with the panel action and statement. However, as this section deals with dust locations, gas/vaportight cable sheaths are not necessary. 506.15(A)(3) should be revised to read as follows:

'(3) In industrial establishments with limited public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable, listed for use in Zone 20 locations, with a ~~gas/vaportight~~ continuous corrugated metallic sheath and overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and provided with termination fittings listed for the application, shall be permitted.'

14-235 Log #1037 NEC-P14 **Final Action: Reject**
(506.15(A)(5) and (C)(7))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change "listed" to "identified" in (A)(5); in (C)(7) revise first sentence: Nonincendive field wiring shall be permitted using any of the identified wiring methods permitted for unclassified locations.

Substantiation: Article 400 does not specify listing for flexible cord and cables; 513.7(B) and 513.10(D)(2) use the word "identified". All wiring methods permitted for unclassified locations may not be suitable and may be perceived as modifying permitted and not permitted uses in wiring method articles.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-58.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-236 Log #3925 NEC-P14 **Final Action: Reject**
(506.15(B) and (C))

Submitter: Goran Haag, Champion Fiberglass, Inc.

Recommendation: Add new text to read as follows:

Type RTRC marked with the suffix -XW" to be added.

Substantiation: Type RTRC marked with the suffix –XW were permitted in the NEC 2008 for Class I Division 2. We want it to be included for Zone 21 and Zone 21 as well. Don't foresee any engineering arguments against this proposal.

Panel Meeting Action: Reject

Panel Statement: Type RTRC was added to 501.10(B)(7) with very specific restrictions, primarily for protection from corrosion. This proposal does not provide these restrictions. The substantiation does not provide any technical data to show that this wiring method is necessary in a Zone 21 or Zone 22 location. CMP 14 did not support its use in Class I, Division 1 and would not support its use in Zone 21.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

BRIESCH, E.: Since this proposal is for Zones 21 and 22, the last sentence in the Panel Statement incorrectly references Class I, Division 1 as one of the reasons for rejection. Since the issue is suitability in a dust atmosphere, the correct reference should be to Class II, Division 1.

14-237 Log #2847 NEC-P14 **Final Action: Accept in Principle**
(506.15(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action as it relates to 4.1.1 of the NEC Style Manual concerning references to entire articles.

This action will be considered by the panel as a public comment.

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.

Recommendation: Revise text as follows:

(C) Zone 22. In Zone 22 locations, the wiring methods in (1) through (8) shall be permitted.

(1) All wiring methods permitted in 506.15(B).

(2) Rigid metal conduit, intermediate metal conduit, electrical metallic tubing, dusttight wireways.

(3) Type MC or MI cable with listed termination fittings.

(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, ~~in cable trays~~ with listed termination fittings.

(5) Type ITC and Type ITC-ER cable as permitted in 727.4 with listed termination fittings. ~~in cable trays~~.

(6) Type MC, MI, MV, or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between two adjacent cables, shall be the wiring method employed. Single-conductor Type MV cables shall be shielded or metallic armored.

(7) Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations.

Nonincendive field wiring systems shall be installed in accordance with the control drawing(s).

Simple apparatus, not shown on the control drawing, shall be permitted in a nonincendive field wiring circuit, provided the simple apparatus does not interconnect the nonincendive field wiring circuit to any other circuit.

FPN: *Simple apparatus* is defined in 504.2.

Separation of nonincendive field wiring circuits shall be in accordance with one of the following:

a. Be in separate cables

b. Be in multiconductor cables where the conductors of each circuit are within a grounded metal shield

c. Be in multiconductor cables where the conductors have insulation with a minimum thickness of 0.25 mm (0.01 in.)

(8) Boxes and fittings shall be dusttight.

Substantiation: This proposal reflects the current installation requirements of 725.154(D) that in conjunction with a companion proposal to revise 725.154(D) move the Classified location permitted wiring methods into Chapter 5, with the installation requirements for these types of cables retained for all users in 725.154(D). See companion proposal on 725.154(D).

Panel Meeting Action: Accept in Principle

Revise text as follows:

(C) Zone 22. In Zone 22 locations, the following wiring methods shall be permitted.

(1) All wiring methods permitted in 506.15(B).

(2) Rigid metal conduit, intermediate metal conduit, electrical metallic tubing, dusttight wireways.

(3) Type MC or MI cable with listed termination fittings.

(4) Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, including ~~or~~ installation in cable tray systems. The cable shall be terminated with listed fittings. ~~PLTC shall be installed in a manner to avoid tensile stress at the termination fittings.~~

(5) Type ITC and Type ITC-ER cable as permitted in 727.4 and terminated with listed fittings.

(6) Type MC, MI, MV, or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between two adjacent cables, shall be the wiring method employed. Single-conductor Type MV cables shall be shielded or metallic armored.

(7) Nonincendive field wiring shall be permitted using any of the wiring methods permitted for unclassified locations.

Nonincendive field wiring systems shall be installed in accordance with the control drawing(s).

Simple apparatus, not shown on the control drawing, shall be permitted in a nonincendive field wiring circuit, provided the simple apparatus does not interconnect the nonincendive field wiring circuit to any other circuit.

FPN: *Simple apparatus* is defined in 504.2.

Separation of nonincendive field wiring circuits shall be in accordance with one of the following:

a. Be in separate cables

b. Be in multiconductor cables where the conductors of each circuit are within a grounded metal shield

c. Be in multiconductor cables where the conductors have insulation with a minimum thickness of 0.25 mm (0.01 in.)

(8) Boxes and fittings shall be dusttight.

Panel Statement: See panel statement on Proposal 14-97.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-238 Log #1032 NEC-P14 **Final Action: Reject**
(506.17)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(1) Be ~~of a type listed~~ an extra-hard usage type identified for the use.
(3) Be connected to terminals ~~or~~ and supply conductors in accordance with 110.14 ~~in an approved manner~~.
(4) Be ~~supported by clamps or other suitable~~ provided with identified means in such a manner to ~~minimize~~ prevent tension on the terminal connections.
(5) Be provided with ~~suitable~~ identified seals to prevent the entrance of combustible dust or ignitable fibers/flyings where the flexible cord enters boxes, ~~or~~ fittings or other enclosures.
Substantiation: Article 400 does not specify listing. All hard-usage types of cords may not be suitable, i.e., electric vehicle cable, not sunlight, oil, or water resistant. "Approved" is not necessarily the same as 110.14. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-238a Log #CP1401 NEC-P14 **Final Action: Accept**
(506.17(5))

Submitter: Code-Making Panel 14,
Recommendation: Revise 506.17(5) to read:
(5) Be terminated with a listed cord connector that maintains the protection technique of the terminal compartment ~~provided with suitable seals to prevent the entrance of combustible dust or ignitible fibers/flyings where the flexible cord enters boxes or fittings~~.
Substantiation: This proposal correlates the flexible cord sealing requirements in Article 506 with changes made to those in sections 501.140(B)(5), 502.140(B)(5), and 503.140(5) by Proposals 14-88, 14-123, and 14-146 respectively.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-239 Log #2848 NEC-P14 **Final Action: Accept**
(506.20(A))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
506.20 Equipment Installation
(A) Zone 20. In Zone 20 locations, only equipment listed and marked as suitable for the location shall be permitted.
Exception:~~Iintrinsically safe apparatus~~ Equipment listed for use in Class II, Division 1 locations with a suitable temperature class shall be permitted.
Substantiation: 506.8(A) permits dust ignitionproof equipment in Zone 20. This proposal makes installation requirements consistent with the equipment requirements.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-240 Log #1036 NEC-P14 **Final Action: Reject**
(506.20(E)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"likely to be" between "Not" and "subject".
Substantiation: Edit. It can be difficult to ascertain with certainty equipment that is not subject to overloading. "Likely" is defined as a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-241 Log #548 NEC-P14 **Final Action: Reject**
(506.21)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete this section:
~~506.21 Multiwire Branch Circuits.~~
~~In a Class I, Zone 1 location, a multiwire branch circuit shall not be permitted.~~
~~Exception: Where the disconnected device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.~~
Substantiation: To confirm to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors on multiwire branch circuit and applies per 90.3.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-242 Log #560 NEC-P14 **Final Action: Reject**
(506.21)

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Delete text as follows:
~~506.21 Multiwire Branch Circuits.~~
~~In Zone 20 and Zone 21 locations, a multiwire branch circuit shall not be permitted.~~
~~Exception: Where the disconnect device(s) for the circuit opens all ungrounded conductors of the multiwire circuit simultaneously.~~
Substantiation: Section 210.4(B) requires all ungrounded conductors of multiwire branch circuits to be provided with a means of simultaneous disconnection at the point where the branch circuit originates. This makes the requirement and Exception in 506.21 unnecessary because Chapters 1-4 have general application.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-243 Log #3200 NEC-P14 **Final Action: Reject**
(506.21)

Submitter: A. W. Ballard, Cooper Crouse-Hinds
Recommendation: Delete 506.21.
This is a companion proposal with 501.40, 502.40, and 505.21.
Substantiation: Since 210.4(B) now requires all multiwire branch circuits to "be provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates", 506.21 is redundant.
This deletion has been suggested by some, but I expect it will be rejected because 210(B) is a requirement for personnel protection and could at some point be changed. The requirement here is for prevention of fire and explosion.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-244 Log #1035 NEC-P14 **Final Action: Reject**
(506.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first paragraph:
Metal enclosures for wiring and equipment shall be grounded. ~~Grounding and bonding shall comply with Article 250~~ and in accordance with the requirements in 506.25(A) and (B).
Revise (B):
TYPES OF EQUIPMENT GROUNDING AND BONDING CONDUCTORS. ~~Liquidtight flexible metal conduit shall not be used as the sole ground fault current path.~~ Separate equipment grounding or bonding conductors shall be installed with liquidtight flexible metal conduit. ~~Where equipment bonding jumpers are installed they shall comply with 250.102.~~
Exception: In Zone 22 equipment grounding and bonding conductors shall ~~be permitted to be deleted~~ not be required where all the following conditions are met. (remainder unchanged).
Substantiation: The grounding requirement should apply to metal enclosures not wiring systems which are covered elsewhere. Compliance with Article 250 includes exceptions and alternatives permitted in that article. The heading of (B) should include bonding conductors addressed in the text and exception. Conductors can be omitted but not deleted unless they are first installed.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-245 Log #2717 NEC-P14 **Final Action: Reject**
(506.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first paragraph:
Grounding and bonding shall comply with applicable provisions of Article 250 and the requirements in 506.25(A) and (B).
Substantiation: Edit. Reference should not be made to an entire article per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-215.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-245a Log #CP1406 NEC-P14 **Final Action: Accept**
(506.25(B))

Submitter: Code-Making Panel 14,
Recommendation: Revise text to read as follows:
(B) Types of Equipment Grounding Conductors. Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type, in compliance with 250.102 ~~not be used as the sole ground-fault current path. Where equipment bonding jumpers are installed, they shall comply with 250.102~~.
Retain existing exception.
Substantiation: This proposal correlates the equipment grounding conductor requirements in Article 506 with changes made to those in Articles 501, 502, and 503 by Proposals 14-40, 14-66, and 14-140 respectively.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 511 — COMMERCIAL GARAGES, REPAIR AND STORAGE

14-246 Log #654 NEC-P14 **Final Action: Reject**
(511)

Submitter: Samuel J. Goble, Just Good Electrical Code Training
Recommendation: Revise text to read as follows:
Article 511 Commercial Garages, Repair ~~and~~, Storage and Laboratories.
Substantiation: Forensic laboratories have advanced to include investigations in vehicles. Government authorities are now building new laboratories to include vehicle bays to perform forensics on vehicles for investigations. In the past, this was done in police garages where this change was not warranted. These vehicles can be dismantled to the frame for investigations. These laboratories will have the same hazards as commercial garages with flammable fuels in the vehicles and should be included in the NEC. Including the word "laboratories" in the title of this Article 511 will include all types of laboratories that do testing and investigations on vehicles.
Panel Meeting Action: Reject
Panel Statement: This is already covered under the scope of this article. Laboratories are addressed in NFPA 45.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-247 Log #655 NEC-P14 **Final Action: Reject**
(511.1)

Submitter: Samuel J. Goble, Just Good Electrical Code Training
Recommendation: Revise text to read as follows:
These occupancies shall include locations used for service ~~and~~, repair and laboratories operations in connection with self-propelled vehicles (including, but not limited to, passenger automobiles, buses, trucks, and tractors) in which volatile flammable liquids or flammable gases are used for fuel or power.
Substantiation: Forensic laboratories have advanced to include investigations in vehicles. Government authorities are now building new laboratories to include vehicle bays to perform forensics on vehicles for investigations. In the past, this was done in police garages where this change was not warranted. These vehicles can be dismantled to the frame for investigations. These laboratories will have the same hazards as commercial garages with flammable fuels in the vehicles and should be included in the NEC. Including the word "laboratories" in this section will include all types of laboratories that do testing and investigations on vehicles.
Panel Meeting Action: Reject
Panel Statement: The scope of an article is not the responsibility of the panel it is the responsibility of the Technical Correlating Committee (TCC).
CMP-14 does not recommend to the TCC that the scope be changed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-248 Log #1034 NEC-P14 **Final Action: Reject**
(511.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "and installed" after "designed" in the first paragraph. In (C)(1), (C)(3)(A)(D)(1)(a) delete "mechanical" and insert "electrical powered".
Add: (C)(4) Electrical powered ventilation systems shall be provided with an approved audible or plainly visible means to indicate when the ventilation system is not operating during working hours.
Substantiation: "Mechanical" ventilation may be deemed to be louvers, roof mounted nonelectrical wind turbines, or the like. Indication of malfunction or deenergization should be required.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-249 Log #380 NEC-P14 **Final Action: Reject**
(511.3(C)(1)(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"The floor area shall be unclassified where there is mechanical ventilation providing a minimum of four air changes each ~~per~~ hour or one cubic foot/minute ~~cubic foot per minute~~ of exchanged air for each square foot of floor area. Ventilation shall provide for air exchange across the entire floor area, and exhaust air shall be taken at a point within 0.3 m (12 in.) of the floor."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The term "per" is needed and provides improved understanding. The style manual attempts to reduce confusion and this is a correct use of the term.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-250 Log #4637 NEC-P14 **Final Action: Accept**
(511.3(C)(2)(a))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "from a point not less than" to "from a point not more than".
Substantiation: This is to correct an obvious error. The submitter, who drafted this text, apologizes for the mistake.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-251 Log #381 NEC-P14 **Final Action: Reject**
(511.3(C)(3)(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"The pit area shall be a Class I, Division 2 location where there is mechanical ventilation providing a minimum of six air changes each ~~per~~ hour."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-249.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-252 Log #382 NEC-P14 **Final Action: Reject**
(511.3(D)(1)(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise the first sentence as shown:
"The entire floor area shall be unclassified where there is mechanical ventilation providing a minimum of four air changes each ~~per~~ hour or one cubic foot/minute ~~foot per minute~~ of exchanged air for each square foot of floor area."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-249.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-253 Log #383 NEC-P14 **Final Action: Reject**
(511.3(E)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"…ventilated at a rate of four or more air changes each ~~per~~ hour, or designed with positive air pressure…".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-249.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-254 Log #1097 NEC-P14 **Final Action: Reject**
(511.4(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last paragraph:
Where electrically powered ventilation is provided in the dispensing area... (remainder unchanged).
Substantiation: Edit. Present wording infers the ventilation system is electrically powered but "Mechanical" can imply louvers, wind powered roof turbines, etc.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-255 Log #942 NEC-P14 **Final Action: Reject**
(511.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (A)(2) and substitute:
Extra hard-usage or hard-usage types of flexible cords or cables identified for the use shall be permitted as pendants in accordance with all of the following:
(1) No parts extends into the defined Class 1 location unless it complies with all applicable provisions for Class 1 locations.
(2) The lower end does not terminate in equipment or devices likely to produce sparks or hot metal particles.
(3) The flexible cord or cable is not likely to be subject to physical damage.
(4) The pendant does not support luminaries or lampholders.
(5) The flexible cord or cable contains an equipment grounding conductor.
Revise (B)(1)(a): ARCING EQUIPMENT. Equipment that is less than 3.7 m (12 ft) above finished grade, the floor, platform or other standing surface and that ~~may~~ is likely to produce arcs, sparks...". (remainder unchanged)
Revise (B)(1)(b): FIXED LIGHTING. Luminaires, lamps, and lampholders ~~for fixed lighting~~ that ~~is~~ are located over ~~lanes~~ areas through which vehicles are commonly driven shall be located not less than 3.7 m (12 ft) above floor or grade level, unless of the totally enclosed type or other constructed to prevent escape of sparks or hot metal particles.
Substantiation: "Suitable" is subjective and a term to be avoided per the Style Manual. Article 400 does not require listing. Extra hard usage types should be permitted and identified for the use; some hard usage types may not be suitable, e.g., electric vehicle cable, not sunlight resistant, not oil resistant, not for use in wet locations. Proposal provides additional requirements which should be considered such as not supporting luminaries (501.130(A)(3). "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-256 Log #1096 NEC-P14 **Final Action: Reject**
(511.10(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
~~PLUG~~ CORD CONNECTIONS to VEHICLES. Where the cord is suspended from overhead it shall be arranged so that lowest point of ~~sag~~ the cord and connector is at least 150 mm (6 in.) above the floor. ~~Where an automatic arrangement is provided to pull both cord and plug beyond the range of physical damage no additional connector shall be required in the cable or at the outlet.~~
Substantiation: Sag may be inferred as a bow or loop in the cord or cable not necessarily including a cord connector. "Automatic" implies no personal action; most retractable cord reels require a pull on the cord to actuate retrieval. The last sentence is unclear as to intent; there is no provision for an additional required connector. Devices on the load end of cords supplying vehicles will be connectors, not plugs.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-257 Log #1222 NEC-P14 **Final Action: Reject**
(511.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
GROUNDING. ~~and BONDING REQUIREMENTS~~
(A) GENERAL GROUNDING REQUIREMENTS.
Metal raceways, ~~the metal armor or metallic sheath on~~ and metal covering of cables, and all exposed noncurrent-carrying metal Parts of fixed or portable electrical equipment regardless of voltage, shall be grounded. ~~Grounding and bonding shall comply with 501.30 for Class I Division 1 and 2 locations and 505.25 for Class I Zone 0, 1, and 2 locations~~.
Add: Exception: Listed equipment except portable electric drills, hammers, saws, and chippers shall not be required to be grounded if protected by a system of double insulation and clearly marked as such.
Revise latter portion of (B)(1): "or to the grounded circuit conductor terminal of any utilization equipment".
In (B), delete Grounding in Class I locations shall comply with 501.30".
In (B)(2), change "approved" to "identified".
Substantiation: In (A), noncurrent-carrying should apply to exposed parts. Sections 501.30 and 505.25 already apply. The exception is proposed for consideration whether or not suitable. The grounded terminal of (B)(1) should be the circuit conductor terminal, not the EGC terminal. "Approved" is not the same as "identified"; all means acceptable to the AHJ may not be suitable for the use.
Bonding requirements are already covered by 250.90 and 250.100.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-258 Log #3873 NEC-P14 **Final Action: Reject**
(511.16, FPN (New))

Submitter: Michael J. Farrell, III, Lucas County Building Regulations
Recommendation: Add new Fine Print Note (FPN) following text of 511.16 Grounding and Bonding Requirements
FPN: See 610.61 for bonding jumper requirements required by this section for automotive type hoists.
Substantiation: Placement of a new FPN will direct the code user in all of the requirements for proper application of this article.
Commercial garages and repair facilities use hoists as well as lifts for typical repair of vehicles and the bonding requirements for hoists as located in 610.61 should be observed at these locations for the safety of those who operate the hoist.
Panel Meeting Action: Reject
Panel Statement: CMP-14 does not agree that this fine print note is warranted because the requirements for bonding and grounding of hoists, which would include automotive hoists, is already covered by Section 610.61.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-259 Log #1789 NEC-P14 **Final Action: Reject**
(511.16(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part: "...or to the grounded circuit conductor terminal or lead of any utilization equipment supplied.
Substantiation: Edit. A grounded terminal is one that is grounded and may be inferred as an equipment grounding or bonding conductor connection.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-260 Log #1389 NEC-P14 **Final Action: Reject**
(511.16(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise as follows:
~~Approved~~ Identified Means. ~~Approved~~ Identified means shall be provided... (remainder unchanged).
Substantiation: Edit. "Approved" is not the same as "identified"; the means should be suitable for the use.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 513 — AIRCRAFT HANGARS

14-261 Log #2432 NEC-P14 **Final Action: Reject**
(513.2)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If Power Safe Protector is accepted in 513.12 only, a definition will be needed. There is a proposal for Article 100 also.
Panel Meeting Action: Reject
Panel Statement: There are no product requirements for PSP protection. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated by the code. Installation of these devices is not currently prohibited by the NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-262 Log #458 NEC-P14 **Final Action: Reject**
(513.3(D))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Delete existing subsection (D) and replace with new subsection (D) as follows:
~~**(D) Areas Suitably Cut Off and Ventilated.** Adjacent areas in which flammable liquids or vapors are not likely to be released, such as stock rooms, electrical control rooms, and other similar locations, shall be unclassified where adequately ventilated and where effectively cut off from the hangar itself by walls or partitions.~~
(D) Specific Areas Adjacent to Classified Locations. Areas adjacent to classified locations in which flammable vapors are not likely to be released, such as stock rooms, switchboard rooms, and other similar locations, shall be unclassified where mechanically ventilated at a rate of four or more air changes per hour, or designed with positive air pressure, or where effectively cut off by walls or partitions.
Substantiation: This change is intended to attain consistency between code sections where requirements are similar, such as in Section 511.3(E)(1). There is no intent to change the safety aspect or code allowance as presently worded in the section. Since the hazards are the same, and the adjacent areas are the same, the code sections should also be the same. This change will help to eliminate confusion the currently exists in code enforcement requirements.
Panel Meeting Action: Reject
Panel Statement: CMP-14 supports the intent of the Airport Facilities Committee that the requirement in 513.3(D) require both ventilation and separation. The requirement of 511 allows either.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-263 Log #1388 NEC-P14 **Final Action: Reject**
(513.3(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part: ... where ~~adequately ventilated~~ approved ventilation is provided and where... (remainder unchanged).
Substantiation: Edit. "Adequately" is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The word "adequately" as used in this section is not unenforceable and does not create confusion, as indicated in the requirements of the NEC Style Manual. As such, it does not need to be replaced.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-264 Log #1790 NEC-P14 **Final Action: Reject**
(513.7(A) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "suitable" to "identified".
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-265 Log #4363 NEC-P14 **Final Action: Reject**
(513.8(A))

Submitter: James S. Conrad, Tyco Thermal Controls
Recommendation: Revise text as follows:
A) Wiring and Equipment ~~Embedded, Under Slab, or~~ Under Ground All wiring installed ~~in or under the hangar floor~~ in vaults, pits, or ducts shall comply with the requirements for Class I, Division 1 locations. ~~Where s~~Such wiring shall be provided ~~is located~~ with adequate drainage.
Substantiation: Wiring in or under the hangar floor does not pose a risk because of the lack of oxygen to support combustion. This requirement was changed it section 514.8 during the 2005 ROP.
Panel Meeting Action: Reject
Panel Statement: CMP-14 supports the Airport Facilities Committee's concern about the large volume of fuel that may be present beneath the floor of a hangar. Lack of oxygen beneath the floor cannot be guaranteed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-266 Log #1798 NEC-P14 **Final Action: Reject**
(513.8(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence of (A) and substitute: Vaults, pits, or ducts in which wiring is installed shall be provided with drains to prevent accumulation of liquids.
Delete (B).
Substantiation: Edit. Present wording can be interpreted to require drainage for the wiring. "Adequate" is subjective and a term to be avoided per the Style Manual. Subsection (A) appears to adequately cover buried and embedded raceways, whether or not "interrupted".
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-267 Log #1387 NEC-P14 **Final Action: Reject**
(513.8(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
~~Uninterrupted Raceways~~ and Cables Embedded In Or Under Slab Underground. I. ~~Uninterrupted~~ Raceways and cables that are embedded in a hanger floor or buried beneath the hanger floor shall be considered to be within the class I location above the floor, regardless of the point at which the raceway or cable emerges. ~~Descends below or rises above the floor.~~
Substantiation: Edit. The provision should also apply to permitted cables [332.10(7)(10), 501.10(A)(1)(b)].
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-268 Log #1029 NEC-P14 **Final Action: Reject**
(513.10(E)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "approved" to "identified".
Substantiation: Edit. "Approved" is not necessarily the same as "identified". 513.10(E)(1) and others use the term "identified".
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-269 Log #1797 NEC-P14 **Final Action: Reject**
(513.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: All 125-volt ~~50/60 Hz single phase~~ 15-and 20 ampere receptacles ~~installed in areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used~~ shall have ground-fault circuit-interruption protection for personnel.
Substantiation: Edit. Whether 60 or 400 Hz or dc, 125 volt receptacles should have GFCI protection. Specifying equipment that is to be used is irrelevant to the provision.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-270 Log #2433 NEC-P14 **Final Action: Reject**
(513.12)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
513.12 ~~Ground-Fault Circuit-Interrupter~~ <u>Power Safe Protector</u> Protection for Personnel.

All 125-volt, 50/60-Hz, single-phase, 15- and 20-ampere receptacles installed in areas where electrical diagnostic equipment, electrical hand tools, or portable lighting equipment are to be used shall have ~~ground-fault circuit-interrupter~~ <u>power safe protector</u> protection for personnel.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-261.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-271 Log #1220 NEC-P14 **Final Action: Reject**
(513.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

GROUNDING. ~~and BONDING~~ All metal raceways, the ~~metal armor or metallic sheath on~~ <u>covering</u> of cables and all <u>exposed</u> noncurrent-carrying metal parts of fixed or portable electric equipment shall be grounded ~~and bonded as provided in Article 250. Grounding and bonding shall comply with 501.30 for Class I Division 1 and 2 locations and 505.25 for Class I Zone O, 1, and 2 locations~~.

Exception: Listed equipment except portable electric drills, hammers, saws, and chippers shall not be required to be grounded if protected by a system of double insulation and clearly marked as such.

Revise latter portion of (B)(1): "or to the grounded <u>circuit conductor</u> of any utilization equipment".

In (B)(2), change "approved" to "identified".
Substantiation: Noncurrent-carrying should apply to exposed parts. Article 250 and sections 501.30 and 505.25 already apply. The exception is proposed for consideration whether or not suitable. The grounded terminal of (B)(1) should be the circuit conductor terminal not the EGC. "Approved" is not the same as "identified"; all means acceptable to the AHJ may not be suitable for the use. Bonding requirements are already covered by 250.90 and 250.100.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-272 Log #1028 NEC-P14 **Final Action: Reject**
(513.16(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "approved" to "identified".
Substantiation: Approved is not necessarily the same as identified; 513.10(E)(2) and others use the word "identified".
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 514 — MOTOR FUEL DISPENSING FACILITIES

14-273 Log #4877 NEC-P14 **Final Action: Reject**
(Table 514.3(B)(1))

Submitter: Technical Committee on Automotive and Marine Service Stations,
Recommendation: Revise table 514.3(B)(1) as follows:

See Table 514.3(B)(1) on Pages 667 and 668

Substantiation: The attached revision of Table 514.3(B)(1) of Article 514 more clearly incorporates the Zone classification system as it is intended to be presented by the source table, Table 8.3.1 of NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*. Also, a Division 1 classification has been added for the internal area of an Overhead Dispenser and the prior reference to UL 87 has been deleted, as UL 87 does not include requirements for such a device and none are known to be listed in the U.S.

The word "nonclassified" has been changed to "unclassified" to correlate with NFPA 70 usage and the overall format of the table reflects NFPA 70 usage.

The intent of this proposal is that both tables, Table 514.3(B)(1) in NFPA 70 and Table 8.3.1 in NFPA 30A, be identical in their respective new editions.
Panel Meeting Action: Reject
Panel Statement: Table 514.3(B)(1) is extracted material from NFPA 30A. The table being proposed is not a part of NFPA 30A at this time. CMP-14 notes the following issues that need to be addressed:
- Group designations need to be added for both Divisions and Zones.
- Consideration should be given to adding Zone 0 for the interior of storage tanks.
- Reverse US customary and SI units to match NEC usage.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

Table 514.3(B)(1) Class I Locations — Motor Fuel Dispensing Facilities

Location	Class I Division	Class I Zone	Extent of Classified Location[1]
Dispensing Device (except Overhead Type) [2,3]			
Pits	1	1	Entire space within any pit or box below grade level, any part of which is within a Division 1 or Division 2 classified location or within a Zone 1 or Zone 2 classified location
Dispenser	2	2	Within 18 in. (450 mm) of dispenser enclosure or that portion of dispenser enclosure containing liquid handling components, extending horizontally in all directions and down to grade level
Outdoor	2	2	Up to 18 in. (450 mm) above grade level, extending 20 ft (6 m) horizontally in all directions from dispenser enclosure
Indoor			
- with mechanical ventilation	2	2	Up to 18 in. (450 mm) above floor level, extending 20 ft. (6 m) horizontally in all directions from dispenser enclosure
- with gravity ventilation	2	2	Up to 18 in. (450 mm) above floor level, extending 25 ft (7.5 m) horizontally in all directions from dispenser enclosure
Dispensing Device — Overhead Type[4]	1	1	Space within dispenser enclosure and all electrical equipment integral with dispensing hose or nozzle
	2	2	Within 18 in. (450 mm) of dispenser enclosure, extending horizontally in all directions and down to grade level
	2	2	Up to 18 in. (450 mm) above grade level, extending 20 ft (6 m) horizontally in all directions from a point vertically below edge of dispenser enclosure
Remote Pump —			
Outdoor	1	1	Entire space within any pit or box below grade level, any part of which is within 10 ft (3 m) horizontally from any edge of pump
	2	2	Within 3 ft (900 mm) of any edge of pump, extending horizontally in all directions
	2	2	Up to 18 in. (450 mm) above grade level, extending 20 ft (6 m) horizontally in all directions from any edge of pump
Indoor	1	1	Entire space within any pit
	2	2	Within 5 ft (1.5 m) of any edge of pump, extending horizontally in all directions
	2	2	Up to 3 ft (900 mm) above floor level, extending 25 ft (7.5) horizontally in all directions from any edge of pump
Sales, Storage, Rest Rooms	unclassified	unclassified	Except as noted below
	1	1	Entire room, if there is any opening to room within the extent of a Division 1 or Zone 1 location,
Tank, Aboveground			
Shell, ends, roof, dike area	1	1	Entire space within dike, where dike height exceeds distance from tank shell to inside of dike wall for more than 50 percent of tank circumference
	2	2	Entire space within dike, where dike height does not exceed distance from tank shell to inside of dike wall for more than 50 percent of tank circumference

Table 514.3(B)(1) Class I Locations — Motor Fuel Dispensing Facilities *(continued)*

Location	Class I Division	Class I Zone	Extent of Classified Location[1]
	2	2	Within 10 ft (3 m) of shell, ends , or roof of tank
Specific areas adjacent to classified locations	2	2	Areas adjacent to classified locations where flammable vapors are not likely to be released, such as stock rooms, switchboard rooms, and other similar locations, shall not be classified where mechanically ventilated at a rate of four or more air changes per hour, or designed with positive air pressure, or where effectively cut off by walls or partitions
Vent	1	1	Within 5 ft (1.5 m) of open end of vent, extending in all directions
	2	2	Between 5 ft and 10 ft (1.5 m and 3 m) from open end of vent, extending in all directions
Tank, Underground Fill Opening	1	1	Entire space within any pit or box below grade level, any part of which is within a Division 1 or Division 2 classified location or within a Zone 1 or Zone 2 classified location
	2	2	Within 18 in. (450 mm) of any loose-fill connection or within 5 ft (1.5 m) from any tight-fill connection, extending horizontally in all directions
Vent	1	1	Within 5 ft (1.5 m) of open end of vent, extending in all directions
	2	2	Between 5 ft and 10 ft (1.5 m and 3 m) from open end of vent, extending in all directions
Vapor Processing System Pits	1	1	Entire space within any pit or box below grade level, any part of which: (1) is within a Division 1 or Division 2 classified location; (2) is within a Zone 1 or Zone 2 classified location; (3) houses any equipment used to transfer or process vapors
Equipment in protective enclosures	2	2	Entire space within enclosure
Equipment not within protective enclosure	2	2	Within 18 in. (450 mm) of equipment containing flammable vapors or liquid, extending horizontally in all directions and down to grade level
	2	2	Up to 18 in. (450 mm) above grade level within 10 ft (3 m) horizontally of the vapor processing equipment
- Equipment enclosure	1	1	Entire space within enclosure, if flammable vapor or liquid is present under normal operating conditions
	2	2	Entire space within enclosure, if flammable vapor or liquid is not present under normal operating conditions
- Vacuum assist blower	2	2	Within 18 in. (450 mm) of blower, extending horizontally in all directions and down to grade level
	2	2	Up to 18 in. (450 mm) above grade level, extending 10 ft (3 m) horizontally in all directions
Vault	1	1	Entire interior space, if Class I liquids are stored within

[1]For marine application, *grade level* means the surface of a pier, extending down to water level.
[2]Refer to Figure 514.3 for an illustration of classified areas around dispensing devices.
[3]Area classification inside the dispenser enclosure is covered in UL 87, *Standard for Power-Operated Dispensing Devices for Petroleum Products.*
[4]Ceiling-mounted hose reel.

14-274 Log #563 NEC-P14 **Final Action: Reject**
(514.8 Exception No. 2)

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that the term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
Exception No. 2: ~~Rigid~~ PVC ~~nonmetallic~~ conduit shall be permitted where buried under not less than 600 mm (2 ft) of cover. Where ~~rigid~~ PVC ~~nonmetallic~~ conduit is used, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (2 ft) of the underground run to emergence or to the point of connection to the aboveground raceway, and an equipment grounding conductor shall be included to provide electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.
Substantiation: In the 2008 NEC development cycle, Article 352 was revised to change the title of the Article from Rigid Nonmetallic Conduit to Rigid Polyvinyl Chloride Conduit: Type PVC. This revision was also to have been implemented globally in the NEC. The continued use of this term appears to be an inadvertent oversight. The revision promotes consistency with revisions in the 2008 NEC cycle and replaces the term "rigid nonmetallic conduit" in this section with the term now used for this wiring method.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-277.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12 Negative: 2
Explanation of Negative:
BRIESCH, E.: See My Explanation of Negative on 14-277 (Log #2785).
OFFERDAHL, D.: This proposal should have been accepted in principal. 514.8 Exception 2 in pertains to the non-metallic raceway buried 2 feet below the earth. This underground installation comply with articles 352.10, 353.10 and 355.10 as well as Articles 352.100 353.100 and 355.100 listing the construction specification of these wiring method and UL product standards rigid nonmetallic underground conduit, plastic (eazx) reinforced thermosetting resin conduit (dzkt).

14-275 Log #1027 NEC-P14 **Final Action: Reject**
(514.8 Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence:
Where rigid nonmetallic conduit is used threaded rigid metal conduit or threaded steel intermediate conduit with threaded or watertight fittings shall be used for at least the last 600 mm (2 ft) of the underground run to emergence or to the point of connection to the aboveground wiring and an equipment grounding conductor equipment bonding conductor shall be provided in the raceway. ~~To provide electrical continuity of the raceway system and for grounding of noncurrent-carrying metal parts.~~
Substantiation: The purpose of the EGC is understood and grounding is covered elsewhere in the Code.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-276 Log #2417 NEC-P14 **Final Action: Reject**
(514.8 Exception No. 2)

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follows:
rigid ~~non-metallic~~ PVC conduit shall be permitted where buried under not less than 600 mm (2 ft) of cover. "Where rigid ~~non-metallic~~ PVC conduit...".
Substantiation: Conforming to style manual Article 352.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-277.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12 Negative: 2
Explanation of Negative:
BRIESCH, E.: See My Explanation of Negative on 14-277 (Log #2785).
OFFERDAHL, D.: This proposal should have been accepted in principal. 514.8 Exception 2 in pertains to the non-metallic raceway buried 2 feet below the earth. This underground installation comply with articles 352.10, 353.10 and 355.10 as well as Articles 352.100 353.100 and 355.100 listing the construction specification of these wiring method and UL product standards rigid nonmetallic underground conduit, plastic (eazx) reinforced thermosetting resin conduit (dzkt).

14-277 Log #2785 NEC-P14 **Final Action: Reject**
(514.8 Exception No. 2)

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise Exception No. 2 of 514.8 as shown:
Exception No. 2: Rigid PVC, RTRC, or HDPE ~~nonmetallic~~ conduit shall be permitted where buried under not less than 600 mm (2 ft) of cover. Where rigid PVC, RTRC, or HDPE ~~nonmetallic~~ conduit is used...
Substantiation: In the 2008 NEC development cycle, Article 352 was revised to change the title of the article from rigid nonmetallic conduit to Rigid Polyvinyl Chloride Conduit: type PVC. In addition, HDPE had already been moved to another article and a new article for RTRC was introduced and accepted. All of these conduits are types of rigid nonmetallic conduits and should be considered equally in this exception. The revision from "rigid nonmetallic conduit" to the various types was also to have been implemented globally in the NEC. The continued use of the old term appears to be an inadvertent oversight. The revision promotes consistency with revisions in the 2008 NEC cycle and replaces the term rigid nonmetallic conduit in this section with the terms now used for this general wiring method.
Panel Meeting Action: Reject
Panel Statement: This is an issue that extends throughout the code. At the present time, CMP-14 is not sure what constitutes rigid nonmetallic conduit. Furthermore, it is of great concern to CMP-14 that the suitability of the conduit is appropriate for use in hazardous (classified) locations, including items such as minimum wall thickness, rigidity, etc. CMP-14 respectfully requests direction from the TCC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12 Negative: 2
Explanation of Negative:
BRIESCH, E.: I agree with the Panel that the issue of rigid nonmetallic conduit needs to be addressed throughout the Code. Rejection of this proposal, however, does nothing to alleviate the existing problem. The present text permits any type of rigid nonmetallic conduit in any thickness. This is exactly what the panel has stated is not acceptable. The proposal should be accepted since it removes the ambiguity by stating the specific types of conduit permitted.
OFFERDAHL, D.: This proposal should have been accepted. 514.8 Exception 2 in pertains to the non-metallic raceway buried 2 feet below the earth. This underground installation comply with articles 352.10, 353.10 and 355.10 as well as Articles 352.100 353.100 and 355.100 listing the construction specification of these wiring method and UL product standards rigid nonmetallic underground conduit, plastic (eazx) reinforced thermosetting resin conduit (dzkt).

14-278 Log #3672 NEC-P14 **Final Action: Reject**
(514.8 Exception No. 2)

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Revise text as follows:
514.8 Exception No. 2: Rigid nonmetallic conduit shall be permitted where buried under not less than 600 mm (2 ft) of cover. Where rigid nonmetallic conduit is used, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (2 ft) of the underground run to emergence or to the point of connection to the above ground raceway, and an equipment grounding conductor, sized per 250.122, shall be included to provide electrical continuity of the raceway system and for grounding of non-current carrying metal parts.
Substantiation: This change would provide installers with direction for sizing the equipment grounding conductors required in underground nonmetallic conduits supplying power to Motor Fuel Dispensers.
Panel Meeting Action: Reject
Panel Statement: The rules for sizing equipment grounding are found in Article 250. CMP-14 does not agree that special emphasis is needed since Article 250 is such a basic part of the code.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-279 Log #4045 NEC-P14 **Final Action: Accept in Principle**
(514.11)

Submitter: Jimmy Ford, Power Integrity Corp.
Recommendation: Revise text to read as follows:
514.11 Circuit Disconnects.
(A) General. Each circuit leading to or through dispensing equipment, including all associated power, communication, and equipment for remote pumping systems, shall be provided with a clearly identified and readily accessible switch or other listed a~~cceptable~~ means, located remote from the dispensing devices, to disconnect simultaneously from the source of supply, all conductors of the circuits, including the grounded conductor, if any.
Single-pole breakers utilizing handle ties shall not be permitted.
Substantiation: The current wording of Section 514.11 creates discrepancies in the way this section is applied to the design, installation and the inspection of dispensing equipment. In many cases the Emergency Stop Control Circuit controlling power to the dispenser is considered to be acceptable and the only required disconnect of external voltage sources. This is incorrect. Dispensing equipment is supplied by more than one external voltage source, 120 VAC power for dispenser operation plus low voltage power for the data/communication circuits. These voltage sources supply power to energize the dispenser as well as numerous data and communication circuits. While an Emergency Stop Control Circuit may be an acceptable means for disconnecting the AC power source from dispensing equipment, the control circuit does not disconnect the low voltage data/communication circuits. When not properly disconnected, the data/communication circuits create an explosion and electrical shock hazard.
Updating the language in this Section becomes more important due to the increasing number of circuits connected to dispensing equipment. Today's advanced dispensing equipment now often requires additional circuits to add features such as "marketing at the pump". This feature uses closed caption video feeds, advanced networking and display options. Other circuits can include but are not limited to AC power, intercom, serial data, and current loop circuits.
It is very important that the installer understands how this Section of the code is applied to the equipment he is installing, as it is up to him to provide a proper means of removing the numerous external voltage sources.
While dispenser manufacturers show the installation of a breaker and mentions an Emergency Stop Control circuit (which can be used as a means for removing the external voltage source of the AC power circuit) it becomes complicated in determining what means needs to be installed to remove the other external voltages. Typically the dispenser manufacturers do not illustrate the installation of a disconnecting means for circuits other than the AC power circuit.
There are also third party equipment manufacturers providing equipment that can be installed on the dispensers with their circuits being routed to and through the dispenser. This third party equipment requires even more circuits, and needs to be considered when field installing a proper emergency stop means of removing external voltage sources.
For those technicians, service people and inspectors who feel these requirements should not be applied to low voltage communication and data circuits, it is important to understand the risks and rejections to previous proposed changes to this section of code.
Previous proposals to exclude intrinsically safe circuits from Section 514.13 have been rejected by the panel. (See 2004 May Association Technical Meeting. National Electrical Code Committee Report on Proposals. 14-141 (Log #1279), Volume 1:1307; 14-143 (Log #2804), Volume 1:1308; 2003). The panel stated, "Some intrinsically safe circuits can present a shock hazard. Some communications circuits can also present a shock hazard and an ignition hazard."
In addition to the proposed text defining the types of circuits that are to be disconnected, the means of removing the voltage should be described as a "listed" means. It is important that the means disconnects the wiring from the source. This insures that any stored energy in the source cannot be discharged through the data wiring during servicing of the dispensing equipment.
Therefore I feel it is important to adopt the proposed changes to accomplish the following:
1) Specifically identify the circuits of the dispensing equipment that need to be disconnected, as required by this Section, to eliminate any question of installers and inspectors.
2) Require that the means for removing the voltage sources be an "Approved" means to insure full compliance to these requirements and that the removal of external voltage sources is done in a manner that provides the level of safeguards intended.
The following supporting material has been provided:
1) "Safety Letters A Compilation 1980-1994"; Petroleum Equipment Institute, ISBN 0-9642638-0-7; Excerpts, Pages 39, 52, 53.
2) "Dispenser Disconnects - Critical safety net that is overlooked?"; Pages 75-77, IAEI, Vol. 80, Number 6 November/December 2008.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
514.11 Circuit Disconnects. (A) General. Each circuit leading to or through dispensing equipment, including all associated power, communication, data, and video circuits, and equipment for remote pumping systems, shall be provided with a clearly identified and readily accessible switch or other approved a~~cceptable~~ means, located remote from the dispensing devices, to disconnect simultaneously from the source of supply, all conductors of the circuits, including the grounded conductor, if any.
Single-pole breakers utilizing handle ties shall not be permitted.
Panel Statement: The panel agrees with the proposal, but has added data and video circuits because these may also present a hazard. The panel concluded that "approved" is a more appropriate term.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BATTA, JR., D.: This proposal should be rejected. Disconnect hardware to disconnect all of these various type circuits in one device may not be available. Safety and security at a dispensing station will be impaired by disconnecting lighting and video. Restart of communication circuits will be difficult after isolating these data and video circuits since the entire system shuts down when this happens.

14-280 Log #1026 NEC-P14 **Final Action: Reject**
(514.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Each dispensing device shall be provided with identified means to simultaneously disconnect all conductors installed to or through the dispensing device ~~remove all external voltage sources including feedback, during periods of maintenance and service of the dispensing equipment~~. The location of this means shall be permitted to be other than inside or adjacent to the dispensing equipment. The disconnecting means shall be ~~capable of~~ provided with an identified integral and permanent means for being locked in the open (off) position.
Substantiation: Edit. "Removal of all sources" literally applies to conductors, transformers, switchboards, and all other sources of supply. "During periods of maintenance and service" is irrelevant to the requirement. Proposal for locking is specific and doesn't allow for makeshift methods.
Panel Meeting Action: Reject
Panel Statement: This requirement applies to maintenance and there is no reason or need for simultaneous disconnection of the conductors. Also, literal interpretation of the proposed language would require disconnection of the equipment grounding conductor. CMP-14 notes that the substantiation does not address these points.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-281 Log #4046 NEC-P14 **Final Action: Accept in Principle**
(514.13)

Submitter: Jimmy Ford, Power Integrity Corp.
Recommendation: Revise text to read as follows:
514.13 Provisions for Maintenance and Service of Dispensing Equipment. Each dispensing device shall be provided with a listed means to remove all external voltage sources of power and communication circuits, including feedback, during periods of maintenance and service of the dispensing equipment. The location of this shall be permitted to be other than inside or adjacent to the dispensing device. The means shall be capable of being locked in the open position.
Substantiation: The current wording of Section 514.11 creates discrepancies in the way this section is applied to the design, installation and the inspection of dispensing equipment. In many cases the Emergency Stop Control Circuit controlling power to the dispenser is considered to be acceptable and the only required disconnect of external voltage sources. This is incorrect. Dispensing equipment is supplied by more than one external voltage source, 120 VAC power for dispenser operation plus low voltage power for the data/communication circuits. These voltage sources supply power to energize the dispenser as well as numerous data and communication circuits. While an Emergency Stop Control Circuit may be an acceptable means for disconnecting the AC power source from dispensing equipment, the control circuit does not disconnect the low voltage data/communication circuits. When not properly disconnected, the data/communication circuits create an explosion and electrical shock hazard.
Updating the language in this Section becomes more important due to the increasing number of circuits connected to dispensing equipment. Today's advanced dispensing equipment now often requires additional circuits to add features such as "marketing at the pump". This feature uses closed caption video feeds, advanced networking and display options. Other circuits can include but are not limited to AC power, intercom, serial data, and current loop circuits.
It is very important that the installer understands how this Section of the code is applied to the equipment he is installing, as it is up to him to provide a proper means of removing the numerous external voltage sources.

While dispenser manufacturers show the installation of a breaker and mentions an Emergency Stop Control circuit (which can be used as a means for removing the external voltage source of the AC power circuit) it becomes complicated in determining what means needs to be installed to remove the other external voltages. Typically the dispenser manufacturers do not illustrate the installation of a disconnecting means for circuits other than the AC power circuit.

There are also third party equipment manufacturers providing equipment that can be installed on the dispensers with their circuits being routed to and through the dispenser. This third party equipment requires even more circuits, and needs to be considered when field installing a proper emergency stop means of removing external voltage sources.

For those technicians, service people and inspectors who feel these requirements should not be applied to low voltage communication and data circuits, it is important to understand the risks and rejections to previous proposed changes to this section of code.

Previous proposals to exclude intrinsically safe circuits from Section 514.13 have been rejected by the panel. (See 2004 May Association Technical Meeting. National Electrical Code Committee Report on Proposals. 14-141 (Log #1279), Volume 1:1307; 14-143 (Log #2804), Volume 1:1308; 2003). The panel stated, "Some intrinsically safe circuits can present a shock hazard. Some communications circuits can also present a shock hazard and an ignition hazard."

In addition to the proposed text defining the types of circuits that are to be disconnected, the means of removing the voltage should be described as a "listed" means. It is important that the means disconnects the wiring from the source. This insures that any stored energy in the source cannot be discharged through the data wiring during servicing of the dispensing equipment.

Therefore I feel it is important to adopt the proposed changes to accomplish the following:

1) Specifically identify the circuits of the dispensing equipment that need to be disconnected, as required by this Section, to eliminate any question of installers and inspectors.

2) Require that the means for removing the voltage sources be an "Approved" means to insure full compliance to these requirements and that the removal of external voltage sources is done in a manner that provides the level of safeguards intended.

The following supporting material has been provided:

1) "Safety Letters A Compilation 1980-1994"; Petroleum Equipment Institute, ISBN 0-9642638-0-7; Excerpts, Pages 39, 52, 53.

2) "Dispenser Disconnects - Critical safety net that is overlooked?"; Pages 75-77, IAEI, Vol. 80, Number 6 November/December 2008.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

514.13 Provisions for Maintenance and Service of Dispensing Equipment. Each dispensing device shall be provided with a means to remove all external voltage sources, <u>including power, communication, data, and video circuits and</u>~~,~~ including feedback, during periods of maintenance and service of the dispensing equipment. The location of this shall be permitted to be other than inside or adjacent to the dispensing device. The means shall be capable of being locked in the open position.

Panel Statement: The panel agrees with the proposal but has added data and video circuits because these may also present a hazard. The panel concluded that "listed" is not necessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

BATTA, JR., D.: This proposal should be rejected. See my ballot comment on Proposal 14-279.

14-282 Log #3908 NEC-P14 **Final Action: Accept in Part**
(514.16)

Submitter: Eugene F. Swisher, City of Tampa / Rep. IBEW Local 915

Recommendation: Revise text as follows:

"...all metal raceways, the metal armor or metallic sheath on cables, and all non-current-carrying metals parts of <u>all</u> fixed <u>and</u> portable electrical equipment, regardless of...".

Substantiation: Equipment cannot be both fixed and portable. This will clarify that equipment, whether fixed or portable, must be grounded and bonded.

Panel Meeting Action: Accept in Part

Accept the word "and". Do not accept the word "all".

Panel Statement: The panel recognizes there was a typographical error during the last code cycle, which has been resolved by adding the word "and". Adding the word "all" is not required.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

ARTICLE 515 — BULK STORAGE PLANTS

14-282a Log #CP1402 NEC-P14 **Final Action: Accept**
(Table 515.3)

Submitter: Code-Making Panel 14,

Recommendation: In the description of "Shell, ends, or roof and dike area" correct the wording: "…area inside dike to level of top of ~~tank~~ <u>dike wall.</u>

Substantiation: The current wording appears to be a misprint, as Table 515.3 is essentially extracted from NFPA 30 Table 7.3.3 which has the correct wording "…to top of dike wall".

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-283 Log #4422 NEC-P14 **Final Action: Accept in Principle**
(515.7(A))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with regard to which cables require the listed fitting.

In addition, the Technical Correlating Committee directs that the panel clarify the panel action as it relates to 4.1.1 of the NEC Style Manual concerning references to entire articles.

This action will be considered by the panel as a public comment.

Submitter: Bruce Decker, NuStar Energy, L.P.

Recommendation: Revise text to read as follows:

(A) Fixed Wiring. All fixed wiring above Class I locations shall be in metal raceways, Schedule 80 PVC conduit, Type RTRC marked with the suffix –XW, or type MI, TC, or MC cable<u>, or PLTC cable in accordance with Article 725, or Type ITC cable in accordance with Article 727.</u>

Substantiation: The current rule prohibits the use of PLTC cable or Type ITC cable above Class I locations in bulk storage facilities. PLTC cable and Type ITC cable are commonly used in bulk storage facilities for class 1, class 2, and class 3 remote-control, signaling, and power-limited circuits. Current rules allow their installation in both classified and unclassified locations, including both classified and unclassified locations in bulk storage facilities with the exception of 515.7(A). Many times, however, PLTC cable or Type ITC cable is installed in cable trays and many times the cable tray is located above the classified area.

One example consists of a cable tray containing PLTC cable or Type ITC cable that is run from an electrical/control building into a tank farm. The cable tray and cables originate in the unclassified area, pass over a dike wall, and then reside above the classified area until (1) the cable tray drops down into the classified area, or (2) the cable tray maintains its height above the classified area and the cables themselves drop down via conduit or other approved method into the classified area to specific pieces of equipment. In either case, in its current form, 515.7(A) prohibits this necessary installation.

The omission of PLTC cable and Type ITC cable from 515.7(A) is inadvertent, and the revised text will allow PLTC cable and Type ITC cable to be properly utilized in bulk storage facilities.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(A) Fixed Wiring. All fixed wiring above Class I locations shall be in metal raceways, Schedule 80 PVC conduit, Type RTRC marked with the suffix –XW, or Type MI, Type TC, or Type MC cable<u>, or Type PLTC and Type PLTC-ER cable in accordance with the provisions of Article 725, including installation in cable tray systems or Type ITC and Type ITC-ER cable as permitted in 727.4. The cable shall be terminated with listed fittings.</u>

Panel Statement: The changes made by CMP-14 correlate with previous changes made in Proposal 14-43.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-284 Log #1025 NEC-P14 **Final Action: Reject**
(515.7(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change "may" to "is likely to".

Substantiation: "May" is a term to be avoided per the Style Manual. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 14-15.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

14-285 Log #2418 NEC-P14 **Final Action: Reject**
(515.8)

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follows:
"...where rigid ~~non-metallic~~ PVC conduit is used, threaded rigid metal conduit.
Substantiation: Conforming to style manual Article 352.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-277.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BRIESCH, E.: See My Explanation of Negative on 14-277 (Log #2785).

14-286 Log #564 NEC-P14 **Final Action: Reject**
(515.8(A))

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
515.8 Underground Wiring.
(A) Wiring Method. Underground wiring shall be installed in threaded rigid metal conduit or threaded steel intermediate metal conduit or, where buried under not less than 600 mm (2 ft) of cover, shall be permitted in PVC ~~rigid nonmetallic~~ conduit or a listed cable. Where PVC ~~rigid nonmetallic~~ conduit is used, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (2 ft) of the conduit run to emergence or to the point of connection to the aboveground raceway.
Substantiation: In the 2008 NEC development cycle, Article 352 was revised to change the title of the Article from Rigid Nonmetallic Conduit to Rigid Polyvinyl Chloride Conduit: Type PVC. This revision was also to have been implemented globally in the NEC. The continued use of this term appears to be an inadvertent oversight. The revision promotes consistency with revisions in the 2008 NEC cycle and replaces the term "rigid nonmetallic conduit" in this section with the term now used for this wiring method.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-277.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BRIESCH, E.: See My Explanation of Negative on 14-277 (Log #2785).

14-287 Log #858 NEC-P14 **Final Action: Reject**
(515.8(A) and (C))

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(A) WIRING METHOD. Underground wiring shall be installed in threaded rigid metal conduit or threaded intermediate metal conduit with threaded fittings or, where buried under not less than 600 mm (2 ft) of earth ~~cover~~ or 100 mm (4 in.) of concrete shall be permitted in Type PVC rigid nonmetallic conduit. Where Type PVC rigid nonmetallic conduit is used, threaded rigid metal conduit or threaded intermediate metal conduit with threaded fittings shall be used for not less than the last 600 mm (2 ft) of the conduit run to emergency ~~or~~ and to the point of ~~connection~~ transition to an aboveground wiring method or enclosure. ~~The aboveground raceway.~~
In (C), delete text after "included".
Substantiation: Threaded fittings should be specified; 342.42(A) and 344.42(A) permit threadless couplings and connectors. PVC should be permitted where under 4 in. or more of concrete. The provision should indicate the last 2 ft is a minimum. An emerging raceway may not always connect to an aboveground raceway, it may transition to a cable or terminate in a cabinet, switch, or other enclosure. The latter part of (C) is superfluous, the purpose of an EGC is defined in Article 100.
Panel Meeting Action: Reject
Panel Statement: This is an issue that extends throughout the Code. At the present time, CMP-14 is not sure what constitutes rigid nonmetallic conduit. Furthermore, it is of great concern to CMP-14 that the suitability of the conduit is appropriate for use in hazardous (classified) locations, including items such as minimum wall thickness, rigidity, etc. CMP-14 respectfully requests direction from the TCC.
See also panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BRIESCH, E.: This proposal should have been Accepted in Principle in Part. Addition of the Type PVC should have been accepted and the rigid nonmetallic conduit deleted. The remainder of the proposal should not be accepted. See Comment on Proposal 14-277.

14-288 Log #1024 NEC-P14 **Final Action: Reject**
(515.8(A) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (A):
Underground wiring shall be installed in a threaded rigid metal conduit or threaded intermediate metal conduit, with threaded fittings, or where buried under not less than 600 mm (2 ft) of cover or 100 mm (4 in.) of concrete shall be permitted in rigid nonmetallic conduit or an identified cable. Where rigid nonmetallic conduit is used, threaded rigid metal conduit or threaded steel intermediate metal conduit with threaded fittings shall be used for not less than the last 1600 mm (2 ft) of the conduit run to emergence. ~~Or to the point of connection to an aboveground raceway.~~ Where cable is used it shall be enclosed in threaded rigid metal conduit or threaded steel intermediate conduit with threaded fittings from the lowest buried cable level to the point of emergence connection ~~to the aboveground raceway~~.
In (C), delete text after "included".
Substantiation: All cables which are listed may not be suitable. The provision for the last two feet literally does not permit more than two feet. The existing last sentence is covered by the proposed addition of cable in the second sentence. "To emergence" is the defining requirement; underground wiring may terminate in poles, in walls, in enclosures, or connect to wiring other than raceways. The requirement in (C) to provide an EGC does not need to include the reason, which is superfluous and generally not included in similar requirements.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-289 Log #565 NEC-P14 **Final Action: Reject**
(515.8(C))

TCC Action: In response to the request from Code-Making Panel 14, the Technical Correlating Committee notes that term "rigid nonmetallic conduit" includes Types PVC, RTRC, and HDPE. The suitability of any type of rigid nonmetallic conduit in a hazardous (classified) location is under the purview of Code-Making Panel 14.
Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
(C) Nonmetallic Wiring. Where PVC ~~rigid nonmetallic~~ conduit or cable with a nonmetallic sheath is used, an equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.
Substantiation: In the 2008 NEC development cycle, Article 352 was revised to change the title of the Article from Rigid Nonmetallic Conduit to Rigid Polyvinyl Chloride Conduit: Type PVC. This revision was also to have been implemented globally in the NEC. The continued use of this term appears to be an inadvertent oversight. The revision promotes consistency with revisions in the 2008 NEC cycle and replaces the term "rigid nonmetallic conduit" in this section with the term now used for this wiring method.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-277.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BRIESCH, E.: See My Explanation of Negative on 14-277 (Log #2785).

14-290 Log #1022 NEC-P14 **Final Action: Reject**
(515.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "as provided in Article 250".
Substantiation: Edit. Article 250 contains provisions and exceptions for where grounding is not required. Many sections do not use this phrase which eliminates ambiguity.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-215.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-291 Log #1221 NEC-P14 **Final Action: Reject**
(515.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
GROUNDING ~~and BONDING~~ All metal raceways, the metal ~~armor or metallic shield on~~ covering of cables and all exposed noncurrent-carrying metal parts of electrical equipment regardless of voltage shall be grounded ~~and bonded as provided in Article 250. Grounding and bonding shall comply with 501.30 for Class I Division 1 and 2 locations and 505.25 for Class I Zone O, 1, and 2 locations~~. Exception: Listed equipment except portable electric drill motors, electric saws, electric hammers and chippers, shall not be required to be grounded if protected by a system of double insulation and clearly marked as such.
Substantiation: Grounding should apply to exposed parts. Article 250 and 501.30 and 505.30 already apply. The exception is proposed for consideration whether or not suitable. Bonding requirements are covered by 250.90 and 250.100.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-63.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-292 Log #1886 NEC-P14 **Final Action: Reject**
(515.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete: "as provided in Article 250."
Substantiation: Edit. Per 4.1.1 of the Style Manual, reference should not be made to an entire article. Article 250 has provisions which permit non-grounding which may be deemed to void or nullify the apparent intent of this provision. Many sections re: grounding do not use this phrase. See 3.3.5 of the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-215.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 516 — SPRAY APPLICATION, DIPPING, AND COATING PROCESSES

14-293 Log #1021 NEC-P14 **Final Action: Reject**
(516.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
The spray booth is provided with a dedicated electrically powered ventilation exhaust and supply system. But may shall be permitted to draw supply air from a larger room or area or have a dedicated air supply.
Substantiation: Edit. The exhaust system should be electrically powered; nonelectrical systems are not adequate.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-294 Log #1023 NEC-P14 **Final Action: Reject**
(516.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
A purposely enclosed room built for spray (coating) dipping applications provided with a dedicated ventilation supply and electrically powered exhaust system. The exhaust system shall be arranged to operate when spray/coating/dipping operations are conducted and be provided with identified means, visual or audible or both, at an approved location, to indicate when the exhaust system is not operable.
Substantiation: The exhaust system should be electrically powered; mechanical louvers and roof turbines should not constitute the exhaust system.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-295 Log #582 NEC-P14 **Final Action: Reject**
(516.3(C)(2)(a) and (b))

Submitter: Mitch Feininger, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
(a) If the exhaust ventilation system is interlocked with the spray application equipment, the Division 2 or Zone 2 location shall encompass a radius of 1.5 m (5 ft) horizontally 900 mm (3 ft) vertically...". (Remainder unchanged).
(b) If the exhaust ventilation system is not interlocked with the spray application equipment, the Division 2 or Zone 2 location shall encompass a radius of 3 m (10 ft) horizontally and 900 mm (3 ft)...". (Remainder unchanged).
Substantiation: This proposal's intent is to establish a relationship between the article which makes no reference to the concept of a radical inclusion, while Figure 516.3(2) uses the word radius in every illustration subtext.
Panel Meeting Action: Reject
Panel Statement: This is text extracted from NFPA 33 and CMP-14 cannot alter it in any substantive sense. This submittal does not add clarity. CMP-14 notes that the figures are referenced to provide the necessary information.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-296 Log #466 NEC-P14 **Final Action: Reject**
(516.3(E))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Delete existing subsection (E) and replace with new subsection (E) as follows:
~~**(E) Adjacent Locations.** Adjacent locations that are cut off from the defined class I or Class II locations by tight partitions without communicating openings, and within which flammable vapors or combustible powders are not likely to be released, shall be unclassified.~~
(E) Specific Areas Adjacent to Classified Locations. Areas adjacent to classified locations in which flammable vapors are not likely to be released, such as stock rooms, switchboard rooms, and other similar locations, shall be unclassified where mechanically ventilated at a rate of four or more air changes per hour, or designed with positive air pressure, or where effectively cut off by walls or partitions.
Substantiation: This change is intended to attain consistency between code sections where requirements are similar, such as in Section 511.3(E)(1). There is no intent to change the safety aspect or code allowance as presently worded in the section. Since the hazards are the same, and the adjacent areas are the same, the code sections should also be the same. This change will help to eliminate confusion the currently exists in code enforcement requirements.
Panel Meeting Action: Reject
Panel Statement: The proposal removes text that is specific to spray application processes. There is no substantiation provided for correlating the text of 511.3(E)(1) with that of 516.3(E). The hazards in Article 511 are different than those in Article 516.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-297 Log #1020 NEC-P14 **Final Action: Accept**
(516.4(D) Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "automobile" to "vehicle".
Substantiation: Edit. Trucks and other vehicles may not be deemed "automobiles".
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
NEAGLE, J.: The provision for portable electric drying apparatus should not be limited to use in automotive refinishing type spray booths. Such equipment has application in industrial and other spray coating operations also falling within the scope of NFPA 33 and NEC Article 516. 516.4(D) Exception No. 2 should be revised as follows:
'Exception No. 2: Where portable electric drying apparatus is used in ~~automobile refinishing~~ spray booths and the following requirements are met:…'.
Retain items (a) through (d).

14-298 Log #1019 NEC-P14 **Final Action: Reject**
(516.7(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "suitable" to "identified" and "may" to "is likely to".
Substantiation: Edit. "Suitable" and "may" are subjective and terms to be avoided per the Style Manual. "Identified" is defined and "likely" is a term used in many sections, defined as such a nature or circumstance as to make something probable.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-58.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-299 Log #1017 NEC-P14 **Final Action: Reject**
(516.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "adequate" in (A)(7).
In (A)(8), change qualified to "authorized".
In (B)(4), revise first sentence: All electrically conductive objects in the spray in area shall be adequately grounded in an approved manner.
Substantiation: Edit. "Adequate" is a term to be avoided per the Style Manual; additionally the latter part suggests that adequacy is achieved. Qualified person (personnel) is defined as one who has skills and knowledge relating to the construction of electrical equipment; painters are not likely to be so qualified.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 14-36. The word "adequate" as used in this section is not unenforceable and does not create confusion, as indicated in the requirements of the NEC Style Manual. As such, it does not need to be replaced.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

14-300 Log #1018 NEC-P14 **Final Action: Reject**
(516.10(A)(2) and (3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A)(2), change "adequately" to "securely".
Revise text of (A)(3):
High-voltage leads shall be properly insulated for the voltage employed and protected from mechanical physical damage or and exposure to destructive agents chemicals.
Substantiation: Edit. "Adequately" and "properly" are terms to be avoided per the Style Manual. "Mechanical" implies machinery or tools. "Agents" is more inclusive and covers more than chemicals.
Panel Meeting Action: Reject
Panel Statement: In 516.10(A)(2) the word "adequately" as used in this section is not unenforceable and does not create confusion, as indicated in the requirements of the NEC Style Manual. As such, it does not need to be replaced.
The text of 516.10(A)(3) already clearly requires what the submitter is proposing.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 517 — HEALTH CARE FACILITIES

15-3a Log #CP1503 NEC-P15 **Final Action: Accept**
(517.2 (NEW))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comment expressed in the voting.
In addition, the Technical Correlating Committee directs the panel to clarify the action on this proposal as it relates to 2.2.2 of the NEC Style Manual concerning the use of mandatory text in a definition.
This action shall be considered by the panel as a public comment.
Submitter: Code-Making Panel 15,
Recommendation: Add a new definition to 517-2:
Battery Powered Lighting Units.
Individual unit equipment for back up illumination shall consist of the following:
(1) A rechargeable battery
(2) A battery charging means
(3) Provisions for one or more lamps mounted on the equipment, or shall be permitted to have terminals for remote lamps, or both
(4) A relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment.
Substantiation: The adoption of proposal 15-109 details Battery Powered Lighting Units, these units should be defined in Article 517 as per Regulations Governing Committee Projects.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.
Comment on Affirmative:
SAMPSON, M.: I respectfully request that the panel revisit this issue. This new definition for "Battery Powered Lighting Units" is identical to that in 700.12(F) for "Unit Equipment." Using the same definition for two different terms within the Code is contradictory. The name should be agreed upon and the definition moved to Article 100 or the reference to unit equipment in 700.12(F) should be restored.

15-4 Log #3252 NEC-P15 **Final Action: Reject**
(517.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "with the core and case connected to an equipment grounding conductor."
Substantiation: Editorial. Correlation with present 517.64(C)(2).
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3.(b) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-5 Log #260 NEC-P15 **Final Action: Reject**
(517.2.Ambulatory Health Care Occupancy)

Submitter: Kyle Medaugh, State of Michigan - MDCH / Rep. Health Care
Recommendation: 517.2 Definitions
Ambulatory Health Care Facility. A building or part thereof used to provide services or treatment to four or more patients at the same time and meeting either (1) or (2).
(1) Those facilities that provide, on an outpatient basis, treatment for patients that would render them incapable of taking action for self-preservation under emergency conditions without assistance from others, ~~such as hemodialysis units or freestanding emergency medical units.~~
(2) Those facilities that provide, on an outpatient basis, surgical treatment requiring general anesthesia.
Substantiation: Definition does not match NFPA 101 (2006 edition)
3.3.168.1 Ambulatory Health Care Occupancy. A building or portion thereof used to provide services or treatment simultaneously to four or more patients that provides, on an outpatient basis, one or more of the following: (1) treatment for patients that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others; (2) anesthesia that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others; (3) emergency or urgent care for patients who, due to the nature of their injury or illness, are incapable of taking action for self-preservation under emergency conditions without the assistance of others.
A3.3.168.1 Ambulatory Health Care Occupancy. It is not the intent that occupants be considered to be incapable of self-preservation just because they are in a wheelchair or use assistive walking devices, such as a cane, a walker, or crutches. Rather it is the intent to address emergency care centers that receive patients who have been rendered incapable of self-preservation due to the emergency, such as being rendered unconscious as a result of an accident or being unable to move due to sudden illness.
By specifically stating that hemodialysis units are Ambulatory Health Care Facilities is contradictory to the language of "self-preservation" because patients in outpatient hemodialysis facilities are required by the Center for Medicare and Medicaid Services (CMS) to be able to disconnect themselves from medical equipment in the event of an emergency. In some cases a patient may not be able to disconnect themselves but it would not be more then one or two, below the requirement of four or more in the definition.
CMS Conditions for Coverage of Suppliers of End-Stage Renal Disease Services
42 CFR 405 Subpart U
405.2140(d)(5) Patients are trained to handle medical and non-medical emergencies. Patients must be fully informed regarding what to do, where to go, and whom to contact if a medical or non-medical emergency occurs.
Panel Meeting Action: Reject
Panel Statement: The text of the 2008 NEC already contains this language submitted by the proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-6 Log #4136 NEC-P15 **Final Action: Accept**
(517.2.Critical Branch)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
Critical Branch. A subsystem of the ~~emergency~~ essential electrical system consisting of feeders and branch circuits supplying energy to task illumination, special power circuits, and selected receptacles serving areas and functions related to patient care and that are connected to alternate power sources by one or more transfer switches during interruption of normal power source. [**99:**3.3.26]
Substantiation: To coordinate with the 2010 Edition of NFPA 99.
Panel Meeting Action: Accept
Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-7 Log #4137 NEC-P15 **Final Action: Accept**
(517.2.Emergency System)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Delete as follows:

~~**Emergency System.** A system of circuits and equipment intended to supply alternate power to a limited number of prescribed functions vital to the protection of life and safety. [**99:**3.3.41]~~

Substantiation: Defining the parts of the health care facility essential electrical system as three branches (critical, life safety, and equipment) instead of two systems (emergency and equipment) eliminates an unnecessary hierarchal level. More important, this change creates a clear distinction between the requirements for essential systems of health care facilities and those in NFPA Article 700 for emergency, legally required standby, and optional standby systems in other occupancies. Although some functions of the health care facility essential electrical system do have commonality with functions of emergency and standby systems in other occupancies, there are many patient care related functions that are uniquely performance related and apply only in the health care environment because of the unique needs of operating a health care facility, including during fire emergencies, there is an urgent need to distinguish the two sets of requirements.

The fundamental purpose of this proposal is to coordinate with the 2010 version of NFPA 99.

Panel Meeting Action: Accept
Panel Statement: The panel action is based on the action in proposal 15-72. The panel does not necessarily agree with the substantiation provided by the submitter with regard to Article 700.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

15-8 Log #4135 NEC-P15 **Final Action: Accept**
(517.2.Equipment System Branch)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
Equipment ~~System~~ <u>Branch</u>. A system of circuits and equipment arranged for delayed, automatic, or manual connection to the alternate power source and that serves primarily 3-phase power equipment.
Substantiation: This is one of three branches on the essential electrical power supply system. It is not a separate system, but a vital part of the EEPSS. Refer to proposal by same author on 517.2.

To coordinate with the 2010 Edition of NFPA 99.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-9 Log #4162 NEC-P15 **Final Action: Reject**
(517.2.Health Care Facilities)

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:

Section 517.2 Definitions.

Health Care Facilities. Buildings or portions or buildings in which medical, dental, psychiatric, nursing, obstetrical, or surgical care are provided. Health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, <u>chiropractic offices, physical therapy offices</u> and ambulatory care centers, whether permanent or movable.

Substantiation: Doctors of Chiropractic Medicine and physical therapists frequently use electrical diagnostic and therapeutic equipment during the treatment of patients and the patients are subjected to many of the same hazards of any other medical office. In many cases, the equipment design requires compliance with Article 517 patient care area requirements. The lack of inclusion in this definition leads Architects, Engineers, Inspectors, and Contractors to believe these offices should not be considered health care facilities and the wiring methods for these facilities in Article 517 for exam and treatment rooms do not apply.
Panel Meeting Action: Reject
Panel Statement: It is inappropriate to create and attempt to maintain a laundry list of occupancies that may or may not be considered health care facilities. NFPA 99 is taking a risk based approach to classify buildings or areas of buildings that provide patient treatment. We expect these definitions to be revised in the near future to align with NFPA 99.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-10 Log #1434 NEC-P15 **Final Action: Reject**
(517.2.Isolated Power System)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

A system comprising an <u>isolation</u> ~~isolating~~ transformer or ~~its equivalent~~ <u>other power source with no direct connection between its supply conductors and the conductors it supplies,</u> a line isolation monitor, and its ungrounded <u>secondary system and</u> circuit conductors.

Substantiation: There is no definition for isolating transformer. In addition to ungrounded circuit conductors the system should be specified as ungrounded. Present wording does not prohibit a 240-volt 2-wire circuit supplied from a 120/240 volt grounded secondary. The phrase "ungrounded secondary" is used in 668.20(B).
Panel Meeting Action: Reject
Panel Statement: The term "isolating" is correct as used. This is an adjective that describes what the noun is. Webster's defines "ing" as "adding to verbs or sometimes nouns to form verbal nouns-the act or instance of (a specified verb) painting, digging." Isolating is a v.t. or verb transition. Isolating describes the action of the noun – what it does for the transformer. The rest of the proposed text appears to not meet the NEC Manual of Style. Proposed language contains requirements. Requirements for these systems should be in Part VII he existing definition is consistent with that in NFPA 99 and should remain consistent for clarity."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-11 Log #1016 NEC-P15 **Final Action: Reject**
(517.2.Isolating Transformer)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

ISOLATED POWER SYSTEM. Change "isolating" to "isolation".

Substantiation: Isolating transformer is not defined whereas isolation transformer is; are two different types intended? Different wording pertaining to the same thing may cause confusion per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The existing definition is consistent with that in NFPA 99 and should remain consistent for clarity. The term "isolating" is correct as it is an adverb that describes what the noun is. Webster's defines "ing" as "adding to verbs or sometimes nouns to form verbal nouns - the act or instance of (a specified verb) painting, digging." Isolating is a v.t. or verb transition. Isolating describes the action of the noun – what it does for the transformer."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-12 Log #1063 NEC-P15 **Final Action: Accept**
(517.2.Isolation Transformer)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
ISOLATION TRANSFORMER: A transformer of the multiple winding type, with the primary and secondary windings physically separated, which inductively couples its secondary winding(s) to ~~the grounded feeder systems that energize~~ circuit conductors connected to its primary windings(s).
Substantiation: Edit. A transformer may (and is often) supplied (energized) by a branch circuit or an ungrounded system or circuit which may energize the secondary winding(s) (reverse connected).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-13 Log #4134 NEC-P15 **Final Action: Accept**
(517.2.Life Safety Branch)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
Life Safety Branch. A subsystem of the ~~emergency~~ essential electrical system consisting of feeders and branch circuits, ~~meeting the requirements of Article 700 and~~ intended to provide adequate power needs to ensure safety to patients and personnel, and that are automatically connected to alternate power sources during interruption of the normal power source. [**99:**3.3.96]
Substantiation: Article 700 no longer applies to essential electrical systems of health care facilities. These systems shall meet only the requirements of Article 517. See justification in Proposal regarding 517.2 for further justification.
To coordinate with the 2010 Edition of NFPA 99.
Panel Meeting Action: Accept
Panel Statement: The panel action is based on the action in Proposal 15-72. The panel does not necessarily agree with the substantiation provided by the submitter with regard to Article 700.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.
WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-14 Log #2272a NEC-P15 **Final Action: Reject**
(517.2.Long-Time Rating (X-Ray Equipment) and Momentary Rating (X-Ray Equipment) (New))

TCC Action: The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 12 for correlating action in Article 660.
This action will be considered by Code-Making Panel 12 as a public comment.
Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Relocate and revise two definitions from Articles 660 and 517 to Article 100.
Long-Time Rating (X-Ray Equipment). A rating based on an operating interval of 5 minutes or longer.
Momentary Rating (X-Ray Equipment). A rating based on an operating interval that does not exceed 5 seconds.
This proposal has also been sent to CMP-12 for 660.2.
Substantiation: These definitions are identical and are used in two separate articles of the NEC. This change proposal is in compliance with the NEC Style Manual section 2.2.2.1.
Panel Meeting Action: Reject
Panel Statement: While the definitions are identical and appear in two different NEC articles, the type of x-ray equipment found in 517 and 660 are radically different from one another. 517 refers to medical x-ray equipment and 660 refers to industrial x-ray equipment. It is important that the definitions stay in the appropriate articles to aid code users.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-15 Log #4133 NEC-P15 **Final Action: Accept**
(517.2.Patient Bed Location)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
Patient Bed Location. The location of a patient sleeping bed, or the bed or procedure table of a critical care ~~area~~ room. [**99:**3.3.137]
Substantiation: To coordinate with the 2010 edition of NFPA 99. NFPA 99 uses this definition to distinguish the location of various performance requirements for the health care facility. As such, the definition is a necessary part of 99, and should be common between 70 and 99.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.
WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-16 Log #4132 NEC-P15 **Final Action: Accept**
(517.2.Patient Care Area)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
The Technical Correlating Committee further directs that the panel clarify the panel action related to the word "portion".
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
Patient Care ~~Area~~ Room. Any portion room of a health care facility wherein patients are intended to be examined or treated. ~~Areas~~ Rooms of a health care facility in which patient care is administered are classified as basic care rooms, general care ~~areas~~ rooms, or critical care ~~areas~~ rooms. The governing body of the facility designates these areas rooms in accordance with the type of patient care anticipated and with the following definitions of the room ~~area~~ classification.
Basic Care Rooms. Rooms in which the failure of equipment or systems is not likely to cause injury to the patients or caregivers but may cause patient discomfort.
FPN: Basic care rooms are typically rooms in which basic medical or dental care, treatment, or examinations are performed. Examples include but are not limited to examination or treatment rooms in hospitals, clinics, medical and dental offices, nursing homes, and limited care facilities.
General Care ~~Areas~~ Rooms. ~~Patient bedrooms, examining rooms, treatment rooms, clinics, and similar areas in which it is intended that the patient will come in contact with ordinary appliances such as a nurse call system, electric beds, examining lamps, telephones, and entertainment devices. [99, 2005]~~ Rooms in which failure of equipment or systems is likely to cause minor injury to patients or caregivers.
FPN: Examples of general patient care rooms include but are not limited to inpatient bedrooms, dialysis rooms, invitro-fertilization rooms, IV sedation rooms, and similar rooms.
Critical Care ~~Areas~~ Rooms. ~~Those special care units, intensive care units, coronary care units, angiography laboratories, cardiac catheterization laboratories, delivery rooms, operating rooms, and similar areas in which patients are intended to be subjected to invasive procedures and connected to line operated, electromedical devices.~~ Rooms in which failure of equipment or systems is likely to cause major injury or death of patients or caregivers.
FPN: Critical care rooms are typically where patients are intended to be subjected to invasive procedures and connected to line operated, patient care related appliances. Examples include but are not limited to special care patient rooms used for critical care, intensive care, and special care treatment rooms such as angiography labs, cardiac catheterization laboratories, delivery rooms, operating rooms, post anesthesia care units, trauma rooms, and other similar rooms.
Substantiation: Patient care is delivered in specific rooms within a health care occupancy. The term area is misleading to the electrical inspector because corridors, nurses stations, clean and soiled utility rooms should not be included as a patient care treatment room. NFPA 99 uses this definition to distinguish the location of various performance requirements for the health care facility. As such, the definition is a necessary part of 99, and should be common between 70 and 99.

Basic care rooms are those locations where a failure of the electrical system will only cause patients or caregivers a minor injury. This definition better defines the use of basic care rooms in health care facilities.

This change is necessary to coordinate with the 2010 edition of NFPA 99.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-17 Log #4131 NEC-P15 **Final Action: Accept in Principle**
(517.2.Patient Care Areas, General Care Area)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:

General Care ~~Areas~~ Rooms. ~~Patient bedrooms, examining rooms, treatment rooms, clinics, and similar areas in which it is intended that the patient will come in contact with ordinary appliances such as a nurse call system, electric beds, examining lamps, telephones, and entertainment devices. [**99,** 2005]~~ Rooms in which failure of equipment or systems is likely to cause minor injury to patients or caregivers.

FPN: Examples of general patient care rooms include but are not limited to inpatient bedrooms, dialysis rooms, invitro-fertilization rooms, IV sedation rooms, and similar rooms.

Substantiation: NFPA 99 uses this definition to distinguish the location of various performance requirements for the health care facility. As such, the definition is a necessary part of 99, and should be common between 70 and 99.

Coordination with the 2010 edition of NFPA 99.

Panel Meeting Action: Accept in Principle
Panel Statement: The action on Proposal 15-16 includes the changes requested by the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-18 Log #2795 NEC-P15 **Final Action: Accept**
(517.2.Patient Care Location, Wet Procedure Locations)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise last sentence as follows:

Patient Care Location.

Wet Procedure Locations...Routine housekeeping procedures and incidental spillage of liquids do not define a wet procedure location.

Substantiation: Providing the additional word "procedure" between "wet" and "locations" in the last sentence does not substantially change the definition of this application, but does provide added description to the phrase and differentiates between "Wet Locations: as defined in Article 100 and this very special type of Wet Location here in Article 517. General housekeeping procedures may require washing the area down and that action could define a wet location requiring compliance with 406.8(B) but would not define a wet procedure location.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-19 Log #2434 NEC-P15 **Final Action: Reject**
(517.2.Power Safe Protector (PSP))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:

Article 100

DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.

Substantiation: If Power Safe Protector is accepted in 517.20(A) and 517.21, a definition will be needed here. There is a proposal for Article 100 also.

Panel Meeting Action: Reject
Panel Statement: The proposal is not specific to Article 517.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-20 Log #4163 NEC-P15 **Final Action: Accept**
(517.2.Wet Procedure Locations)

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Add new text as follows:

Wet Procedure Locations. Those spaces within patient care areas where a procedure is performed and that are normally subject to wet conditions while patients are present. These include standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. Routine housekeeping procedures and incidental spillage of liquids do not define a wet procedure location.

Substantiation: Providing the additional word procedure between "wet" and "locations" in the last sentence does not substantially change the definition of this application, but does provide added description to the phrase and differentiates between "Wet Locations" as defined in Article 100 and this very special type of Wet Location here in Article 517. General housekeeping procedures may require washing the area down and that action could define a wet location requiring compliance with 406.8(B), but would not define a wet procedure location.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-21 Log #1064 NEC-P15 **Final Action: Accept**
(517.2. X-ray Installations Transportable)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal since it accepted the proposal, and then modified the text in the panel statement.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

X-ray INSTALLATIONS TRANSPORTABLE X-ray equipment to be ~~installed in~~ transported by a vehicle or that ~~may be~~ is readily disassembled for transport by a vehicle.

Substantiation: Edit. Provision should allow for transport by, but not necessarily in, a vehicle. "May" is a term to be avoided per the Style Manual.

Panel Meeting Action: Accept
Panel Statement: The definition is identical to the definition found in NFPA 70, Article 660 X-Ray Equipment
a t Instead of hte st portion of the revised text of the author, it is proposed to insert the word "conveyed" for the two words deleted (installed in) by the author in the original document. Using the same root word to describe the word being defined is not usually recommended. This change would coincide with the author's intent. Elimination of "may be" should take place as set forth in the NEC Style Manual. Definition to read "X-ray equipment to be conveyed by a vehicle or that is readily disassembled…""
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-22 Log #882 NEC-P15 **Final Action: Reject**
(517.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
~~The purpose of~~ This article ~~is to~~ specifies the installation criteria and wiring methods that minimize electrical hazards by the maintenance of ~~adequately~~ low potential differences ~~only~~ between exposed conductive surfaces that are likely to become energized and ~~could~~ be contacted by a person ~~patient~~.
Substantiation: Edit. Most articles have a scope but do not explain the purpose, nor is the purpose explained for most rules, which normally is not necessary or pertinent. “Could” is irrelevant, subjective, and a term to be avoided per the Style Manual. The provision should apply where exposed surfaces can be contacted by persons other than patients. The definition of “exposed” applies to any person whether patient, employee, or visitor.
Panel Meeting Action: Reject
Panel Statement: The current code language more correctly and clearly defines the purpose of the Article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-23 Log #943 NEC-P15 **Final Action: Reject**
(517.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~The purpose of~~ This article ~~is to~~ specifies the installation criteria and wiring methods that minimize electrical hazards by the maintenance of ~~adequately~~ low potential differences ~~only~~ between exposed conductive surfaces that are likely to become energized and ~~could~~ be contacted by a person ~~patient~~.
Substantiation: Edit. Most articles have a scope but do not explain the purpose, nor is the purpose explained for most rules, which normally is not necessary or pertinent. “Could” is irrelevant, subjective, and a term to be avoided per the Style Manual. The provision should apply where exposed surfaces can be contacted by persons other than patients. The definition of “exposed” applies to any person whether patient, employee, or visitor. “Adequately” is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 15-22.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-24 Log #1065 NEC-P15 **Final Action: Accept**
(517.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Except as modified in this Article, wiring methods shall comply with the applicable provisions ~~requirements~~ of Chapters 1 through 4 of this Code.
Substantiation: Edit. Applicable provisions which are not requirements, per se, but permissive, exceptions, or alternatives, should be included. Compliance should not be limited to Chapters 1 through 4.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-25 Log #3755 NEC-P15 **Final Action: Accept**
(517.13(B))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action on Proposal 15-29 in relation to isolated ground receptacles.
This action will be considered by the panel as a public comment.
Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise 517.13(B) to read as follows
(B) Insulated Equipment Grounding Conductor.
(1) General. The following shall be directly connected to an insulated copper equipment grounding conductor that is installed in metal raceways or as a part of listed cables having a metallic armor or sheath assembly with the branch-circuit conductors supplying these receptacles or fixed equipment.
(1) The grounding terminals of all receptacles.
(2) Metal boxes and enclosures containing receptacles.
(3) All non–current carrying conductive surfaces of fixed electrical equipment likely to become energized that are subject to personal contact, operating at over 100 volts.
Exception No. 1 to (1): The equipment grounding terminal of a receptacle shall be permitted to be connected to an insulated equipment bonding jumper that extends from a metal box or enclosure that is connected to an insulated equipment grounding conductor.
Exception No. 2 to (2): Metal boxes and enclosures containing an isolated ground receptacle(s) as permitted by 250.146(D)
Exception No. 3 to (3): Metal faceplates shall be permitted to be connected to the equipment grounding conductor by means of a metal mounting screw(s) securing the faceplate to a grounded outlet box or grounded wiring device.
Exception No. 4 to (3): Luminaires more than 2.3 m (71/2 ft) above the floor and switches located outside of the patient care vicinity shall be permitted to be connected to an equipment grounding return path complying with 517.13(A).
(2) Sizing. Equipment grounding conductors and equipment bonding jumpers shall be sized in accordance with Table 250.122.
Substantiation: The objective of this proposal is to rearrange the text in 517.13(B) for usability and to clear up some confusion about whether or not the metal box is required to be directly connected to the insulated equipment grounding conductor.
The revisions rearrange the paragraph to create a direct first sentence to state what must be connected to the copper equipment grounding conductor. The existing items in the paragraph are now numbered and a new item (2) is added to specifically state that the insulated equipment grounding conductor must be connected to the metal box that contains the receptacle. This arrangement is the only way to get true “redundant” paths. Today, many of these installations are being made by taking the insulated equipment grounding conductor to the receptacle without connection to the box.
Two new exceptions are added that will recognize some additional situations. Exception No. 1 would allow a bonding jumper to be installed from the box to the receptacle. This would result in the insulated equipment grounding conductor being terminated to the box and then a bonding jumper to go from the box to the receptacle.
Exception No. 2 is to recognize that there are situations where isolated ground receptacles may be installed and this exception would allow you to omit the connection to the box and take the conductor directly to the receptacle.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.
Comment on Affirmative:
SAMPSON, M.: Per the panel action on Proposal 15-29, exception #2 needs to be eliminated and the subsequent exceptions renumbered accordingly.

15-26 Log #2534 NEC-P15 **Final Action: Reject**
(517.14)

Submitter: Marcus R. Sampson, Lysistrata Electric
Recommendation: Revise text to read as follows:
517.14 Panelboard Bonding.
The equipment grounding terminal buses of the normal and essential branch-circuit panelboards serving the same individual patient care vicinity shall be connected together with an ~~insulated~~ continuous copper conductor not smaller than ~~10~~ 8 AWG. Where two or more panelboards serving the same individual patient care vicinity are served from separate transfer switches on the emergency system, the equipment grounding terminal buses of those panelboards shall be connected together with an ~~insulated~~ continuous copper conductor not smaller than ~~10~~ 8 AWG. This conductor shall be permitted to be broken in order to terminate on the equipment grounding terminal bus in each panelboard.
Substantiation: While we want to be extremely cautious with electrical distribution in health care facilities, why would any bonding conductor be required to be insulated?
And if the minimum size is only required to be #10 copper, would anything larger ever be required? Since this is considered an equipotential bond, shouldn’t the conductor be at least #8 copper - the same minimum size used for the equipotential bonding conductor in an animal confinement building or swimming pool?
Panel Meeting Action: Reject
Panel Statement: The submitter failed to provide any technical substantiation that a problem exists in the field to warrant a change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-27 Log #4113 NEC-P15 **Final Action: Accept in Principle**
(517.15 (New))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Add new text to read as follows:
Overcurrent protective devices shall not be located in public access spaces. Isolated power panels shall be permitted to be located in patient care rooms.
Substantiation: Panelboards and the overcurrent devices should not be accessible to the public. These devices should be in a space that is only accessed by facility personnel. Furthermore, healthcare facility staff frequently access the electrical equipment for service, and should not do so in public areas. This requirement was extensively debated by the NFPA 99 Electrical Systems Technical Committee and it will appear in NFPA 99. NFPA 70 should extract it so as to ensure compliance with this important safety measure and to ensure coordination between the two documents.

Unless the isolated power panels are within the designated area, excessive cable-induced leakage currents may seriously limit the number of fixed and portable medical devices that can be powered from the isolated power supply.
Panel Meeting Action: Accept in Principle

Revise the text as follows:
517.15 Panelboard Location.
Panelboards shall not be located in public access spaces. Isolated power panels shall be permitted to be located in patient care rooms.
Panel Statement: The panel agreed with the proposal but added a 5itle for clarity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-28 Log #568 NEC-P15 **Final Action: Reject**
(517.16)

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:

517.16 Receptacles with Insulated Grounding Terminals.

(A) Identification. Receptacles with insulated grounding terminals, as permitted in 250.146(D), shall be identified; such identification shall be visible after installation.

(B) Equipment Grounding Conductors. Isolated ground receptacles installed in branch circuits for patient care areas shall be connected to an insulated equipment grounding conductor in accordance with 250.146(D) in addition to the two equipment grounding conductor paths required in 517.13(A) and (B).

(C) Equipment Grounding Conductor Identification. The equipment grounding conductor installed for isolated grounding receptacles in patient care areas shall be clearly identified in accordance with 250.119 from the insulated equipment grounding conductor required by 517.13(A) and (B).

FPN: Caution is important in specifying such a system with receptacles having insulated grounding terminals, since the grounding impedance is controlled only by the single equipment grounding conductors and does not benefit functionally from any parallel grounding paths. This type of installation is typically used where a reduction of electrical noise (electromagnetic interference) is necessary and parallel grounding paths are to be avoided.
Substantiation: Confusion exists regarding the number of equipment grounding conductors that must be installed for isolated ground receptacles when they are installed in a patient care location. The proposed revision clarifies what is required to satisfy the equipment grounding conductor requirements for branch circuits serving these areas where the isolated equipment grounding conductor and IG receptacles are specified. The proposal also clarifies what is already vaguely addressed only in the fine print note to this section. The proposal organizes these into two requirements to clearly distinguish the identification requirement from the number of equipment grounding conductor requirement.
Panel Meeting Action: Reject
Panel Statement: Panel action on Proposal 15-29 makes this proposal unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-29 Log #3004 NEC-P15 **Final Action: Accept**
(517.16)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action on Proposal 15-25.

This action will be considered by the panel as a public comment.
Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

517.16 Receptacles with Insulated Grounding Terminals.

Receptacles with insulated grounding terminals, as described ~~permitted~~ in 250.146(D), shall not be permitted. ~~be identified; such identification shall be visible after installation.~~

~~FPN: Caution is important in specifying such a system with receptacles having insulated grounding terminals, since the grounding impedance is controlled only by the equipment grounding conductors and does not benefit functionally from any parallel grounding paths. This type of installation is typically used where a reduction of electrical noise (electromagnetic interference) is necessary and parallel grounding paths are to be avoided.~~
Substantiation: The very existence of the existing fine print note tells us that that the use of an isolated grounding receptacle is a bad idea in a patient care area. The reduction of electrical noise should not be taken more seriously than protecting the patient, particularly in an invasive procedure area.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-30 Log #3222 NEC-P15 **Final Action: Reject**
(517.16, FPN)

Submitter: Jack E. Jamison, Jr., MEGCO Inspections, Inc. / Rep. WV Division Ohio Chapter
Recommendation: Revise text as follows:

517.16 FPN: Caution is important when specifying such a system with receptacles having insulated grounding terminals since the grounding impedance is controlled only by the insulated grounding conductor and does not benefit functionally from the parallel grounding paths. This type of installation is typically used where the reduction of electric noise (electromagnetic interference) is necessary and parallel grounding paths are to be avoided.

Two insulated equipment grounding conductors are required to be installed in the metallic wiring system of this system to meet the requirements of 250.146(D), 517.13(B), and 517.16.
Substantiation: 250.146(D) allows the isolated equipment grounding conductor to pass unattached through the entire wiring system back to the building service grounding point for use on receptacles with isolated equipment grounding terminal.

517.13(B) Insulated Equipment Grounding Conductors. The grounding terminals of all receptacles and all non current carrying conductive surfaces of fixed electrical equipment likely to become energized that are subject to personnel contacts, operating over 100V, shall be connected an insulated copper equipment grounding conductor sized in accordance with 250.122 and installed in a metal raceway.

517.16 Receptacles with Insulated Grounding Terminals

These three code articles will substantiate the code requirement for two insulated copper equipment grounding conductors in a metallic wiring system for receptacles with insulated equipment grounding terminals in patient care areas of health care facilities.
Panel Meeting Action: Reject
Panel Statement: Panel action on Proposal 15-29 makes this proposal unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-31 Log #4910 NEC-P15 **Final Action: Reject**
(517.17)

Submitter: James Brozek, Acton, MA
Recommendation: Delete 517.17 entirely. This is a companion proposal in association with a proposal covering new 240.27 and 240.28, which consolidates requirements from 246.13, 230.95, 700.26, 215.10, 517.17, and 708.52.
Substantiation: If the proposal for new 240.27 and 240.28 is accepted, 517.17 will no longer be necessary.
Panel Meeting Action: Reject
Panel Statement: While CMP-10 has responsibility for the concept and methods of ground-fault protection for equipment, other CMPs need the flexibility to enact requirements and permissions as appropriate to their areas of responsibility.
Panel 15 is best suited to make decisions regarding GFP for the essential system.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-32 Log #4130 NEC-P15 **Final Action: Accept**
(517.17(A))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(A) Applicability. The requirements of 517.17 shall apply to hospitals and other buildings (including multiple occupancy buildings) with critical care ~~areas~~ rooms or utilizing electrical life support equipment, and buildings that provide the required essential utilities or services for the operation of critical care ~~areas~~ rooms or electrical life support equipment.
Substantiation: To coordinate with the 2010 edition of NFPA 99, and with definitions submitted in other proposals.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word “emergency” from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.
WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-33 Log #18 NEC-P15 **Final Action: Accept in Principle in Part**
(517.17(B))

NOTE: This proposal appeared as Comment 15-20 on Proposal 15-29 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-29 was:
Delete the following text from 517.17(B):
~~The additional levels of ground-fault protection shall not be installed as follows:~~
~~(1) On the load side of an essential electrical system transfer switch~~
~~(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)~~
~~(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase~~
Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: NEMA recommends that Proposal 15-29 be Accept as written.
Substantiation: In order to provide the reliability in the essential electrical system that the CMP wants, multiple levels of GFP (ground fault protection) must be provided for the following reasons:
1. Ground faults are the most common form of faults in a operating electrical system. Multiple levels of GFP on both the normal and alternate source sides of the system are needed to isolate such faults as close to their point of occurrence as possible, thus providing a level of selective coordination and yielding the minimum disruption to the essential electrical system. It would seem that minimizing such disruption is even more important when a ground fault has occurred.
2. Closing a transfer switch or a generator into a ground fault presents the real possibility of damaging the transfer switch, or generator, or both, thus potentially decreasing system reliability.
As Mr. Wiseman pointed out in his negative comment, the panel statement is incorrect. The proposed deletion does not establish a conflict. The conflict is in the existing language since the additional level of ground-fault protection is prohibited in portions of the essential electrical system that could be fed from the alternate power source, while Article 700 actually permits ground-fault protection at the source. There is no substantiation that deviating from the requirement in Article 700 for ground-fault protection enhances the reliability of the system.
The panel statement suggests that most generators are small and, therefore, the risk of burn-down is not an issue. That statement may be accurate, but has no relevance to this discussion since the requirement for ground-fault protection is triggered by the size of the service disconnect in 230.95 or the feeder in 215.10. Therefore, the smaller generators which do not include a feeder disconnect rated 1000A or greater are not required to have ground-fault protection.
There has been no evidence presented or substantiation presented in the panel statement that supports rejecting this proposal.
Panel Meeting Action: Accept in Principle in Part
Merge introductory phrase and (1), to read (in total): “The additional levels of ground-fault protection shall not be installed on the load side of an essential system transfer switch”.
Delete (2) and (3), entirely.
Panel Statement: Subsections (2) and (3) address situations in which first -level ground-fault protection (GFPE) is not required by the code. Therefore, second -level GFPE could never be required, and exempting it is unnecessary. Eliminating (2) permits multiple levels of (GFPE) ahead of the transfer switch when the choice is made to provide GFPE on the alternate source. In this case, the second level of GFPE will greatly assist in needed coordination.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-34 Log #19 NEC-P15 **Final Action: Reject**
(517.17(B))

NOTE: This proposal appeared as Comment 15-21 on Proposal 15-29 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-29 was:
Delete the following text from 517.17(B):
~~The additional levels of ground-fault protection shall not be installed as follows:~~
~~(1) On the load side of an essential electrical system transfer switch~~
~~(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)~~
~~(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase~~
Submitter: Eugene E. Morgan, Clakamas County, Building Codes Divison
Recommendation: Panel 15 should reconsider the merits of this proposal. The submitter’s intent could be met and clarified with a revision of existing and new text, rather than a deletion as originally proposed:
517.15(B) Feeders. Revise last sentence of main paragraph as follows and add new text:
The additional levels of ground-fault protection shall not be ~~installed as follows~~: required on the following systems:
(1) On the load side of an essential electrical system transfer switch, where the alternate power source is 750 kVA or less
(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es), where the alternate power source is 750 kVA or less
(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase
Essential electrical systems where the alternate power source is rated over 750 kVA, and the system is designed under qualified engineering supervision, shall be permitted to have ground-fault protection. Where the alternate power source is 750 kVA or less, ground-fault detection shall be provided in accordance with 700.7(D), and shall include detection at the second level of feeders as specified in this section.
Substantiation: I respectfully disagree with the panel’s action and statement on three points:
(1) The original submittal, and the comment submitted herewith are not in conflict with 700.7(D), which provides for ground-fault detection. Article 700 provides for ground-fault detection, but it does not prohibit the use of ground-fault protection.
(2) Section 700.26 states that ground-fault protection shall not be required, but it is not prohibited.

(3) There is a trend toward larger regional hospitals with generators that exceed 1 megawatt of output. The original proposal gave the example of an 8 megawatt installation. In the jurisdiction that I serve, there is a new hospital generator system installation rated at 4.5 megawatts. The argument that a majority of hospitals have smaller alternate power sources does not answer the need for safety in the newer, larger installations. In the 4.5 megawatt system installed locally, the available fault current at the first transfer switch is 51,800 amps. The potential for a system meltdown in the event of a fault actually exceeds the fault current and potential damage from the utility transformers.

There should be some valid point at which ground-fault protection is needed. It is true that small alternate power sources should have ground-fault detection, and not ground-fault protection. The distinction between systems over 750 kVA (typically 1 megawatt or larger), and those 750 kVA or under, distinguishes between systems where available fault current would be significant. With the revision outlined above, the provision for an engineer to utilize ground-fault protection is available, but it is clearly at the engineer's discretion and not mandatory. This is also an opportunity to point out that Section 700.7(D) provides for ground-fault detection, which should always be installed when ground-fault protection is not an option.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 15-33.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-35 Log #20 NEC-P15 **Final Action: Accept in Principle in Part**

(517.17(B))

NOTE: This proposal appeared as Comment 15-22 on Proposal 15-29 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-29 was:

Delete the following text from 517.17(B):

~~The additional levels of ground-fault protection shall not be installed as follows:~~

~~(1) On the load side of an essential electrical system transfer switch~~

~~(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)~~

~~(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase~~

Submitter: Alan Manche, Square D Co.

Recommendation: The Panel should reconsider Proposal 15-29 and Accept it.

Substantiation: In order to provide the reliability in the essential electrical system that the CMP wants, multiple levels of GFP (ground fault protection) must be provided, once the first level is provided, for the following reasons:

1. Ground faults are the most common form of faults in an operating electrical system. Multiple levels of GFP on both the normal and alternate source sides of the system are needed to isolate such faults as close to their point of occurrence as possible, thus providing a level of selective coordination and yielding the minimum disruption to the essential electrical system. It would seem that minimizing such disruption is even more important when a ground fault has occurred.

2. Closing a transfer switch or a generator into a ground fault presents the real possibility of damaging the transfer switch, or generator, or both, thus potentially decreasing system reliability.

As Mr. Wiseman pointed out in his negative comment, the panel statement is incorrect. The proposed deletion does not establish a conflict. The conflict is in the existing language since the additional level of ground-fault protection is prohibited in portions of the essential electrical system that could be fed from the alternate power source, while NEC 700 actually permits ground-fault protection at the source. There is no substantiation indicating a need to amend NEC Article 700 for NEC 517 installations nor is there substantiation that disallowing a properly installed ground-fault protection system will enhance the reliability of the system.

The panel statement suggests that most generators are small and therefore the risk of burn-down is not an issue. That statement may be accurate but has no relevance to this discussion since the requirement for ground-fault protection is triggered by the size of the service disconnect in 230.95 or the feeder in 215.10. Therefore, the smaller generators which do not include a feeder disconnect rated 1000A or greater are not required to have ground-fault protection, and this revision would have no impact on them.

There has been no evidence presented or substantiation presented in the panel statement that supports rejecting this proposal.

Panel Meeting Action: Accept in Principle in Part

See panel action on Proposal 15-33. This proposal is identical to proposal 15-33.

Panel Statement: See the panel action and statement on Proposal 15-33. This proposal is identical to Proposal 15-33.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-36 Log #2221 NEC-P15 **Final Action: Reject**

(517.17(B))

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: 517.17 Ground-Fault Protection. (B) Feeders. Delete the text as follows:

"...~~The additional levels of ground-fault protection shall not be installed as follows: (1) On the load side of an essential electrical system transfer switch (2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es) (3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase~~."

Substantiation: If the intent is to achieve maximum reliability with the lowest impact to the distribution system during ground faults, such as system-wide black-outs, the prohibition of this overcurrent protection technology is questionable at best. This issue was put on HOLD in the previous code-change cycle and should be carefully re-considered for the 2011 NEC edition.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on proposal 15-33.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-37 Log #4313 NEC-P15 **Final Action: Reject**

(517.17(B))

Submitter: James R. Duncan, Sparling, Inc.

Recommendation: Revise text as follows:

517.17(B) Feeders. Where ground-fault protection is provided for operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load. Such protection shall consist of overcurrent devices and current transformers or other equivalent protective equipment that shall cause the feeder disconnecting means to open.

The additional levels of ground-fault protection shall not be ~~installed~~ required as follows:

(1) On the load side of an essential electrical system transfer switch where the alternate power source overcurrent protective device is rated 1000 amperes or more.

(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es) where the alternate power source overcurrent protective device is rated 1000 amperes or more.

(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase. Essential electrical systems where the alternate power source overcurrent protective device is rated 1000 amperes or more and the system is designed under engineering supervision, shall be permitted to have ground-fault protection.

Substantiation: There is a trend toward larger regional hospitals with generators that exceed 2 megawatts of output where there is the potential for a system meltdown in the event of a large ground fault. This proposal provides the provision for an engineer to utilize ground-fault protection at the engineer's discretion. Multiple levels of GFP on both the normal and alternate source sides of large systems may be needed to isolate such faults as close to their point of occurrence as possible, thus providing a level of selective coordination and yielding the minimum disruption to the essential electrical system.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 15-33.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-38 Log #21 NEC-P15 **Final Action: Reject**
(517.17(B)(2))

NOTE: This proposal appeared as Comment 15-23 on Proposal 15-29 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-29 was:
Delete the following text from 517.17(B):
~~**The additional levels of ground-fault protection shall not be installed as follows:**~~
~~**(1) On the load side of an essential electrical system transfer switch**~~
~~**(2) Between the on-site generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)**~~
~~**(3) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase**~~
Submitter: Hugh O. Nash, Jr., Nash Lipsey Burch, LLC
Recommendation: Continue to reject 15-29 which applies to 517.17 Ground-Fault Protection. Add the following sentence to 517.17(B)(2):
For solidly grounded wye-emergency systems of more than 150 volts to ground and circuit-protective devices rated 1000 or more, refer to 700.7(D).
(Note: The intent is to refer to the language in the 2005 edition. If this wording is deleted, the entire text of 517.17(B)(2) shall be added here.)
Substantiation: Regardless of the size of the alternate source, ground-fault interruption on the alternate source overcurrent device can cause interruption of the alternate source feed to health care facility essential system loads. Automatic disconnecting should not be provided under any circumstances. 517.17(B) states, "The additional levels of ground-fault protection shall not be installed as follows: (1) On the load side of the essential electrical system transfer switch, (2) Between the onsite generating unit as described in 517.35(B) and the essential electrical system transfer switch(es). For many years, 517.17 warned against placing GFP interruption between the alternate source and the transfer switch(es). This warning has now become a prohibition. There are documented instances where GFP interrupted the normal source and the alternate source, leaving critical care areas without normal or alternate power.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 15-33.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-39 Log #685 NEC-P15 **Final Action: Reject**
(517.17(B)(6))

Submitter: Marcelo Valdes, GE
Recommendation: Revise text to read as follows:
(B) Feeders. Where ground-fault protection is provided for operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load. Such protection shall consist of overcurrent devices and current transformers or other equivalent protective equipment that shall cause the feeder disconnecting means to open.
The additional levels of ground-fault protection shall not be installed as follows:
(3) On the load side of an essential electrical system transfer switch
(4) Between the onsite generating unit(s) described in 517.35(B) and the essential electrical system transfer switch(es)
(5) On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground but not exceeding 600 volts phase-to-phase
(6) On feeders where the ground fault selectivity requirements defined in 517.17(C) are met by the feeder's phase protection without the need for the additional level of dedicated ground fault protection.
Substantiation: The addition of this fourth exception recognizes the fact that phase and ground fault protection work together. If the feeder disconnect device is small enough, it may offer perfectly selective ground fault protection without the need for a dedicated GF relay function at that level. Forced inclusion of the GF relay in a small feeder makes it very difficult or impossible to achieve a third layer of ground fault or phase selectivity causing unnecessary nuisance trips of the feeder device in systems that would otherwise be selective and meet the protection and selectivity requirement intent of the code.
Note: Supporting Material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Two levels of GFP using GFPE are easily verifiable in the field and should not be prohibited. The submitter's proposal prohibits this arrangement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-40 Log #686 NEC-P15 **Final Action: Accept in Principle**
(517.17(C))

Submitter: Marcelo Valdes, GE
Recommendation: Revise text to read as follows:
(C) Selectivity. Ground-fault protection for operation of the service and feeder disconnecting means shall be fully selective such that the feeder device, but not the service device, shall open on ground faults on the load side of the feeder device. ~~A six cycle minimum separation between the service and feeder ground fault tripping bands shall be provided.~~ Separation of time bands shall conform to manufacturer's recommendations and shall consider all required tolerances and disconnect device operating time~~. Operating time of the disconnecting devices shall be considered in selecting the time spread between these two bands~~ to achieve 100 percent selectivity.
Substantiation: The 6-cycle separation requirement is not universally required and is a carryover from the days of electromechanical relays operating on separate switching mechanisms. In most cases today, ground fault protection is integral to the disconnect devices upon which the GF relay operates. Manufacturer's curves include all applicable tolerances and mechanical operating time. It is not required to add artificial clearance between curves. Adding artificial delays where they are not required complicates the process of designing selective systems and slows down protection unnecessarily, potentially increasing exposure to arc flash hazard. System design and system analysis engineers should understand how coordination between devices is achieved and routinely consider manufacturer's recommendations in the selection and setting of protective devices.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Selectivity. Ground-fault protection for operation of the service and feeder disconnecting means shall be fully selective such that the feeder device, but not the service device, shall open on ground faults on the load side of the feeder device. Separation of ground-fault protection time current characteristics shall conform to manufacturer's recommendations and shall consider all required tolerances and disconnect operating time to achieve 100 percent selectivity."
Panel Statement: The panel contends that the revised wording clarifies and simplifies the language and meets the intent of the submitter.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-41 Log #4164 NEC-P15 **Final Action: Reject**
(517.17(C))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(C) Selectivity. Ground-fault protection for operations of the service and feeder disconnecting means shall be fully selective such that the downstream device, not the upstream device, ~~feeder device, but not the service device~~, shall open on ground faults on the load side of the downstream ~~feeder~~ device. A six-cycle minimum separation between the service and feeder ground-fault tripping bands shall be provided. Operating time of the disconnecting devices shall be considered in selecting the time spread between these two bands to achieve 100 percent selectivity.
Substantiation: The manner in which the present text is written would only apply selectivity for the service overcurrent protective device and the feeder device but, where an over 600 volt service occurs, the first GFP device may be the feeder device at the secondary of a high voltage primary with a 480/277 volt secondary. The next level down would also be a GFP so the selectivity text must be written to also cover this application.
Panel Meeting Action: Reject
Panel Statement: The panel contends that the original language is more appropriate. The submitter failed to identify what problem he is attempting to resolve.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-42 Log #644 NEC-P15 **Final Action: Reject**
(517.17(C), FPN No. 2)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: Add new text to read as follows:
FPN No. 2: Where two-step ground-fault relaying is provided, it is important to consider the operating characteristics of the overcurrent protection provided for the service, feeder and branch circuits in order to achieve the 100 percent selectivity required by this section.
Substantiation: 100 percent selectivity is not always achieved by having a six or more cycle separation between the service and feeder ground-fault protection tripping bands, due to the fact that the service, feeder and downstream branch-circuit overcurrent devices may not be selectively coordinated.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 15-40, which satisfies the submitters concerns.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-43 Log #3930 NEC-P15 **Final Action: Reject**
(517.17(E))

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Add a new (E) to Section 517.17
(E) Restraint. Ground fault relays on the normal source side (line side of the transfer switch) that supply essential electrical systems are permitted to be restrained from operating for ground faults on the loadside of the transfer switch if the system complies with both of the following:
(1) Ground fault protection relays on the normal source side (line side of the transfer switch) are not restrained from operation for ground faults on the normal source side (line side of the transfer switch)
(2) Audible and visual signal devices indicate whenever a ground fault relay has been restrained. Instructions on the course of action to be taken in the event of an indicated ground fault shall be located at or near the sensor location.
Substantiation: For life-safety purposes and system reliability for the prevention of blackouts, it is desirable that a ground-fault on the load side of a transfer switch in an essential electrical system not take out the ground fault protection on the normal source. This proposal allows the ground fault protection on the normal source to be restrained from operating and taking down all or large portions of the entire normal system because of a ground fault on the load side of the transfer switch. For these critical life-safety-related applications, it requires both audible and visual signaling that a ground fault has occurred and that it is being restrained.
Restraining the normal system ground fault protection relays for faults on the load side of the transfer switch is consistent with the concept of continuity of service for emergency systems (700.26 & 700.7(D)), legally required standby systems (701.17), and healthcare essential electrical systems (517.17(B))
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: It is unclear how the proposed restrained GFP improves performance and reliability.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-44 Log #4128 NEC-P15 **Final Action: Accept in Part**
(517.18(A))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(A) Patient Bed ~~Location~~ Room. Each patient bed ~~location~~ room shall be supplied by at least two branch circuits,one from the ~~emergency system~~ critical branch and one from the normal system. All branch circuits from the normal system shall originate in the same panelboard.
Exception No. 3: A general care patient bed ~~location~~ room served from two separate transfer switches on the ~~emergency system~~ critical branch shall not be required to have circuits from the normal system.
Substantiation: To coordinate with the 2010 edition of NFPA 99. See previous proposals on definitions by the same submitter for further rationale.
Panel Meeting Action: Accept in Part
Retain "location" (3 places).
(A) Patient Bed Location. Each patient bed location shall be supplied by at least two branch circuits, one from the ~~emergency system~~ critical branch and one from the normal system. All branch circuits from the normal system shall originate in the same panelboard.
Exception No. 3: A general care patient bed location served from two separate transfer switches on the ~~emergency system~~ critical branch shall not be required to have circuits from the normal system.
Panel Statement: "Patient bed location" is needed when defining requirements for number of circuits or number of receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-45 Log #1504 NEC-P15 **Final Action: Accept**
(517.18(A) and 517.19(A))

Submitter: Patrick J. Clancy, Clancy Electric
Recommendation: Add new second paragraph to read as follows:
517.18(A) & 517.19(A): The branch circuit serving patient bed locations shall not be part of a multi-wire branch circuit.
Substantiation: The reason is because of the new requirements in 210.4 that required handle ties or 2 or 3 pole breakers to be used. This will cause more than one patient room to lose power. A problem that one room can shut off other patient room equipment, which will cause patients to not get the treatment needed. There are some pieces of equipment that operate from batteries, but the batteries have failed at times. The time it takes for a nurse to get to three could cause the patient to be injured or die.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-46 Log #2796 NEC-P15 **Final Action: Accept**
(517.18(B))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(B) Patient Bed Location Receptacles. Each patient bed location shall be provided with a minimum of four receptacles. They shall be permitted to be of the single, duplex, quad plex, or any combination of the three, ~~or duplex types or a combination of both~~. All receptacles, whether four or more, shall be listed "hospital grade" and so identified. The grounding terminal of each receptacle shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table 250.122.
Substantiation: Delete the phrase "or duplex or a combination of both" and replace it with, "duplex, quad-plex, or any combination of the three". "Hospital grade" quad receptacles are available on the market and should be permitted in these locations. Installing a quad receptacle as a replacement for a single or a duplex, especially where a single gang plaster ring has been installed, would provide the hospital maintenance with an option of not tearing out the plaster ring to replace it with a two gang plaster ring. It would permit double the number of receptacles at a single outlet without compromising safety. With the present wording in the Code, this installation would not be legal.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-47 Log #2948 NEC-P15 **Final Action: Reject**
(517.18(B))

Submitter: James Harvey, University of Michigan Hospitals / Rep. Manager of Electrical Engineering
Recommendation: Revise text to read as follows:
Each patient bed location shall be provided with a minimum of four receptacles. Fifty percent (50%) of these receptacles shall be on the emergency branch circuit, and the remaining 50% shall be connected to the normal power circuit.
Substantiation: If the patient bed location has a need for a given number of receptacles, that number needs to be available at all times. By requiring that 50% are on one circuit, and 50% are on another circuit, the probability of having the needed power at the bed location is increased. Under current wording engineers will often put a disproportionate number on one of the circuits (usually the normal power circuit), and an insufficient number on the other branch circuit (typically the emergency power circuit). If the normal power circuit is lost for whatever reason, insufficient receptacles are available to maintain the patient. This often results in the use of extension cords, or other means, inconsistent with the requirements of the life safety codes and other codes.
Panel Meeting Action: Reject
Panel Statement: The decision of splitting up of receptacles between the emergency branch and the normal branch should be made between the owner and designer. The code should not specify performance or design criteria. The code does not prohibit a 50/50 split of normal and emergency.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-48 Log #4127 NEC-P15 **Final Action: Reject**
(517.18(B))

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(B) Patient Bed ~~Location~~ Room Receptacles. Each patient bed ~~location~~ room shall be provided with a minimum of four receptacles. They shall be permitted to be of the single or duplex types or a combination of both.
Substantiation: To coordinate with the 2010 edition of NFPA 99. See previous proposals by the same commenter regarding definitions for further substantiation.
Panel Meeting Action: Reject
Panel Statement: “Patient bed location” is needed when defining requirements for number of circuits or number of receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-49 Log #4165 NEC-P15 **Final Action: Accept**
(517.18(B))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(B) Patient Bed Location Receptacles. Each patient bed location shall be provided with a minimum of four receptacles. They shall be permitted to be of the single, duplex, quad plex, or any combination of the three, ~~or duplex types types or a combination of both~~. All receptacles, whether four or more, shall be listed “hospital grade” and so identified. The grounding terminal of each receptacle shall be connected to an insulated copper equipment grounding conductor sized in accordance with Table 250.122.
Substantiation: Delete the phrase “or duplex or a combination of both” and replace it with, “duplex, quad-plex, or any combination of the three”. “Hospital grade” quad receptacles are available on the market and should be permitted in these locations. Installing a quad receptacle as a replacement for a single or a duplex, especially where a single plaster ring has been installed, would provide the hospital maintenance with an option of not tearing out the plaster ring to replace it with a two gang plaster ring. It would permit double the number of receptacles at a single outlet without compromising safety. With the present wording in the Code, this installation would not be legal.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-50 Log #2184 NEC-P15 **Final Action: Accept**
(517.18(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its action on Proposal 15-53.
This action will be considered by the panel as a public comment.
Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Add the word “designated” and change the word “wards” to “locations” as shown here.
(C) Pediatric Locations. Receptacles located within the rooms, bathrooms, playrooms, activity rooms, and patient care areas of designated pediatric ~~wards~~ locations shall be listed tamper resistant or shall employ a listed tamper resistant cover.
Substantiation: The word “ward” is not defined in the NEC, and several referenced dictionaries describe “ward” as being a portion of a hospital. By using a less specific term here, the possibility of NOT applying the requirements found in this section is reduced and the code intent is clarified. Also, by adding the word “designated” it clarifies that the focus of this code section is for those areas that are intended by the governing body of the health care facility for pediatric treatment rather than those areas which incidental services to pediatric patients. These changes would help clarify the code application for designers, installers, and inspectors.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-51 Log #2271 NEC-P15 **Final Action: Accept**
(517.18(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its action on Proposal 15-53.
This action will be considered by the panel as a public comment.
Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Add the word “designated” and change the word “wards” to “locations” as shown here.
(C) Pediatric Locations. Receptacles located within the rooms, bathrooms, playrooms, activity rooms, and patient care areas of designated pediatric ~~wards~~ locations shall be listed tamper resistant or shall employ a listed tamper resistant cover.
Substantiation: The word “ward” is not defined in the NEC, and several referenced dictionaries describe “ward” as being a portion of a hospital. By using a less specific term here, the possibility of NOT appropriately applying the requirements found in this section is reduced and the code intent is clarified. Also, by adding the word “designated” it clarifies that the focus of this code section is for those areas that are intended by the governing body of the health care facility for pediatric treatment rather than those areas which provide incidental services to pediatric patients. These changes would help clarify the code application for designers, installers, and inspectors.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-52 Log #2956 NEC-P15 **Final Action: Reject**
(517.18(C))

Submitter: Fred W. Brown, HI Electron
Recommendation: Change 517.18(C) to read:
(C) Pediatric Locations. Receptacles located within the rooms, bathrooms, playrooms, activity rooms, and patient care areas of pediatric wards shall be listed tamper resistant, ~~or~~ shall employ a listed tamper resistant cover, or Electrical-Fault Circuit-Interrupter (EFCI) type.
Substantiation: U.S. Consumer Product Safety Commission (CPSC) conducted a 10 year study (1991 – 2001) of National Electronic Injury Surveillance Systems (NEISS). The data shows 24,000+ children less than 10 years old were treated in Emergency Rooms for incidents related to electrical receptacles. A similar study done by Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) 8 Year Study (1996-2003) from 14 CHIRPP Hospitals 465 children less than 9 years old were treated in Emergency Rooms for incidents related to electrical receptacles. The National Electrical Code, NFPA 70 2005 & 2008, has added requirements for tamper resistant receptacles in dwellings and Health Care pediatric areas. Electrical-Fault Circuit-Interrupter (EFCI) type receptacles give an additional type of protection to children and persons.

GFCI outlets and breakers are designed and tested to prevent death for most adults from line to ground leakage, but do not protect against death from line to neutral contact. Young adults, older adults, and children have a lower resistance to electrical current affects and are more vulnerable to injury. Tamper Resistance Receptacles are not tamperproof. These receptacles provide a reasonable means of protection against shock but are not child or foolproof.

Protection from line-to-neutral shocks is needed around children, since they do not all recognize the shock hazards and risks. Tamper Resistance outlets use a mechanical insulating shutter system to shield children from accessing live voltages on electrical receptacle sockets. Electrical-Fault Circuit-Interrupter (EFCI) uses a relay to normally disconnect electricity at the receptacle sockets. EFCI only turns electricity on at the socket when it detects the insertion of an electrical plug. The detection mechanism is an RFID tag embedded in a device plug or attached to the face of a device plug that complies with the Right Plug standard. Both Tamper Resistance and EFCI outlets provide a reasonable means of preventing line-to-neutral shocks. If proper receptacle installation is not accomplished then it may lead to more children injuries.

In the 2008 National Electrical Code Arc-Fault Circuit-Interrupter (AFCI) has been expanded to protect most 120 volt, single phase, 15 and 20 ampere branch circuits in dwelling units. AFCI technology senses parallel arcing faults in the range of 70 amperes, series arcing faults in the range of 5 amperes, and de-energize the branch circuit. Electrical-Fault Circuit-Interrupter (EFCI) would greatly improve the protection of persons and property from the use of electricity. This type of protection would help to minimize the risk of fires in dwelling units. Their sensitivity to some electrical fault conditions would be to isolate the dangerous causes of electrical fires.

During the 1999 National Electrical Code cycle there were extensive documentation presented that pointed out that most of the electrical fires that occurred in dwelling units were in wiring and equipment beyond the branch circuit overcurrent protection device. Overcurrent protection devices are to protect conductors and equipment if currents reach a value that will cause an excessive or dangerous temperature in conductors or conductor insulation. This protection is for large currents caused by short circuit, ground faults, or overloads. Article 210.19(A)(4) in the National Electrical Code (NEC) recognizes the use of ‘tap conductors’ connected to branch circuits. Tap conductors have overcurrent protection ahead of its point of supply that exceeds the value permitted for branch circuit conductors that are protected according their calculated load and allowable ampacity. Article 210.19(A)(4) Exception No. 2 allows small than 14 AWG cords where approved for and used with a specific listed appliance or luminaire. Article 310.5 in the NEC requires the minimum size conductor to be 14 AWG copper except as permitted elsewhere in the Code. The article “How Electricity Ignites Fires by John S. Robison” points out that currents far less than the design limits of branch circuit overcurrent protection devices and AFCIs are some of the causes for fires in electrical equipment, wiring, appliance cords, and other cords.

Electrical-Fault Circuit-Interrupter (EFCI) senses a lower level of fault and overload current conditions than branch circuit protection devices and AFCIs. The article "Stop Fires Before They Start by Steve Montgomery" points out that EFCI provide protection against over and under voltage, open neutral conductors, high resistance connections, damage wiring, overloading of small appliance cords, etc. that branch circuit overcurrent protection devices and AFCIs might not protect against. Even with the increased sensitive the EFCI they will not be a cause of nuisance tripping. EFCI detect a potential cause of electrical fires and safely segregate it.

A proposal similar to this was submitted to the State of Wisconsin Electrical Committee during the adoption of the 2008 National Electrical Code and to National Fire Protection Health Care (NFPA 99-82 Log #197 HEA-ELS, 4.3.2.2.6.2(D) **Receptacles for Special Area**) 2010. Both of these committees were supportive of this new technology but felt that this requirements belonged elsewhere. The State of Wisconsin Department of Commerce felt that the EFCI requirement should best be adopted at the National Fire Protection was more appropriate for NFPA 70.

Panel Meeting Action: Reject

Panel Statement: There are no product requirements for Electrical-Fault Circuit-Interrupter Protection. The Fact-Finding Investigations submitted by the two testing laboratories (CSA and Intertek) appear to be only test programs designed by the product manufacturer. They conclude that Safe Plug performs as specified by the manufacturer. A thorough study of wiring device failure mechanisms, and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the Code. Installation of these devices is not currently prohibited by the NEC.

In addition, the features proposed for receptacle power denial and overload protection of the cords are issues that would be under the jurisdiction of CMP-18 and CMP-10 respectively.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-53 Log #4126 NEC-P15 **Final Action: Accept in Part**

(517.18(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its actions on Proposals 15-50 and 15-51.

In addition, the Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Revise text to read as follows:

(C) Pediatric Locations. Receptacles located within the rooms, bathrooms, playrooms, <u>and</u> activity rooms~~, and patient care areas~~ of pediatric ~~wards~~ <u>units, other than nurseries,</u> shall be listed tamper resistant or shall employ a listed tamper resistant cover.

Substantiation: This proposal came out of the public comments for the NFPA 99 Technical Systems Technical Committee, and in recognition of real-world performance issues in health care facilities. It is based on the fact that hospitals are no longer built with wards. It also recognizes that in nurseries, the hazard of children playing with outlets is much less than in room occupied by older children. This requirement was carefully word-smithed by our committee of many engineers who design and operate hospitals around the country, with the great assistance of the physician who sits on our committee. This proposal is a performance requirement that will appear as proposed here in the next edition of NFPA 99, and it is crucial that NFPA 70 coordinate with this language to avoid confusion.

Panel Meeting Action: Accept in Part

The action is to accept the insertion of the terms "other than nurseries" and to reject all other changes. In order to correlate with action on proposal 15-50 part (C) the remaining will be edited as follows:

Retain the text:

(C) Pediatric Locations. Receptacles located within the rooms, bathrooms, playrooms, activity rooms, and patient care areas of <u>designated</u> pediatric ~~wards~~ <u>locations, other than nurseries,</u> shall be listed tamper- resistant or shall employ a listed tamper resistant cover.

Panel Statement: The panel agrees with the submitter's substantiation to exempt nurseries. The panel action also coordinates this proposal with the action taken on Proposal 15-50.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-54 Log #2949 NEC-P15 **Final Action: Reject**

(517.19(B))

Submitter: James Harvey, University of Michigan Hospitals / Rep. Manager of Electrical Engineering

Recommendation: Revise text to read as follows:

Each patient bed location shall be provided with a minimum of six receptacles,~~ at least one~~ fifty percent (50%) of which shall be connected to ~~either~~ each of the following:

(1) The normal system branch required in 517.19(A)

(2) An emergency system branch supplied circuit supplied by a different transfer switch than the other receptacles at the same location.

Substantiation: If the critical care patient bed location has a need for a given number of receptacles, that number needs to be available at all times. By requiring that 50% are on one circuit, and 50% are on another circuit, the probability of having the needed power at the bed location is increased. Under current wording engineers will often put a disproportionate number on one of the circuits (usually the normal power circuit) and an insufficient number on the other branch circuit (typically the emergency power circuit). If the normal power circuit is lost for whatever reason, insufficient receptacles are available to maintain the patient. This often results in the use of extension cords, or other means, inconsistent with the requirements of the life safety codes and other codes.

Panel Meeting Action: Reject

Panel Statement: The decision of splitting up of receptacles between the emergency branch and the normal branch should be made between the owner and designer. The code should not specify performance or design criteria. The code does not prohibit a 50/50 split of normal and emergency.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-55 Log #4125 NEC-P15 **Final Action: Accept in Part**

(517.19(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its actions on Proposals 15-57 and 15-58.

In addition, the Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Revise text to read as follows:

(B) Patient Bed ~~Location~~ <u>Room</u> Receptacles.

(1) Minimum Number and Supply. Each patient bed location shall be provided with a minimum of ~~six~~ <u>fourteen</u> receptacles, at least ~~one~~ <u>four</u> of which shall be connected to either of the following:

(1) The normal system branch circuit required in 517.19(A)

(2) A~~n emergency system~~ <u>critical branch</u> circuit supplied by a different transfer switch than the other receptacles at the same location

(2) Receptacle requirements. The receptacles required in 517.19(B)(1) shall be permitted to be of the single or duplex types or a combination of both. All such receptacles shall be listed "hospital grade" and shall be so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.

Substantiation: This proposal came out of the public comments for the NFPA 99 Technical Systems Technical Committee, and in recognition of real-world performance issues in health care facilities. This requirement reflects the growing need for cord-and-plug equipped electro-medical equipment in operating rooms today. This requirement was carefully word-smithed by our committee of many engineers who design and operate hospitals around the country, with the great assistance of the physician who sits on our committee. This proposal is a performance requirement that will appear as proposed here in the next edition of NFPA 99, and it is crucial that NFPA 70 coordinate with this language to avoid confusion.

Panel Meeting Action: Accept in Part

Retain "location" in title of (B).

(B) Patient Bed <u>Location</u> Receptacles.

(1) Minimum Number and Supply. Each patient bed location shall be provided with a minimum of ~~six~~ <u>fourteen</u> receptacles, at least ~~one~~ <u>four</u> of which shall be connected to either of the following:

(1) The normal system branch circuit required in 517.19(A)

(2) A~~n emergency system~~ <u>critical branch</u> circuit supplied by a different transfer switch than the other receptacles at the same location

(2) Receptacle Requirements. The receptacles required in 517.19(B)(1) shall be permitted to be of the single or duplex types or a combination of both. All such receptacles shall be listed "hospital grade" and shall be so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.

Panel Statement: "Patient bed location" is needed when defining requirements for number of circuits or number of receptacles.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-56 Log #1738 NEC-P15 **Final Action: Reject**
(517.19(B)(2))

Submitter: Mark Christian, Hixson, TN
Recommendation: Add new text to read as follows:
Receptacles shall have an integral light indicating the receptacle is powered or be part of a listed headwall assembly that provides indication of power to each receptacle.
Substantiation: Acceptance of this proposal would provide visual indication to medical staff that normal or emergency power is available from a receptacle for critical medical equipment. This would assist personnel in knowing whether or not an equipment issue is related to the equipment or the power source, thereby facilitating faster responses to loss of equipment function. If power is lost to a receptacle, medical staff could quickly identify receptacles that continue to be active or supplied by emergency sources.
Although critical equipment may be provided with indicator lights that depict the unit is connected to the electrical supply, these indicators would not readily demonstrate which receptacle can be used to ensure further operation. Critical equipment is often accompanied by a battery backup. While the battery backup will sustain equipment operation for a certain time, the element of time is important. Assuming that a power interruption may affect several rooms at one time, the lighted receptacle will facilitate personnel in locating active receptacles in less time, and provide medical staff with time to tend to multiple patients or other situations that occur.
Lighted receptacles on the market today use LEDs for power indication. LEDs are known to have very long lives, which is a key selling point for the many new LED lighting products. In the very rare event that an indicator light fails, medical personnel could use indicators on the equipment to verify that it is still operating from the electrical supply source.
The receptacle indicator lights, while readily visible, are sufficiently subdued that they should not disturb patients. General lighting in critical care areas are much more of a distraction than tiny LEDs with minimal output. The LED, while intended as a safety feature, may also limit the number of times medical staff has to use general lighting to plug a cord into a receptacle to verify power access, therefore, not having to disturb the patient when connecting or moving equipment.
Panel Meeting Action: Reject
Panel Statement: There has been no new compelling substantiation of the need submitted for this requirement since this same proposal was rejected in the 2008 cycle. See Comment 15-26 (on Proposal 15-34) in the 2008 cycle. This proposal is performance criteria and therefore the submitter should make a proposal to NFPA 99.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-57 Log #2797 NEC-P15 **Final Action: Accept**
(517.19(B)(2))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its action on Proposal 15-55.
This action will be considered by the panel as a public comment.
Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(B) Patient Bed Location Receptacles.
(1) Minimum Number and Supply. Each patient bed location shall be provided with a minimum of six receptacles, at least one of which shall be connected to either of the following:
(1) The normal system branch circuit required in 517.19(A)
(2) An emergency system branch circuit supplied by a different transfer switch than the other receptacles at the same location.
(2) Receptacle Requirements. The receptacles required in 517.19(B)(1) shall be permitted to be of the single, duplex, quad-plex, or any combination of the three. ~~or duplex types or a combination of both.~~ All receptacles, whether six or more, shall be listed "hospital grade" and so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.
Substantiation: Delete the phrase "or duplex types or a combination of both", and replace it with "duplex, quad-plex, or any combination of the three. "Hospital grade" quad receptacles are available on the market, and should be permitted in these locations: Installing a quad receptacle as a replacement for a single or duplex, especially where a single gang plaster ring has been installed, would provide the hospital maintenance with an option of not tearing out the plaster ting to replace it with a two gang plaster ring. It would permit double the number of receptacles at a single outlet without compromising safety. With the present wording in the Code, this installation would not be legal.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-58 Log #4166 NEC-P15 **Final Action: Accept**
(517.19(B)(2))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its action on Proposal 15-55.
This action will be considered by the panel as a public comment.
Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
(B) Patient Bed Location Receptacles.
(1) Minimum Number and Supply. Each patient bed location shall be provided with a minimum of six receptacles, at least one of which shall be connected to either of the following:
(1) The normal system branch circuit required in 517.19(A)
(2) An emergency system branch circuit supplied by a different transfer switch than the other receptacles at the same location.
(2) Receptacle Requirements. The receptacles required in 517.19(B)(1) shall be permitted to be of the single, duplex, quad-plex, or any combination of the three. ~~or duplex types or a combination of both.~~ All receptacles, whether six or more, shall be listed "hospital grade" and so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.
Substantiation: Delete the phrase "or duplex types or a combination of both" and replace it with "duplex, quad-plex, or any combination of the three". "Hospital grade" quad receptacles are available on the market and should be permitted in these locations. Installing a quad receptacle as a replacement for a single or duplex, especially where a single gang plaster ring has been installed, would provide the hospital maintenance with an option of not tearing out the plaster ring to replace it with a two gang plaster ring. It would permit double the number of receptacles at a single outlet without compromising safety. With the present wording in the Code, this installation would not be legal.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-59 Log #4124 NEC-P15 **Final Action: Accept in Principle**
(517.19(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal to correlate with its action on Proposals 15-57 and 15-58.
The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Add new text to read as follows:
(C) Operating Room Receptacles.
(1) Minimum Number and Supply. Each operating rooms shall be provided with a minimum of thirty six receptacles, at least twelve of which shall be connected to either of the following:
(1) The normal system branch circuit required in 517.19(A)
(2) A critical branch circuit supplied by a different transfer switch than the other receptacles at the same location
(2) Receptacle Requirements. The receptacles required in 517.19(C)(1) shall be permitted to be of the single or duplex types or a combination of both. All receptacles, whether thirty six or more, shall be listed "hospital grade" and so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.
Renumber other paragraphs accordingly.
Substantiation: This proposal came out of the public comments for the NFPA 99 Technical Systems Technical Committee, and in recognition of real-world performance issues in health care facilities. This requirement reflects the growing need for cord-and-plug equipped electro-medical equipment in operating rooms today. This requirement was carefully word-smithed by our committee of many engineers who design and operate hospitals around the country, with the great assistance of the physician who sits on our committee. This proposal is a performance requirement that will appear as proposed here in the next edition of NFPA 99, and it is crucial that NFPA 70 coordinate with this language to avoid confusion.
Panel Meeting Action: Accept in Principle
Revise the text to read as follows:
(C) Operating Room Receptacles.
(1) Minimum Number and Supply. Each operating rooms shall be provided with a minimum of 36 receptacles, at least 12 of which shall be connected to either of the following:
(1) The normal system branch circuit required in 517.19(A)
(2) A critical branch circuit supplied by a different transfer switch than the other receptacles at the same location
(2) Receptacle Requirements. The receptacles required in 517.19(C)(1) shall be permitted to be of the single or duplex types or a combination of both.

All receptacles, whether 36 or more, shall be listed "hospital grade" and so identified. The grounding terminal of each receptacle shall be connected to the reference grounding point by means of an insulated copper equipment grounding conductor.

Renumber other paragraphs accordingly.

Panel Statement: The panel accepts the proposal and made an editorial change by changing rooms to room in the first sentence.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-60 Log #2220 NEC-P15 **Final Action: Accept in Principle**

(517.19(D))

Submitter: Jim Davis, Electrical Education Services, LLC

Recommendation: Revise text to read as follows:

(D) Panelboard Grounding and Bonding. Where a grounded electrical distribution system is used and metal feeder raceway or Type MC or MI cable that qualifies as an equipment grounding conductor in accordance with 250.118 is installed, grounding of a ~~panelboard or switchboard~~ switchboard or panelboard enclosure shall be ensured by one of the following bonding means at each termination or junction point of the metal raceway or Type MC or MI cable:

Substantiation: The definition for "panelboard" in Article 100 makes it clear that **it is actually the cabinet or cutout box (enclosure) that is grounded and bonded** by the feeder wiring method specified in 517.19(D). The "panelboard" is grounded and bonded by adherence to the manufacturer's listing or labeling installation instructions as addressed in 110.3 (B) when the assembly is completed beyond the "rough" installation phase. This proposed addition of one word, and minor rearrangement of words, clarifies what is intended by this section.

Panel Meeting Action: Accept in Principle

Change Title to "Equipment Grounding and Bonding".

Replace "grounding of a panelboard or switchboard" with "grounding of enclosures and equipment such as panelboards and switchboards".

Panel Statement: The new title is more accurate, and will also help avoid confusion with 517.14, which is entitled "Panelboard Bonding".

The panel also contends that the revised wording clarifies and simplifies the language and meets the intent of the submitter.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-61 Log #4123 NEC-P15 **Final Action: Accept**

(517.19(E))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Revise text to read as follows:

(E) Additional Protective Techniques in Critical Care Areas (Optional). Isolated power systems shall be permitted to be used for critical care ~~areas~~ rooms, and, if used, the isolated power system equipment shall be listed as isolated power equipment. The isolated power system shall be designed and installed in accordance with 517.160.

Substantiation: To coordinate with the 2010 edition of NFPA 99. See previous proposals by the same author with respect to the needs for definition changes which drove this proposal.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 2

Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-62 Log #1435 NEC-P15 **Final Action: Accept in Part**

(517.19(F))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: Isolated Power System Equipment Grounding Conductor. Where an isolated ~~ungrounded~~ power system source ~~is used and~~ limits the ~~first~~ fault current to a ~~low magnitude~~ value less than the maximum available fault current acceptable to the authority having jurisdiction, the equipment grounding conductor... (remainder unchanged).

Substantiation: Present wording implies the system is grounded. "Low magnitude" is not defined: if not feasible to specify a value perhaps the AHJ should make the determination. "Ungrounded" and "source" are superfluous.

Panel Meeting Action: Accept in Part

Accept the term "equipment" in two places. Everything else is rejected.

(F) Isolated Power System Equipment Grounding. Where an isolated ungrounded power source is used and limits the first fault current to a low magnitude, the equipment grounding conductor...". (remainder unchanged).

Panel Statement: The panel accepts the addition of the word "equipment" in both places. The system is not grounded intentionally so the word "ungrounded" should remain. The remainder of the proposed changes make this unenforceable as fault current thresholds are established by the healthcare industry and the equipment, not by the AHJ.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-63 Log #2435 NEC-P15 **Final Action: Reject**

(517.20(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.

Recommendation: Revise text to read as follows:

(A) Receptacles and Fixed Equipment. All receptacles and fixed equipment within the area of the wet procedure location shall have ~~ground fault circuit-interrupter~~ power safe protector protection for personnel if interruption of power under fault conditions can be tolerated, or be served by an isolated power system if such interruption cannot be tolerated.

Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.

The Power Safe Protector (PSP) device overcomes these limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.

2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There are no product standard requirements for the PSP receptacle and as such it is inappropriate to consider adding such requirements to the code. A study of wiring device failure mechanisms along with evidence that the technology can mitigate the hazards claimed is necessary before further consideration can be given.

The Panel notes that there is nothing in the NEC prohibiting installation of these devices.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-64 Log #2926 NEC-P15 **Final Action: Accept in Principle**
(517.20(A))

TCC Action: The Technical Correlating Committee directs that the panel reconsider the action taken on this proposal as to whether both list items are required together or individually.
This action will be considered by the panel as a public comment.
Submitter: Burton R. Klein, Burton Klein Associates
Recommendation: Revise wording to read:
"Wet (procedure) location patient care areas shall be provided with special protection against electric shock, either:
(1) A power distribution system that inherently limits the possible ground-fault current due to a first fault to a low value, without interrupting the power supply, or
(2) A power distribution system in which the power supply is interrupted if the ground-fault current does, in fact, exceed a value of 6 mA.
Substantiation: Text currently extracted, paragraphs 4.3.2.2.8.4 and 4.3.2.2.8.5 from NFPA 99, is only partially extracted and incomplete text. It is also a cause of misinterpretation with respect to the phrase "can be tolerated" and "cannot be tolerated." Main issue is what type of system is to be installed in a wet procedure location: one that interrupts power when a certain current flow is reached, or a system that limits possible ground due to first fault but without interrupting power supply. The proposal is wording from paragraph 4.3.2.2.8.1.
Extracted text is not to change the intent of requirements, in this instance the performance criteria intended, per NFPA Extract Policy.
Panel Meeting Action: Accept in Principle
Revise wording to read:
(A) **Receptacles and Fixed Equipment.** Wet procedure location patient care areas shall be provided with special protection against electric shock, either:
(1) A power distribution system that inherently limits the possible ground-fault current due to a first fault to a low value, without interrupting the power supply, or
(2) A power distribution system in which the power supply is interrupted if the ground-fault current does, in fact, exceed a value of 6 mA.
Panel Statement: The panel accepts the proposed changes, however notes that the Title of 517.20(A) has not changed and the exceptions to (A) will remain.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-65 Log #4805 NEC-P15 **Final Action: Accept**
(517.20(A) Exception(b))

Submitter: Leo F. Martin, Jr., Martin Electrical Code Consultants
Recommendation: Revise 517.20(A) Exception (b) to read ALL conductive surfaces of the equipment are connected to an <u>insulated copper</u> equipment grounding conductor.
Substantiation: To comply with the requirements in 517.13(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-66 Log #2436 NEC-P15 **Final Action: Reject**
(517.21)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
517.21 ~~Ground-Fault Circuit-Interrupter~~ <u>Power Safe Protector</u> Protection for Personnel. ~~Ground-fault circuit-interrupter~~ <u>Power safe protector</u> protection for personnel shall not be required for receptacles installed in those critical care areas where the toilet and basin are installed within the patient room.
Substantiation: Changes to maintain code consistency with proposed changes of 517.20(A) change proposal to adopt use of power safe protector in place of GFCI.
Panel Meeting Action: Reject
Panel Statement: There are no product standard requirements for the PSP receptacle and as such it is inappropriate to consider adding such requirements to the code. A study of wiring device failure mechanisms along with evidence that the technology can mitigate the hazards claimed is necessary before further consideration can be given.
The panel notes that there is nothing in the NEC prohibiting installation of these devices.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-66a Log #CP1500 NEC-P15 **Final Action: Accept**
(517.26)

TCC Action: The Technical Correlating Committee directs that the panel add the publication date of the referenced NFPA document to conform with the Manual of Style for NFPA Technical Committee Documents Section 2.4.1.4.4 which requires dates of publication for referenced NFPA documents.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 15,
Recommendation: Add a new fine print note as follows:
FPN: The provisions of NFPA 110, Standard for Emergency and Standby Power Systems, should be considered when designing and installing essential electrical power supply systems.
Substantiation: The panel recognizes the need to reference NFPA 110.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-67 Log #4108 NEC-P15 **Final Action: Reject**
(517.26)

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Delete text to read as follows:
~~**517.26 Application of Other Articles.** The essential electrical system shall meet the requirements of Article 700, except as amended by Article 517.~~
Substantiation: The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, not not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctly so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on,and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and, thus, reduce confusion.
Panel Meeting Action: Reject
Panel Statement: The life safety branch, or at least parts thereof, will be decreed by many (building code, municipalities, etc.) as "emergency", bringing in the requirements of Article 700. Without a modifying statement within Article 517, no deviations from Article 700 will be acceptable, causing issues with number of transfer switches, generator sizing, and perhaps other areas."
See action on Proposal 15-68.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-68 Log #4638 NEC-P15 **Final Action: Accept in Principle**
(517.26)

TCC Action: The Technical Correlating Committee directs that the panel reconsider the panel action on this proposal and correlate it with the action taken on Proposal 15-13.
This action will be considered by the panel as a public comment.
Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows: "The life safety branch of the emergency system shall meet the requirements of Article 700, except as modified by Article 517."
Substantiation: Essential electrical systems have three components, only one of which is pure Art. 700 (the life safety branch). The other half of the "emergency system" is the critical branch, which does not refer to Art. 700 within its definition, and is probably closer to Article 701 (legally required standby) than Article 700. Although it does have the same reconnection time of 10 seconds, it is not allowed to enter a common raceway with circuits on the life safety branch, by 517.30(C)(1). This proposal clarifies that Article 700 is not the appropriate article to include as applicable in its entirety (except as specifically modified here) for the critical branch and certainly not the equipment system. The "equipment system" is plainly not Art. 700 or even Article 701, with numerous permissions for delayed automatic or even manual reconnection to power. This proposal also mitigates the supposed mandatory application of 700.27 in hospital settings.
Panel Meeting Action: Accept in Principle
Revise as follows:
The life safety branch of the <u>essential electrical</u> system shall meet the requirements of Article 700, except as modified by Article 517.
Panel Statement: The panel revised the wording "emergency" to "essential electrical", for consistency with Proposal 15-72.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-69 Log #1396 NEC-P15 **Final Action: Accept**
(517.30)

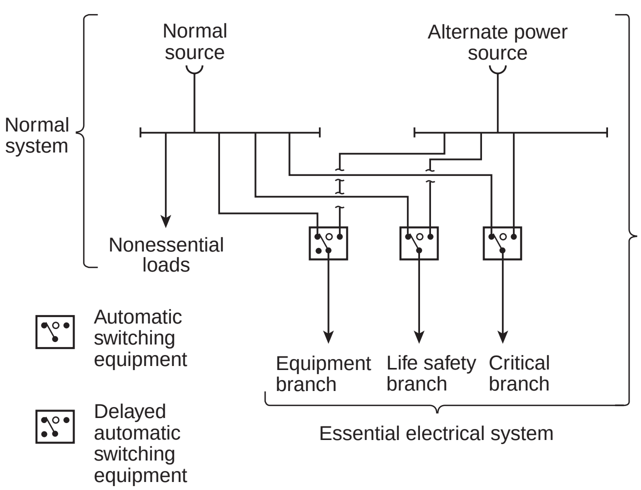
Submitter: Jon Reuter, Minneapolis, MN
Recommendation: Qualify FPN Figure 517.30, No. 1 as follows:
FPN Figure 517.30, No. 1 Hospital – Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.
Substantiation: FPN Figure 517.30, No. 1 is only the minimum requirement if greater than 150 kVA. Otherwise, FPN Figure 517.30, No. 2 is the minimum requirement.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-70 Log #2927 NEC-P15 **Final Action: Reject**
(517.30, Figures 1 and 2)

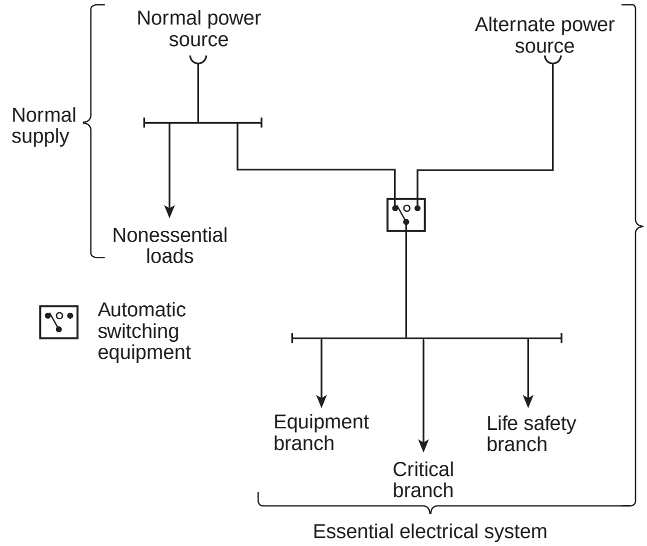
Submitter: Burton R. Klein, Burton Klein Associates
Recommendation: 1. Move Figures 1 & 2 to new Annex G, titled: A.517.30 Essential Electrical Systems for Hospitals.
Figure 1. A typical arrangement of transfer switches for essential electrical systems with essential loads greater than 150 KVA.
Figure 1. A typical arrangement of using one transfer switch for essential electrical systems with essential loads less than 150 KVA.
2. In 517.30, below title, add "See Annex G for examples of transfer switch arrangements."
Substantiation: These drawings in body of text are being used as 'mandatory' methods of transfer switch arrangements. They are only examples, and as such should be located in Annex to avoid any misinterpretations.
Panel Meeting Action: Reject
Panel Statement: Figures 517.30 No. 1 and 517.30 No. 2 are FPN figures. The NEC Manual of Style permits figures in an FPN and are not enforceable.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-70a Log #CP1501 NEC-P15 **Final Action: Accept**
(FPN Figure 517.30 No. 1 and No. 2)

Submitter: Code-Making Panel 15,
Recommendation: Revise FPN Figure No. 1 and No. 2 to revise text in the diagram by replacing the word system to branch in the phrase Equipment branch and in FPN Figure No. 1 remove the reference to Emergency system and bracket. See the attached diagram for clarification.



FPN FIGURE 517.30 No. 1



FPN FIGURE 517.30 No. 2

Substantiation: This is necessary to correlate with action and statement on proposal 15-72.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-71 Log #4116 NEC-P15 **Final Action: Accept**
(517.30(3) and 517.41(E))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(E) Receptacle Identification. The cover plates for the electrical receptacles or the electrical receptacles themselves supplied from the ~~emergency~~ essential electrical system shall have a distinctive color or making so as to be readily identifiable. [**99:**4.4.2.2.4.2(B)]
Substantiation: To coordinate with the 2010 edition of NFPA 99. See previous proposals by this author regarding the need for changing the definitions for words used in this proposal.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.
WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-72 Log #4122 NEC-P15 **Final Action: Accept**
(517.30(B)(1), (2), and (3))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(1) Separate Branches ~~Systems~~. Essential electrical systems for hospitals shall be comprised of three separate branches ~~two separate systems~~ capable of supplying a limited amount of lighting and power service that is considered essential for life safety and effective hospital operation during the time the normal electrical service is interrupted for any reason. The branches are: life safety, critical, and equipment. ~~These two systems shall be the emergency system and the equipment system.~~
~~**(2) Emergency Systems.** The emergency system shall be limited to circuits essential to life safety and critical patient care. These are designated the life safety branch and the critical branch. [99:4.4.2.2.1.1]~~

~~**(3) Equipment System.** The equipment system shall supply major electrical equipment necessary for patient care and basic hospital operation.~~

Modify the diagrams in FPN 517.30 Number 1 to correspond with this change.

Substantiation: The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, do not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctively so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the Electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on, and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and thus, reduce confusion. As noted in other proposals by this commenter, on behalf of that committee, that committee has redefined the essential electrical system of a health care facility to be comprised of three branches, and not of any "systems." This proposal reflects that change.

See also proposal related to 517.34.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 2

Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-73 Log #4121 NEC-P15 **Final Action: Accept**
(517.30(B)(4))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Revise text to read as follows:

(4) Transfer Switches. The number of transfer switches to be used shall be based on reliability, design, and load considerations. Each branch of the ~~emergency system and each equipment~~ essential electrical system shall have one or more transfer switches.

One transfer switch shall be permitted to serve one or more branches or systems in a facility with a maximum demand on the essential electrical system of 150 kVA.

Substantiation: The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, do not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctively so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the Electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on, and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and thus, reduce confusion.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 2

Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-74 Log #2798 NEC-P15 **Final Action: Accept in Principle**
(517.30(C)(1))

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Add new text as follows:

(C) Wiring Requirements.

(1) Separation from Other Circuits. The life safety branch and critical branch of the emergency system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.

Where general care locations are served from two separate transfer switches on the emergency system in accordance with Section 517.18(A), Exception No. 3, the general care circuits from the two separate systems shall be kept independent of each other.

Where critical care locations are served from two separate transfer switches on the emergency system in accordance with Section 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

(the remainder to say the same)

Substantiation: Where the normal electrical system is not used in lieu of using the emergency power system, two transfer switches are required to provide for separation of the emergency system or redundancy, but the circuits are then permitted to be mixed together in raceways, enclosures, and other wiring methods and we lose the separation. A short in one conductor associated with one transfer switch can cause failure in the insulation of a circuit conductor in the other transfer switch power circuit causing them both to go down. The separation for these different essential circuits should remain as the way to the headboard, power module, power boom, or similar equipment and can certainly take the place in the already divided headboard where the normal circuit would be terminated.

Panel Meeting Action: Accept in Principle

Revise text as follows:

(C) Wiring Requirements.

(1) Separation from Other Circuits. The life safety branch and critical branch of the essential electrical system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.

Where general care locations are served from two separate transfer switches on the critical branch in accordance with Section 517.18(A), Exception No. 3, the general care circuits from the two separate systems shall be kept independent of each other.

Where critical care locations are served from two separate transfer switches on the critical branch in accordance with Section 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.

(The remainder changes are as per the panel action on Proposal 15-75.)

Panel Statement: The panel agrees with the proposal but changes emergency system to "life safety branch and critical branch," which correlates with the panel action on Proposal 15-72.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-75 Log #4120 NEC-P15 **Final Action: Accept**
(517.30(C)(1))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Revise text to read as follows:

(C) Wiring Requirements.

(1) Separation from Other Circuits. the life safety branch and critical branch of the ~~emergency~~ essential electrical system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.

Wiring of the life safety branch and the critical branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits not part of the branch where such wiring complies with one of the following:

(1) Is in transfer equipment enclosures

(2) Is in exit or emergency luminaires supplied from two sources

(3) Is in a common junction box attached to exit or emergency luminaires supplied from two sources

(4) Is for two or more emergency circuits supplied from the same branch

The wiring of the equipment ~~system~~ branch shall be permitted to occupy the same raceways, boxes, or cabinets of other circuits that are not part of the ~~emergency~~ essential electrical system.

Substantiation: To coordinate with the 2010 edition of NFPA 99. See other proposals by this author for further justification for the change of definition used in this section.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-76 Log #4167 NEC-P15 **Final Action: Accept in Principle**
(517.30(C)(1))

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Add new text as follows:

(C) Wiring Requirements.

(1) Separation from Other Circuits. The life safety branch and critical branch of the emergency system shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceways, boxes, or cabinets with each other or other wiring.

<u>Where general care locations are served from two separate transfer switches on the emergency system in accordance with 517.18(A), Exception No. 3, the general care circuits from the two separate systems shall be kept independent of each other.</u>

<u>Where critical care locations are served from two separate transfer switches on the emergency system in accordance with 517.19(A), Exception No. 2, the critical care circuits from the two separate systems shall be kept independent of each other.</u>

(The remainder to stay the same).

Substantiation: Where the normal electrical system is not used in lieu of using the emergency power system, two transfer switches are required to provide for separation of the emergency system or redundancy, but the circuits are then permitted to be mixed together in raceways, enclosures, and other wiring methods and we lose the separation. A short in one conductor associated with one transfer switch can cause failure in the insulation of a circuit conductor in the other transfer switch power circuit causing them both to go down. The separation for these different essential circuits should remain all the way to the headboard, power module boom, or similar equipment and can certainly take the place in the already divided headboard where the normal circuit would be terminated.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 15-74. This Proposal is identical to proposal 15-74.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-77 Log #1433 NEC-P15 **Final Action: Reject**
(517.30(C)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where isolated power systems are installed in any of the areas in 517.33(A)(1) and (A)(2) each<u> isolation transformer or other isolated</u> system <u>power source</u> shall be supplied by ~~an individual~~ <u>a</u> circuit serving no other load.

Substantiation: Edit. Isolated power systems include the transformer or other source, and the outlets which taken together are not supplied by an individual circuit, which is usually associated with a branch circuit.

Panel Meeting Action: Reject
Panel Statement: The existing wording is consistent with that in NFPA 99.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-78 Log #22 NEC-P15 **Final Action: Reject**
(517.30(C)(3))

NOTE: This proposal appeared as Comment 15-39 on Proposal 15-54 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-54 was:

Revise text to read as follows:

(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid nonmetallic conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

<u>(2) Listed MC cable identified as providing crush, impact and penetration circuit protection performance equivalent to Electrical Metallic Tubing.</u>

(~~2~~ <u>3</u>) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid nonmetallic conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(~~3~~ <u>4</u>) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:

a. Where used in listed prefabricated medical headwalls

b. In listed office furnishings

c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage

d. Where necessary for flexible connection to equipment

(~~4~~ <u>5</u>) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(~~5~~ <u>6</u>) Secondary circuits of Class 2 or Class 3 communication or signaling systems

Submitter: Phil Simmons, Rep. National Armored Cable Manufacturers
Recommendation: Revise 517.30(C)(3) as follows:

(3) Mechanical Protection of the Emergency System. The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and 517.13(B). The following wiring methods shall be permitted:

(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 rigid PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 rigid PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.

(3) Listed flexible metal raceways and listed metal-sheathed cable<u>s.</u> ~~assemblies in any of the following:~~

~~a. Where used in listed prefabricated medical headwalls~~

~~b. In listed office furnishings~~

~~c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage~~

~~d. Where necessary for flexible connection to equipment.~~

(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(5) Secondary circuits of Class 2 or Class 3 communication or signaling systems with or without raceways.

FPN: See 517.13 for additional grounding requirements in patient care areas.

Substantiation: Listed Type AC and Type MC cables are more than adequate to provide mechanical protection of the emergency systems in hospitals and should be accepted for that purpose. In fact, Code Panel 15 made that appropriate conclusion in its Panel Statement on Proposal 15-42 for the 2005 NEC. CMP 15 stated in part, "Types AC and MC cables that are listed provide adequate physical and mechanical protection for the emergency system of health care facilities." We agree with the Panel's conclusion. However, we feel the Panel inappropriately, and without technical justification for such action, limited the use of Type MC and AC cables as shown in the 2005 NEC.

Adequate documentation on the rigorous testing Type AC and MC cables must pass to be listed was submitted with Proposal 15-42. This documentation, plus the satisfactory field experience of CMP-15 members, no doubt led to the conclusion reached by the Panel in processing the 2005 NEC.

Type AC and MC cables are required to satisfactorily pass brutal treatment during the listing process. The testing includes crushing, bending and elongating. The tests the cables must satisfactorily pass are no doubt harsher than would be expected during installation of the cables.

The UL Fact-Finding Report on Nail Penetration of Types AC and MC Cable Installed Parallel to Framing Members (provided) show the cable is more resistant to damage from nails and screws than is Electrical Metallic Tubing. Type MC and AC cables need to be accepted for mechanical protection of the emergency system in hospitals to be treated equally.

It should be noted that items (3)(1) and (3)(2) in the list of accepted uses of listed flexible metal raceways and listed metal-sheathed cables seem to be incorrect as the wiring methods used in the construction of listed equipment by the manufacturer is controlled by the UL Safety Standard that regulates the construction of such equipment. See also 90.7 for an explanation of field examination or evaluation of listed equipment.

The information in this comment should not be considered a new concept as the issue has been before the Panel during the processing of both the 2005 and 2008 NECs.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: At this time the panel is not aware of any MC cable that has the crush, impact, and penetration circuit protection performance equivalent to EMT. The submitter has not referenced any type MC cable that performs equivalent to EMT in this regard. The panel is not receptive to writing code around products that do not exist yet.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-79 Log #959 NEC-P15 **Final Action: Reject**
(517.30(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~MECHANICAL PHYSICAL PROTECTION OF THE~~ EMERGENCY SYSTEM WIRING METHODS. The fixed wiring of the emergency system in hospitals shall ~~be~~ comply with this section. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and (B). Feeder circuit wiring shall comply with 700.9(D)(1). The following wiring methods shall be employed ~~used~~
Delete (1) and (2).
Add: Exception: to first paragraph; Where encased in not less than 50 mm (2 in.) of concrete Schedule 40 or 80 PVC conduit, flexible nonmetallic raceways, nonmetallic jacketed metal raceways, or nonmetallic jacketed metallic cable assemblies listed for installation shall be permitted.
Substantiation: Edit. “Mechanical” implies machinery or tools. “Permitted” doesn’t require any of the wiring methods specified per 90.5(B). Section 230.43 for example is specific. Reference should be made to 700.9(D)(1) for feeders. If the proposed exception for branch circuits is accepted a corresponding provision should be made for 517.13(A) to avoid a conflict.
Panel Meeting Action: Reject
Panel Statement: The title of the section defines the purpose of the requirements: protecting the electrical distribution of the emergency system. Encasing a non-metallic wiring method in concrete is means of providing protection of the emergency system, but in itself is not a wiring method. By listing the permitted methods, but not restricting the language to these methods only, installers and inspectors are able to use alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.”
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-80 Log #1438 NEC-P15 **Final Action: Reject**
(517.30(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: ~~Mechanical~~ Physical Protection of the Emergency Systems. The wiring of the emergency system in hospitals shall be ~~mechanically~~ protected by identified means where likely to be subject to physical damage.
Substantiation: Edit. “mechanical” implies machinery or tools and is not the standard terminology used in similar sections. Different wording pertaining to the same thing may cause confusion per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The requirement for protection of these systems is to maintain a supply of power. The change would introduce a level of confusion not present in the existing language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-81 Log #2209 NEC-P15 **Final Action: Reject**
(517.30(C)(3))

Submitter: Nancy Heckrotte, Silverman and Light, Inc., Consulting Electrical Engineers
Recommendation: Revise 517.30(C)(3) as follows:
(3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
~~a. Where used in listed prefabricated medical headwalls~~
~~b. In listed office furnishings~~
~~c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage~~
~~d. Where necessary for flexible connection to equipment~~
Substantiation: The wiring of the emergency system in hospitals is required to be mechanically protected. However, by prohibiting the use of flexible metal raceways and metallic sheathed cables in new construction of emergency systems the current code unnecessarily equates mechanical protection exclusively with the non-flexible characteristic of the currently approved metal raceways. The Panel already accepts flexible metal raceway and metallic sheathed cables in essential electrical systems for hospitals where it is fished into existing walls and ceilings. Insofar as these fished flexible metal raceways have been providing acceptable service and performance since the advent of the 2005 NEC, the remaining question is whether flexible metal raceways can adequately withstand the rigors of installation in new construction. Flexible metal raceway and metal sheathed cables are mature wiring methods that are installed nation wide every day and have been in use for over 70 years. The concern over damage to these wiring methods in new construction due to nail and screw penetration where they are supported and secured was addressed in a fact finding report that was previously supplied to the panel and which is being provided with this proposal. The report shows that the flexible wiring method is no more prone to damage than is EMT or Rigid Nonmetallic Conduit.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 15-84.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-82 Log #4119 NEC-P15 **Final Action: Accept**
(517.30(C)(3))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(3) Mechanical protection of the ~~Emergency~~ Essential Electrical System.
The wiring of the ~~emergency~~ life safety and critical branches ~~system in hospitals~~ shall be mechanically protected. Where installed as branch circuits in patient care rooms ~~areas~~, the installation shall comply with the requirements of 517.13(A) and (B). The following wiring methods shall be permitted:
Substantiation: To coordinate with the 2010 edition of NFPA 99. See other proposals by this author for further justification for the change of definition used in this section.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word “emergency” from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.
WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-83 Log #4471 NEC-P15 **Final Action: Reject**
(517.30(C)(3))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise text to read as follows:
[517.30(C)] **(3) Mechanical Protection of the Emergency System. “**The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and (b). Only ~~T~~the following wiring methods shall be permitted: …”.
Substantiation: The current text of the sentence that introduces the five permitted wiring methods in this section does not convey the concept of exclusivity, and the wiring methods shown can be construed as merely examples of wiring methods that are in addition to any of those covered in chapter three. By adding the word “only” at the beginning of this sentence it is made clear that these are exclusively required wiring methods, and thereby promotes greater code language clarity for code users.
Panel Meeting Action: Reject
Panel Statement: By listing the permitted methods, but not restricting the language to these methods only, installers and inspectors are able to use alternative methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-84 Log #4542 NEC-P15 **Final Action: Reject**
(517.30(C)(3))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revised text as follows:
(3) ~~Mechanical~~ Protection of the Emergency System. The wiring of the emergency system in hospitals shall be ~~mechanically~~ protected against physical damage by installation in one or more of the following wiring methods. ~~Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and (B). The following wiring methods shall be permitted~~:
(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(2)Type AC and Type MC cables are permitted if not likely to be damaged at the location installed or, if subject to physical damage, are protected in accordance with 300.4(A), (C), and (D) if installed through or parallel to framing members.
(3) ~~(2)~~ If ~~Where~~ encased in not less than 50 mm (2 in.) of concrete, Schedule 40 PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete.

Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(4) ~~(3)~~ Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
a. ~~Where used~~ In listed prefabricated medical headwalls
b. In listed office furnishings
c. ~~Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage~~
~~d.~~ If ~~Where~~ necessary for flexible connection to equipment
(5) ~~(4)~~ Flexible power cords of appliances or other utilization equipment connected to the emergency system.
(6) ~~(5)~~ Secondary circuits of Class 2 or Class 3 communication or signaling systems with or without raceways.
FPN: See 517.13 for additional grounding requirements in patient care areas.
Substantiation: It can be safely said that all wiring methods are "subject to physical damage." This phrase is far too general and subjective. At times, opponents of cable wiring methods use the simple statement in the present Code rule as license to unreasonably restrict the use of Type AC and MC cables. All wiring methods should be installed in a manner and location so the wiring method is not expected to be damaged in ordinary use, or is protected in accordance with 300.4. For example, wiring installed in walls, ceilings and floors in compliance with 300.4 can be reasonably expected to be isolated from physical damage in ordinary building operations. Can the cables be damaged in an unexpected event such as cutting a hole in the wall with a reciprocating saw to make a opening for a window or door? Certainly. However that is not likely to happen in normal building operation.
Listed Type MC cables are subject to extensive testing as prescribed in UL 1569, the applicable product safety standard. This testing ensures Type MC cables are suitable to be installed in most all ordinary locations and in those hazardous locations as prescribed in other locations in the Code. Section 330.17 requires Type MC cables to be protected against physical damage in accordance with the appropriate sections of 300.4.
Listed Type AC cables are subject to extensive testing as prescribed in UL 4, the applicable product safety standard. This testing ensures Type AC cables are suitable to be installed in most all ordinary locations. Section 320.17 requires Type AC cables to be protected against physical damage in accordance with the appropriate sections of 300.4.
Section 3.2.5.5 of the NEC Style Manual states that the phrase "protection against physical damage" is preferred over "mechanical protection." This proposal intends to bring this section into compliance with this section of the Style Manual.
The sentence "Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and (B)" is unnecessary repetition as the requirements of those sections apply on their own.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
The term "likely" is used in the proposal to require protection of metallic cable wiring methods if damage is reasonably expected or probable at the location installed. The term "likely" is used in many NEC sections to predict or describe a probability the event or condition will occur such as: "… *likely* to become energized …", "… maximum fault current *likely* to be imposed …", "… not *likely* to be damaged …", "…equipment *likely* to be disconnected for repairs or replacement …", "… not *likely* to stretch during or after installation …" and "… conduct safely any fault current *likely* to be imposed".
Panel Meeting Action: Reject
Panel Statement: The requirement for protection of these systems is to maintain an uninterrupted supply of power in the event of an outage that is not limited to protection from nail or screw penetration during or after construction. The overall survivability of the emergency system must be assured.
At this time the panel is of the opinion that the physical protection of these circuits are best served by non-flexible metallic raceways. The proposal includes all types of MC and AC cable, even those not found to fair well during the previously conducted fact- finding investigation. The panel's concern is the mechanical integrity of the wiring method both during and after installation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-85 Log #3927c NEC-P15 **Final Action: Reject**
(517.30(C)(3)(1))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Everywhere Schedule 80 PVC is mentioned, "Type RTRC marked with the suffix -XW" should also be included.
Substantiation: For the NEC 2008, Type RTRC marked with the suffix –XW and Schedule 80 PVC were added as sufficient for Class I Division 2 installations. The Type RTRC marked with the suffix –XW were "forgotten" at some places in the NEC, needs to be corrected.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient technical data to support the use of RTRC in similar applications as Schedule 80 PVC. The code permits the use of RTRC conduit in Class I Division 2 locations under very restrictive conditions. [See 501.10(B)(1)(7)]. The permitted conditions do not necessarily exist in health care facilities.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-86 Log #154 NEC-P15 **Final Action: Accept**
(517.30(C)(3)(5))

TCC Action: The Technical Correlating Committee understands that the acceptance of this proposal is superseded by the action taken on Proposal 15-87.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "communication" to "communications".
Substantiation: Section 3.3.3 of the NEC Style Manual States: "**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all* components or parts of a given type or class." Changing "communication" to "communications" will correlate with the title of Chapter 8, "Communications Systems"**.**
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-87 Log #4086 NEC-P15 **Final Action: Accept in Principle**
(517.30(C)(3)(5))

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
517.30(C)(3)(5) Secondary circuits of Class 2 or Class 3 communication or signaling systems, <u>data system circuits, fire alarm systems, and systems less than 120 volts, nominal</u> with or without raceways.
Substantiation: The addition of the phrase "with or without raceways" and the second paragraph to 517.80 in 2008 clarified that secondary circuits of transformer-powered communications or signaling systems in patient care areas are not required to be enclosed in raceways unless otherwise required by Chapter 7 or 8. Since the title of 517 Section VI also includes data systems, fire alarm systems, and systems less than 120 volts, nominal, it would be logical to conclude that the panel intends that these systems would be required to be enclosed in raceways. This proposal is submitted to clarify the intent of this paragraph. If the intent is to allow all of these systems to be installed in patient care areas without requiring them to be enclosed in raceways, this proposal should be accepted. Otherwise, since data systems, fire alarm systems, and systems less than 120 volts, nominal were excluded from this sentence, it will be concluded that these systems shall be required to be enclosed in raceways.
A similar proposal has been submitted for 517.80
Panel Meeting Action: Accept in Principle
Revise (5) of this section to read:
(5) Cables for Class 2 or Class 3 systems permitted by Part VI of this Article with or without raceways.
Panel Statement: The panel agrees with the intent of the submitter. The panel action better reflects the intent of the submitter and correlates this requirement with Part VI. The present wording of (5) is not in the proper format as it does not describe a wiring method.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-88 Log #4820 NEC-P15 **Final Action: Reject**
(517.30(C)(3)(6) (New))

Submitter: Robert Konnik, South Windsor, CT
Recommendation: Add new (6) to 517.30(C)(3) as shown below:
517.30(C)(3) Mechanical Protection of the Emergency System.
The wiring of the emergency system in hospitals shall be mechanically protected. Where installed as branch circuits in patient care areas, the installation shall comply with the requirements of 517.13(A) and (B). The following wiring methods shall be permitted:
(1) Nonflexible metal raceways, Type MI cable, or Schedule 80 PVC conduit. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(2) Where encased in not less than 50 mm (2 in.) of concrete, Schedule 40 PVC conduit, flexible nonmetallic or jacketed metallic raceways, or jacketed metallic cable assemblies listed for installation in concrete. Nonmetallic raceways shall not be used for branch circuits that supply patient care areas.
(3) Listed flexible metal raceways and listed metal sheathed cable assemblies in any of the following:
a. Where used in listed prefabricated medical headwalls
b. In listed office furnishings
c. Where fished into existing walls or ceilings, not otherwise accessible and not subject to physical damage

d. Where necessary for flexible connection to equipment

(4) Flexible power cords of appliances or other utilization equipment connected to the emergency system.

(5) Secondary circuits of Class 2 or Class 3 communication or signaling systems with or without raceways.

<u>(6) Type MC cable that employs a continuous, gas/vaportight metal sheath and is listed as an electrical circuit protective system.</u>

Substantiation: In just about all areas of the code, MC cable is allowed to be used where MI cable is used. The exception is in hospitals some areas of hospitals. 517.61(B)(1) allows MC cable with that employs a continuous, gas/vapor-tight metal sheath to be used. Where local jurisdictions require fire rated cable, fire rated MC cable is used in hospitals where allowed by the AHJ. This proposal only allows a small subset of MC cable that has additional positive benefits, that is ability to survive in a fire. MC cable meets crush and impact requirements greater than that required for flexible cords and class 2 and 3 communication cables.

Panel Meeting Action: Reject

Panel Statement: Type MC cable is not always allowed to be used where Type MI cable is permitted, and the provision for a gas/vaportight metal sheath may not provide adequate protection from damage. According to a UL fact-finding report on nail penetration of Type MC and AC cables, this type had the worst results. See panel action and statement on Proposal 15-84.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-89 Log #3855 NEC-P15 **Final Action: Accept**

(517.30(C)(4))

Submitter: Bill McGovern, City of Plano

Recommendation: Revise text as follows:

517.30(C)(4) Is for two or more emergency circuits supplied from the same branch <u>and same transfer switch.</u>

Substantiation: Article 517 is based on redundancy and strengthening of the electrical system to insure the life safety provisions are in place for both the staff and patients alike. Separation of the emergency system wiring from all other wiring insures that short circuits and ground faults that occur in either the normal system or the equipment system will not compromise the integrity of the emergency system. Separation is already in place requiring both branches of the emergency system (critical & life safety) to remain independent of each other. Separation of both feeders and branch circuits originating from separate transfer switches of the same system should also remain independent of each other. Requiring separation of feeders and branch circuits of the same system but supplied by different transfer switches provides an increased level of safety should a ground fault or short circuit occur downsteam of one of the transfer switches.

Panel Meeting Action: Accept

Panel Statement: The panel notes that the proper reference is 517.30 (C)(1)(4).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11

Ballot Not Returned: 1 Lau, L.

15-90 Log #4129 NEC-P15 **Final Action: Reject**

(517.30(F))

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Add new text to read as follows:

<u>**(F) Selective Coordination.** Overcurrent protective devices serving the essential electrical system shall be selectively coordinated for times longer than 0.1 seconds.</u>

<u>*Exception No. 1: Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.*</u>

<u>*Exception No. 2: Isolated power systems inherently comply with this selective coordination requirement.*</u>

Substantiation: The rationale for this proposal has two elements.

First, NFPA 99 is responsible for the performance of the electrical systems in health care facilities. That committee takes very seriously the charge of making health care facilities as safe as humanly possible for the patients we serve, including protecting them from electrical outages that might be caused by un-coordinated electrical systems. However, as designers and operators of these systems, we recognize that coordination is not a pure good in itself, and that there are competing hazards that can, in some cases, trump the ideal of perfect coordination. As chair of the electrical Systems Technical Committee for NFPA 99, I presided over two meetings to review comments from the public, including extensive presentations on this topic from all sides. We debated this issue extensively, testing out the various theories and data reported. In the end, by a clear majority, the committee adopted the performance criteria that, in our judgment, best balances the clear and compelling need for a well-coordinated electrical system with the other considerations involved. The NFPA 99 2010 Edition will include the language proposed here, and the NEC should be changed to prevent confusion in the field.

Second, we will repeat some of the technical arguments against an unfettered pursuit of perfect coordination on health care facilities, assembled by a group of electrical engineers including, by the way, the State of California Office of Statewide Health Planning and Development, who have a state amendment to NFPA 70 specifically excluding health care facilities from all coordination requirements due to the problems it creates.

Selective coordination is only one of several competing factors that must be considered in the selection of appropriate overcurrent protective devices (OCPDs) in health care facilities. Other factors that must be considered in the selection of overcurrent protective devices include: arc flash risk hazard, equipment damage, and reduced risk of extended outages; all of which have direct effects on both staff and patient safety. Mandating selective coordination as the sole determining factor in OCPD selection will result in diminished reliability of the essential electrical system.

The electrical distribution systems in health care facilities are different from those in other buildings. they generally have more levels of distribution between the service and the load thus greatly complicating the coordination task, and creating other potential hazards for the unwary who zealously work to maximize a single element of the overall safety equation. Unfortunately, the code requirement in Article 700, when strictly applied to health care facilities, has not accomplished its primary goal of making electrical systems more reliable. Instead, in many instances, it creates less reliable electrical distribution systems in most instances. Some reasons for this are:

● Achieving selective coordination throughout the entire electrical distribution system requires a delay in the upstream overcurrent devices (to wait for the downstream devices to clear). Delaying the operation of these overcurrent devices can lead to the arc flash levels being driven to dangerously high levels without interruption. Numerous engineers have reported this phenomenon in their designs since the 700 provisions for strict selective coordination began to be applied to health care facilities. G,iven the critical nature of our health care occupancies design engineers are forced to make tough decisions for our clients; de-energize equipment to maintain and repair it and expose the patient/building occupant to a potentially harmful electrical outage or keep the electrical equipment energized and expose the electrical worker to dangerously high arc flash levels. Lower arc flash levels, resulting from the acceptance of the current proposals, will help achieve the goal of making our healthcare electrical systems safer for both patients and electrical workers.

● Many of the members of the 99 committee have been asked to provide forensic engineering analysis for electrical distribution system disruptions. The vast majority of these disruptions resulted in what were initially perceived to be a mis-coordinated system issue. In reviewing the evidence associated with these disruptions we found that most, if not all, of these disruptions were due to low level arc faults to ground. These low level ground faults resulted in the activation of the nearest upstream ground fault device and not the overcurrent device (without ground fault) directly upstream of the fault. By virtue of other sections in NFPA 70 specifically 517.17(B), (1) & (2)) we are not allowed to install further downstream ground fault devices, therefore, not being able to enhance ground fault system coordination. Unfortunately, the current selective coordination verbiage in NFPA 70 paragraph 700.27, 701.18 & 708.54 does not address (nor can it address) the ground fault coordination issue that currently exist and is the most prevalent type of system fault. The addition of the "longer than 0.1 seconds" language as currently proposed does not diminish the goal of a selectively coordinated system since the vast majority of faults do not exist the 0.1 second or less tripping range.

● The selective coordination requirement as currently written in NFPA 70 requires the design engineer to limit the number of electrical equipment levels in order to attempt full selective coordination. This sometimes requires the elimination of electrical devices that would normally have been installed for isolation and maintenance reasons. These types of omissions will require the owner to take larger portions of this electrical system out of service simultaneously when performing off-line maintenance. Many individuals/entities try to make this a fuse versus circuit breaker issue. This argument only clouds the issue and does not get to the real fact that the current selective coordination requirement in NFPA 70 does not enhance our electrical distribution system. This proposal interjects logic and real world practical experience into the selective coordination topic.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 7 Negative: 4

Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: Requiring selective coordination only for times longer than 0.1 second provides coordination for overloads only and does not provide assurance that typical ground faults and arcing faults will not cascade multiple levels of overcurrent protective devices.

SHELLY, B.: The reduction in safety of the electrical system should not be compromised due to cost considerations; therefore, Proposal 15-90 should be rejected and the present requirement left in place.

WHITE, A.: It is with great concern for the safety of patients that we must vote negative on Panel Action on Proposal 15-90. Unfortunately, Panel 15 has fallen victim to the materialistic desires of a few constituents that refuse to spend the time and energy necessary to modify their cookie cutter designs in order to accommodate selective coordination. For decades, financial centers and the military have had no issues designing and installing selectively coordinated systems. Isn't it odd that some in our society are willing to spend the time and money, even if it takes extra floor space, to keep financial centers up and running under all overcurrent conditions, but it they are not willing to take that same precautions for our sick and infirm.

Eliminating selective coordination for times less than 0.1 seconds is the same as eliminating the requirement altogether. If that is the desire of the submitter, have the fortitude to propose just that. They should not hide behind the false sense of security that 0.1 seconds portrays. The move to 0.1 seconds will not cover most ground faults and arcing faults. It will allow major blackouts of entire wings or even entire health care facilities, all because these engineers will now be able to design more quickly, but avoiding their fiduciary responsibility to owners, patients, and workers.

Opponents of selective coordination often cite increased arc-flash hazards as the major reason for avoiding their responsibilities. However, with a little extra work, knowledge, and skill, they could be utilizing several techniques that are aimed specifically at the very issues' they cite. Differential relaying and zone selective interlocking have been around for decades. Arc reducing maintenance switches are also readily available. These methods allow overcurrent devices to open as quickly as possible, with absolutely no increase in arc-flash energy or equipment damage, for overcurrents in their zone of protection. For overcurrents outside their zone of protection, the overcurrent devices are delayed long enough for downstream devices to operate, providing total selective coordination. These techniques are often utilized in industrial facilities, banking centers, and military facilities.

In summary, selective coordination can be achieved, and at the same time, arc-flash energies and equipment damage need not increase, if the designers are willing to spend the extra time and effort to modify their cookie cuter designs and utilize proven techniques that have been successfully employed for decades in financial centers and military facilities. The unnecessary elimination of selective coordination requirements for times less than 0.1 seconds reduces safety for both patients and workers.

WISEMAN, J.: The 0.1 second limit in this proposal could reduce the level of safety by limiting the types of overcurrents that would need to be isolated to the nearest upstream device. Requiring selective coordination down to only 0.1 seconds will cover only overloads and a few minor phase-to-phase fault and minor ground faults.

15-91 Log #4117 NEC-P15 **Final Action: Accept**
(517.30(G) (New))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Add new text to read as follows:

<u>(G) Feeders from Alternate Power Source. A single feeder supplied by a local or remote alternate power source shall be permitted to supply the essential electrical system to the point at which the life safety, critical, and equipment branches are separated. Installation of the transfer equipment shall be permitted at other than the location of the alternate power source.</u>

Renumber following paragraph.

Substantiation: The present requirements of NFPA 70, Article 445 and Article 700 as applied to healthcare facilities essentially eliminates central plant alternate power source applications by requiring additional multiple feeders (and in the case of generating systems greater than 600v, additional transformer(s) emanating from the source to the system distribution equipment.

This new requirement in the NEC provides no proven increase in reliability. In fact, by in effect mandating the use of distributed generation over central plant architecture it can be argued that reliability will be decreased. This proposal permits a single feeder from a health care facility central generating plant to serve the essential electrical system of a remote healthcare building or buildings within the same campus.

The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, do not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctively so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the Electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on, and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and thus, reduce confusion.

Panel Meeting Action: Accept

Panel Statement:

Number Eligible to Vote: 12

Ballot Results: Affirmative: 9 Negative: 2

Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

WHITE, A.: Allowing a single feeder to service the entire essential electrical system, before the transfer equipment, presents obvious reliability issues should the single feeder become deenergized due to fault conditions. The scenario becomes even more horrific should the single feeder become physically damaged, in this case the facilities entire redundant essential electrical system is out of service until emergency repairs can be made; placing patients and staff at grave risk.

Patient safety should be foremost, this proposal plainly puts economics before patient safety and should be rejected.

15-92 Log #4115 NEC-P15 **Final Action: Accept**
(517.31)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.

This action will be considered by the panel as a public comment.

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.

Recommendation: Revise text to read as follows:

517.31 ~~Emergency System~~ <u>Branches for Automatic Connection</u>. ~~Those functions of patient car depending on lighting of appliances that are automatically connected to the emergency essential electrical system shall be divided into two mandatory branches: the life safety branch and the critical branch, described in 517.32 and 517.33.~~

The <u>life safety and critical</u> branches ~~of the emergency system~~ shall be installed and connected to the alternate power source so that all functions <u>supplied by these branches</u> ~~specified here for the emergency essential electrical system~~ shall be automatically restored to operation within 10 seconds after interruption of the normal source. [**99:**4.4.2.2.2.1, 4.4.3.1]

Substantiation: The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, do not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctively so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the Electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on, and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and thus, reduce confusion.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 1

Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word "emergency" from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.

15-93 Log #3926 NEC-P15 **Final Action: Reject**
(517.31(B)(2))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Include “RTRC”
Substantiation: As RTRC is approved for below ground use, direct burial as well as encased in concrete, it should be included in this section.
Panel Meeting Action: Reject
Panel Statement: It is quite impossible to know what the submitter is proposing. The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee
Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-94 Log #4118 NEC-P15 **Final Action: Reject**
(517.31(D) and (4))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(D) Capacity of Systems. The essential electrical system shall have adequate capacity to meet the actual demand expected to be produced by the connected load of the essential electrical system. ~~demand for the operation of all functions and equipment to be served by each system and branch....~~
Change current (4) to (5) (Engineering supervision)
Substantiation: Generator sizing is more of a skill than a science. With duplex motor loads, imaging equipment, and other intermittent patient care use equipment the requirement to meet the demand for all functions will cause generator sets to be oversized. This in return causes wet staking and other mechanical problems for the engine sets.
To coordinate with the 2010 edition of NFPA 99.
Several other sections of the NFPA 70 allow engineering supervision to be used as the criteria for sizing.
Panel Meeting Action: Reject
Panel Statement: The panel notes that the section is 517.30(D).
The ellipses (~~....~~) implies that the remainder of the section is to be removed; The text after the ellipse refers to the feeder sizing and is not addressed in the substantiation. The (4) to (5) change makes no sense without the proposal of an additional subsection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-95 Log #4114 NEC-P15 **Final Action: Accept**
(517.32)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
517.32 Life Safety Branch. No function other than those listed in 517.32(A) though (H) shall be connected to the life safety branch. The life safety branch of the ~~emergency~~ essential electrical system shall supply power for the following lighting, receptacles, and equipment.
Substantiation: To coordinate with the 2010 edition of NFPA 99. See previous proposals by this author regarding the need for changing the terms used in this proposal.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 12
Ballot Results: Affirmative: 9 Negative: 2
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
SAMPSON, M.: The panel should look closely at the lack argument for reconfiguring the essential system by eliminating the emergency system tier. The emergency system of a hospital is for life safety - a branch for those exiting the building and one for those who cannot. Removing the word “emergency” from Article 517 to escape the requirements of Article 700 is clearly cost driven and not in the best interest of the building occupants.
WHITE, A.: The code making cycle for NFPA 99 is not yet complete. Any action taken before this standard is issued by Standards Council is premature.

15-96 Log #952 NEC-P15 **Final Action: Reject**
(517.32(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete “necessary” in the first sentence.
Substantiation: Whether or not the ways of approach to exits are “necessary” (required by the AHJ?) all ways of approach should be included such as specified in 517.42(A).
Panel Meeting Action: Reject
Panel Statement: The word “necessary” has to be retained in order to define which ways of approaching an exit need to be illuminated. The term “necessary” provides direction to the code user.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-97 Log #4112 NEC-P15 **Final Action: Accept in Part**
(517.32(F))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
(F) Generator Set Accessories. ~~Generator Set accessories as required for generator performance.~~ Fuel transfer pump(s), task illumination, and selected receptacles at the generator set location and essential electrical system transfer switch locations. Ventilation fans, electrically operated louvers, controls, cooling system, and other generator accessories essential for generator operation shall be supplied directly from the output terminals of the generator with overcurrent protective devices or from the life safety branch.
Substantiation: Without operation of generator accessories, the generators will not function. The loads for the equipment spaces are very small, and must be the first loads onto the generator to ensure the ability to operate these spaces effectively. This requirement was extensively debated by the NFPA 99 Electrical Systems Technical Committee to ensure proper performance of the systems. This requirement will be in the next edition of NFPA 99 and should be extracted here to ensure coordination between the two documents and to ensure that this issue is covered by 70.
To coordinate with the 2010 edition of NFPA 99.
Panel Meeting Action: Accept in Part
Accept the proposal rejecting the language “directly from the output terminals of the generator with overcurrent protective devices or” the remainder of the language is accepted.
The revised wording will be: **(F) Generator Set Accessories.** ~~Generator Set accessories as required for generator performance.~~ Fuel transfer pump(s), task illumination, and selected receptacles at the generator set location and essential electrical system transfer switch locations, ventilation fans, electrically operated louvers, controls, cooling system, and other generator accessories essential for generator operation shall be supplied from the life safety branch.
Panel Statement: Allowing certain generator accessories to be tapped directly from the generator terminals realistically means the accessories can only be energized when the generator is online; this presents certain issues when commissioning and testing activities occur.
Allowing this connection also provides enormous incident energy at these branch circuits, in turn creating worker safety issues concerning NFPA 70E.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-98 Log #951 NEC-P15 **Final Action: Reject**
(517.33)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (A)(3)(a): Infant and children nurseries.
Substantiation: “Infant” is defined as a child in the first period of life or a person who is not full age which does not specify a specific age and is subjectively defined. All infants are children, but all children are not infants.
Panel Meeting Action: Reject
Panel Statement: The requirement applies to infant nurseries.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-99 Log #4111 NEC-P15 **Final Action: Accept**
(517.33(A))

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
517.33 Critical Branch.
(A) Task Illumination and Selected Receptacles. The critical branch of the ~~emergency~~ essential electrical system shall supply power for task illumination, fixed equipment, selected receptacles, and special power circuits serving the following areas and functions related to patient care:
Substantiation: To coordinate with the 2010 Edition of NFPA 99. See previous proposals by same author regarding need for changing the terms used in this proposal. This proposal simply makes this section consistent with others in the same article.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-100 Log #384 NEC-P15 **Final Action: Accept**
(517.33(A)(8)(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"General care beds (at least one duplex receptacle in each ~~per~~ patient bedroom)".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-101 Log #4110 NEC-P15 **Final Action: Accept**
(517.34)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the final text of NFPA 99 after its adoption.
This action will be considered by the panel as a public comment.
Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:
517.34 Equipment ~~System~~ Branch ~~Connection to Alternate Power Source~~. The equipment branch shall supply major electrical equipment necessary for patient care and basic building operation. The equipment ~~system~~ branch shall be installed and connected to the alternate power source such that the equipment described in 517.34(A) is automatically restored to operation at appropriate time-lag intervals following the energizing of the ~~emergency~~ essential electrical system. Its arrangement shall also provide for the subsequent connection of equipment described in 517.34(B). [**99:**4.4.2.2.3.2]
Substantiation: To coordinate with the 2010 Edition of NFPA 99. See previous proposals by same author regarding need for changing the terms used in this proposal. This proposal simply makes this section consistent with others in the same article.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-102 Log #950 NEC-P15 **Final Action: Reject**
(517.34(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "throw over" to "transfer".
Substantiation: Edit.
Panel Meeting Action: Reject
Panel Statement: The term is used to reference a selector switch, not a transfer switch. See ASME A17.1-2004 Section 2.27.2.4.1. The term "throw over" provides more flexibility for the type of equipment used to service the elevator.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-103 Log #949 NEC-P15 **Final Action: Reject**
(517.35(B)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~An external~~ A utility service when the normal source consists of a generating unit(s) located on the premises.
Substantiation: "External" implies the service equipment is necessarily outdoors.
Panel Meeting Action: Reject
Panel Statement: The term external does not necessarily mean outdoors.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-104 Log #1395 NEC-P15 **Final Action: Accept**
(517.41)

Submitter: Jon Reuter, Minneapolis, MN
Recommendation: Qualify FPN Figure 517.41, No. 1 as follows:
FPN Figure 517.41, No. 1 Nursing Home and Limited Health Care Facilities – Minimum Requirement (greater than 150 kVA) for Transfer Switch Arrangement.
Substantiation: FPN Figure 517.41, No. 1 is only the minimum requirement if greater than 150 kVA. Otherwise, FPN Figure 517.41, No. 2 is the minimum requirement.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-105 Log #964 NEC-P15 **Final Action: Reject**
(517.42(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~Sufficient~~ Lighting as is necessary to provide illumination to exit ways.
Substantiation: Edit. "Sufficient" is a term to be avoided per the Style Manual. Proposal tracks similar wording in 517.42(A). Where "necessary" is usually established by building or fire codes.
Panel Meeting Action: Reject
Panel Statement: There isn't a difference between "lighting as is necessary" and "sufficient illumination."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-106 Log #963 NEC-P15 **Final Action: Reject**
(517.61(B)(2) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: The exception doesn't cover ceiling mounted receptacles; doesn't specify any height above the the 5 ft hazardous area. Sparks or hot metal could be produced by the attachment plug if disconnected under load. It doesn't correlate well with 410.12 which requires lampholders to be unswitched types and 430.14(B).
Panel Meeting Action: Reject
Panel Statement: This exception first appears in the 1984 NEC. This is a stand alone allowance and does not need to correlate to any of the code sections listed. No substantiation has been presented to support the deletion.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-107 Log #2386 NEC-P15 **Final Action: Reject**
(517.61(B)(5))

Submitter: Jamie McNamara, Hastings, MN
Recommendation: Revise text to read as follows:
517.61 Wiring and Equipment.
(B) Above Hazardous (Classified) Anesthetizing Locations.
(5) Receptacles and Attachment Plugs. Receptacles and attachment plugs located above hazardous (classified) anesthetizing locations shall be listed "hospital grade" and ~~for hospital use~~ for services of prescribed voltage, frequency, rating, and number of conductors with provision for the connection of the grounding conductor. This requirement shall apply to attachment plugs and receptacles of the 2-pole, 3-wire grounding type for single-phase, 120-volt, nominal, ac service.
Substantiation: This requirement should be made clear as to what type or receptacle is required. This would harmonize the text with current 517.61(C)(2).
Panel Meeting Action: Reject
Panel Statement: Receptacles listed for use in hospitals (or hospital use) are a specific configuration and are for use in hospitals only. Acceptance of this proposal would relax the requirement without proper substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-108 Log #962 NEC-P15 **Final Action: Accept in Principle in Part**
(517.61(C)(1) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Pendant receptacle ~~construction~~ installations that employ ~~Type SJO or equivalent~~ hard usage or extra-hard usage flexible cords identified for the purpose. (remainder unchanged)
Substantiation: Equivalent is a term to be avoided per the Style Manual. Cords should be identified for the purpose as all hard usage or extra hard usage types may not be suitable for the use or conditions.
Panel Meeting Action: Accept in Principle in Part
Accept all of the recommendation with the exception of the phrase ~~identified for the purpose~~ and the strikeout of "Type SJO or equivalent " as follows:
Pendant receptacle ~~construction~~ installations that employ listed Type SJO, or equivalent hard usage or extra-hard usage, flexible cords ~~identified for the purpose.~~ (remainder unchanged)
Panel Statement: Type SJO designates a specific cord product having rubber insulation and an oil -resistant jacket. Hard or extra -hard service need not be rubber or oil resistant. However, the panel agrees that equivalent is not defined. Therefore, the panel agrees to include "hard usage" or extra "hard usage" cord after equivalent and the word listed before SJO to satisfy part of proposal requesting identified. There are no cords identified for use with pendent receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-109 Log #215 NEC-P15 **Final Action: Accept in Principle**
(517.63(A) Exception (New))

TCC Action: The Technical Correlating Committee directs that the panel correlate the action taken in this proposal with the action taken on Proposal 15-3a.
This action will be considered by the panel as a public comment.
Submitter: Chris Pogorzelski, Graef Anhalt Schloemer & Associates
Recommendation: Add an exception to read as follows:
Exception: For operating rooms, procedure rooms and c-section rooms. The battery-powered emergency lighting units shall be permitted to be wired to the critical lighting circuit in the area and connected ahead of any local switches.
Substantiation: In my years of experience and working in the Healthcare industry as a consultant in various states, the hospital representatives will request putting the emergency battery units serving the surgical suites to the "Critical Circuit" ahead of any local switches. Currently, how the code section is enforced does not allow the owner of the electrical consultant to wire the emergency battery unit on the essential branch (critical power) because NEC 517.63(S) refers to NEC 700.12(F) which refers to the Battery-Powered Emergency Lighting Units to be wired normal lighting circuit.
In NFPA 99, Section 13.4.1.2.6.1(E) "Battery-Powered Emergency Lighting Units" states "such lights shall be wired to circuits serving the general area lighting". In a surgical suite where you have both normal and critical power serving the general area lighting, it could be wired to either branch of power.
In NFPA 99 Section A.4.4.2.2.2.3 (explanatory material) "It is recommended that facility authorities give consideration to providing and properly maintaining automatic battery-powered lighting units or systems to provide minimal task illumination in operating rooms, delivery rooms, and certain special-procedure radiology rooms where the loss of lighting due to failure of the essential electrical system could case severe and immediate danger to a patient undergoing surgery on an invasive radiographic procedure." In my opinion, the above explanation would steer an owner of a healthcare facility to install the Battery-Powered Emergency Lighting units to the (critical) Essential Electrical System branch of power.
We can look at two different scenarios of what would happen in an Operating Suite if there was a loss of normal power and the generator would transfer the power to the Essential branch (critical power).
Scenario One - Battery-Powered Emergency Lighting Units wired to normal power: The Battery-Powered Emergency Lighting Units would energize at the loss of normal power and remain burning for the required 10 seconds as required by NFPA 110 for the generators to start up and automatically switch the load from normal power to the Essential Electrical System (Critical Power), however the Battery-Powered Emergency Lighting Units would remain lit and eventually would discharge all its lumens and power after 90 minutes. In a catastrophic event, after 90 minutes you would lose the Essential Electrical System (Critical Power) and the entire Surgical Suite would be in total darkness.
Scenario Two - Battery-Powered Emergency Lighting Units wired to the Essential Electrical System (Critical Power): The Battery-Powered Emergency Lighting Units would energize at the loss of normal power and remain burning for the required 10 seconds as required by NFPA 110 for the generators to start up and to automatically switch the load from normal power to the Essential Electrical System (Critical Power), however the Battery-Powered Emergency Lighting Units would turn themselves "off" at the first sign of critical power and reenergize the Battery-Powered Emergency Lighting Units back to full strength. In a catastrophic event, after 90 minutes, you would lose the Essential Electrical System (Critical Power) and the staff would still have the full 90 minutes of the full Battery-Powered Emergency Lighting Units to complete any necessary procedures still being performed after the loss of the Essential Electrical System (Critical Power).
In conclusion, I strongly believe if we make this code change we can better utilize the use of the Battery-Powered Emergency Lighting Units and provide the Surgical Staff an additional 90 minutes of lighting if the facility loses the Essential Electrical System (Critical Power).
Panel Meeting Action: Accept in Principle
Revise Section 517.63(A) as follows:
(A) **Battery- Powered Lighting Units.** One or more battery-powered lighting units shall be provided and shall be permitted to be wired to the critical lighting circuit in the area and connected ahead of any local switches.
Panel Statement: The panel is of the opinion that this action better addresses the submitter's intent and eliminates a list of locations and the reference to Article 700 as this is not an emergency egress lighting requirement. Additionally, the revised text is positive language omitting the exception.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-110 Log #1437 NEC-P15 **Final Action: Accept**
(517.63(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence: Isolated power system equipment and its supply circuit ~~grounded primary feeder~~ shall be permitted...(remainder unchanged).
Substantiation: Edit. While "grounded primary feeder" correlates with "grounded power systems" in the heading of 517.63 it infers this subsection may not apply to an ungrounded primary feeder to an isolation transformer, which is not specifically prohibited.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-111 Log #961 NEC-P15 **Final Action: Reject**
(517.64(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Low voltage equipment that is ~~frequently in~~ intended for contact with the bodies of persons or...". (remainder unchanged)
Substantiation: "Frequently" is not defined, is subjective, and a term to be avoided per the Style Manual, and has no bearing on the requirement.
Panel Meeting Action: Reject
Panel Statement: The proposal as presented would essentially change the requirement of 517.64(A) without any substantiation. The term intended would not be readily understood by anyone other than the clinical staff.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-112 Log #960 NEC-P15 **Final Action: Reject**
(517.64(B), (C), and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "isolating" to "isolation" in (B)(1) and (2) and (C) and (E).
Substantiation: Isolation transformer is defined; isolating transformer is not; are these the same or different?
Panel Meeting Action: Reject
Panel Statement: The existing definition is consistent with NFPA 99. See panel action and statement on Proposal 15-11.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-113 Log #843 NEC-P15 **Final Action: Reject**
(517.71(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text (A):
Fixed and stationary X-ray equipment shall be connected to the power supply by means of ~~a~~ an identified wiring method complying with applicable ~~requirements~~ provisions of Chapters 1 through 4 of this Code ~~as~~ unless modified by this article.
Exception: Equipment properly supplied by a branch circuit rated at not over 30 amperes shall be permitted to be supplied through a suitable by an identified attachment plug and hard service or extra-hard service flexible cord or cable identified for the use.
(B) Individual branch circuits shall not be required for portable, mobile, or transportable medical X-ray equipment requiring a capacity with a long short-time rating of not over 60 amperes.
Substantiation: The wiring method and attachment plug should be identified as suitable for the use. There are provisions in Chapters 1 through 4 such as exceptions and alternatives which are permissive and not requirements, which should be included. There is no apparent reason not to permit extra-hard service cords or cables. "Capacity" appears intended to be amperes. For reliability, it seems that long-time ratings should require an individual circuit.
Panel Meeting Action: Reject
Panel Statement: Identified wiring for X-ray equipment should be part of the specification for that equipment. The wiring need not be identified for the purpose.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-114 Log #849 NEC-P15 **Final Action: Reject**
(517.72(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(A) ~~CAPACITY~~ RATING ~~A~~ An identified disconnecting means ~~of adequate ampacity for at least~~ with a current rating not less than 50 percent of the input required for the momentary rating or 100 percent of the rating required for the long-time rating of the X-ray equipment, whichever is greater, shall be provided in the supply branch circuit.
Substantiation: Edit. "Capacity" appears intended to be amperes. Disconnecting means should be identified for the use. "Adequate" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: This language is identical to the disconnecting means requirements in Article 660. Disconnecting means are not required to be "identified."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-115 Log #1436 NEC-P15 **Final Action: Accept in Principle**
(517.78)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:...shall be grounded in a manner specified in Part VII of Article 250 as modified by 517.13(A) and 517.13(B).
Substantiation: Edit. Reference should not be made to an entire article.
Panel Meeting Action: Accept in Principle
Change the existing text of 517.78(C) to read:
(C) Non–Current-Carrying Metal Parts. Non–current-carrying metal parts of X-ray and associated equipment (controls, tables, X-ray tube supports, transformer tanks, shielded cables, X-ray tube heads, etc.) shall be connected to an equipment grounding conductor in the manner specified in Part VII of Article 250, as modified by 517.13(A) and (B).
Panel Statement: Submitter has not recognized that in the 2008 cycle the word "grounded" was changed to "connected to an equipment grounding conductor."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-116 Log #2241 NEC-P15 **Final Action: Reject**
(517.80)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action in relation to the report of "Reject"on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Richard E. Loyd, Sun Lakes, AZ
Recommendation: Delete 2nd paragraph in its entirety.
Substantiation: I recognize this text is extracted from NFPA 99, however, the NFPA 99 Committee does not have electrical expertise, this resides with this committee. Healthcare facilities are unique and deal with persons with low resistance to shock hazards. We historically require more stringent rules to safe guard patients from trauma. Panels 3 and 16 responsible for communications and signaling also do not consider typically persons with low resistance to shock and they are often barefooted and unclothed. The responsibility for determining the degree of physical protection required of these circuits must reside with the designers since 517.2 defines "patient care areas" to cover a variety of conditions and locations.
Please accept this proposal to delete the 2nd paragraph, safety is paramount. There is no record that 517.80 has not worked well over the past many cycles.
Panel Meeting Action: Reject
Change the existing sentence in 517.80 as follows:
Listed cables for Class 2 or Class 3 signaling systems, power-limited fire alarm, data, antenna, fiber optics, and communication circuits installed in patient care areas are deemed to have equivalent insulation and isolation to that required for the electrical distribution systems in those spaces.
Panel Statement: See panel action and statement on Proposal 15-120. The panel contends that the action taken on Proposal 15-120 is more appropriate for these systems in patient care areas.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-117 Log #4098 NEC-P15 **Final Action: Accept in Principle**
(517.80)

Submitter: Rod Mutch, Selah, WA
Recommendation: Revise text to read as follows:
517.80 Patient Care Areas. Equivalent insulation and isolation to that required for the electrical distribution systems in patient care areas shall be provided for communications, signaling systems, data system circuits, fire alarm systems, and systems less than 120 volts, nominal.
Secondary circuits of transformer-powered communications or signaling systems, data system circuits, fire alarm systems, and systems less than 120 volts, nominal shall not be required to be enclosed in raceways unless otherwise specified by Chapter 7 or 8. [99:4.4.2.2.4.6]
Substantiation: The additional of the second paragraph to 517.80 in 2008 clarified that secondary circuits of transformer-powered communications or signaling systems in patient care areas are not required to be enclosed in raceways unless otherwise required by Chapter 7 or 8. Since the title of 517 Section VI also includes data systems, fire alarm systems, and systems less than 120 volts, nominal, it would be logical to conclude that the panel intends that these systems would be required to be enclosed in raceways. This proposal is submitted to clarify the intent of this paragraph. If the intent is to allow all of these systems to be installed in patient care areas without requiring them to be enclosed in raceways, this proposal should be accepted. Otherwise, since data systems, fire alarm systems, and systems less than 120 volts, nominal were excluded from the second paragraph, it will be concluded that these systems shall be required to be enclosed in raceways.
A similar proposal has been submitted for 517.30(C)(3)(5).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on proposal 15-120.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-118 Log #2799 NEC-P15 **Final Action: Accept**
(517.80, FPN)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete FPN as follows:
517.80 Patient Care Areas. Equivalent insulation and isolation to that required for the electrical distribution systems in patient care areas shall be provided for communications, signaling systems, data system circuits, fire alarm systems, and systems for less than 120 volts, nominal.
~~FPN: An acceptable alternate means of providing isolation for patient/nurse call systems is by the use of nonelectrified signaling, communications, or control devices held by the patient or within reach of the patient.~~
Substantiation: Non-electric apparatus may be a safer alternative to electrical apparatus in a patient care area but this Fine Print Note does not seem to have any logical place in the National Electrical Code. Since it is not giving any electrical alternative, reference, or any usable explanation for 517.80 as is the normal function of a Fine Print Note, it should be removed from this section.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-119 Log #4168 NEC-P15 **Final Action: Accept**
(517.80, FPN)

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text as follows:
517.80 Patient Care Areas. Equivalent insulation and isolation to that required for electrical distribution systems in patient care areas shall be provided for communications, signaling systems, data system circuits, fire alarm systems, and systems for less than 120 volts, nominal.
~~FPN: An acceptable alternate means of providing isolation for patient/nurse call systems is by the use of nonelectrified signaling, communications, or control devices held by the patient or within reach of the patient.~~
Substantiation: Non-electric apparatus may be a safer alternative to electrical apparatus in a patient care area, but this Fine Print Note does not seem to have any logical place in the National Electrical Code. Since it is not giving any electrical alternative, reference, or any usable explanation for 517.80 as is the normal function of a Fine Print Note, it should be removed from this section.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-120 Log #67 NEC-P15 **Final Action: Accept in Principle**
(517.80 Exception No. 3 (New))

Note: This Proposal appeared as Comment 15-56 on Proposal 15-103 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 15-103 was:
Add an exception to 517.80:
517.80 Patient Care Areas Equivalent insulation and isolation...nominal.
Exception: Secondary circuits of Class 2 or Class 3 communications or signaling systems.
Submitter: Hugh O. Nash, Jr., Nash Lipsey Burch, LLC
Recommendation: Delete 517.80 Patient Care Areas, including the FPN. Add an additional exception under 517.13(B).
Exception No. 3 shall read: <u>Secondary circuits of Class 2 and Class 3 communications or signaling systems.</u>
Substantiation: 517.80 has been a source of confusion for many years. Nurse call and other Class 2 and Class 3 communications systems at the patient bedside are intrinsically safe. This section has been misinterpreted by many AHJs. Some have interpreted this section to mean that nurse call wiring must be installed in metallic conduit for mechanical protection. This has never been the intent of 517.80, since nurse call systems are not a part of the emergency system. Some AHJs have required insulated green ground conductors and metallic conduit. 517.30(C)(3)(5) permits secondary circuits of Class 2 or Class 3 communication or signaling systems to be installed without mechanical protection. The proposed exception under 517.13(B) will make it clear that metal conduit and an insulated green ground conductor are not required for electrical safety.
Panel Meeting Action: Accept in Principle
Revise text of 517.80 as follows:
517.80 Patient Care Areas. Equivalent insulation and isolation to that required for the electrical distribution systems in patient care areas shall be provided for communications, signaling systems, data system circuits, fire alarm systems, and systems less than 120 volts, nominal. Circuits of these Class 2 and Class 3 signaling and communications systems shall not be required to comply with the grounding requirements of 517.13, comply with the mechanical protection requirements of 517.30(C)(3)(5), or to be enclosed in raceways unless otherwise specified by Chapter 7 or 8.
Panel Statement: The panel agrees with the intent of the submitter's proposal. The panel is of the opinion that the action satisfies the submitter's intent and reduces confusion in three areas; 1. Grounding, 2. Mechanical protection, 3. Insulation and isolation, associated with communication and signaling systems.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1
Ballot Not Returned: 1 Lau, L.
Explanation of Negative:
WHITE, A.: The assertion that Class 2 and Class 3 circuits are somehow not a danger to patients is mystifying. Table 11 (A) and (B) in Chapter 9 detail the power source requirements for Class 2 and Class 3 circuits. In both cases, each table is preceded by a technical note explaining voltage ranges are defined in:... indoor locations or where wet contact is unlikely to occur. Wet contact is certainly a real possibility in patient care areas. Patient safety, not economics,should be foremost, these circuits should be effectively grounded and mechanically protected to provide protection to patients and staff.

15-121 Log #4169 NEC-P15 **Final Action: Accept in Principle**
(517.81)

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
517.81 Other than Patient Care Areas. In other than patient care areas, installations shall be in accordance with the appropriate provisions of Articles 640, 725, 760, 800, <u>770, 810, 820, and 830.</u>
Substantiation: As written, this section addresses only sound systems, Class 1, Class 2, Class 3 circuits, as well as fire alarm circuits. Many health care facilities now employ the various additional systems covered in Articles 770, for fiber optical cables and raceways, radio and television antenna systems, CATV, and network powered broadband, and these system requirements should be added into this section. Even though the NEC Style Manual recommends not referencing one section to an entire Article, various parts or all of the Articles may apply to areas within a health care area not part of a patient care area so the reference to entire Articles is appropriate in this case.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
517.81 **Other than Patient Care Areas**. In other than patient care areas, installations shall be in accordance with the applicable provisions of <u>other parts of the code</u>.
Panel Statement: Adding those article numbers to the current list is correct, but the NEC Style Manual states that references shall not be made to an entire article. A general statement referring users to the applicable parts of the code is more appropriate.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-122 Log #842 NEC-P15 **Final Action: Reject**
(517.160)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence of (A)(1) and substitute:
Each isolated power circuit shall be controlled by a switch or circuit breaker that simultaneously disconnects all conductors of the circuit.
Delete text of (A)(2) and substitute:
Circuits supplying primaries of isolating transformers shall operate at no more than 600 volts, nominal between conductors. Overcurrent protection for transformers and conductors supplying transformers or supplied by generators or batteries shall be in accordance with applicable provisions of Articles 240 and 450. The voltage of each isolated power circuit shall not exceed 600 volts, nominal, between conductors. Secondaries, if isolation transformers and systems derived directly from generator sets, batteries, or other sources shall be ungrounded. If a transformer has an electrostatic shield it shall be grounded.
Revise text of (3):
The ~~isolating~~ <u>isolation</u> transformers, ~~motor~~ generator sets, batteries, battery chargers, <u>and other isolated power system sources and their supply conductors,</u> associated primary and secondary overcurrent devices <u>and disconnecting means</u> shall not be installed in a hazardous (classified) location. The isolated <u>power system branch circuits</u> extending into a hazardous <u>(classified)</u> ~~anesthetizing~~ location shall be installed in accordance with ~~501.10~~ <u>the applicable requirements for the location</u>.
Revise first paragraph of (4):
An isolation transformer, <u>generator, batteries, or other isolated power system supply source</u> shall not serve more than one operating room except as covered in (A)(4)(a) and (A)(4)(b).
Delete text of (A)(4)(b) and substitute:
Where isolated power system circuits operating at over 150 volts, nominal, supply power to receptacles for equipment such as X-ray units or other equipment, the receptacles and mating plugs shall be uniquely configurated and not compatible with receptacles and plugs of other systems on the premises and receptacles shall be of the single type.

Substantiation: Types/ratings of overcurrent devices are covered elsewhere in the Code. "Proper" is a term to be avoided per the Style Manual. Systems supplied by other than transformers, generators, and batteries should be included. Present wording of (A)(4)(b) implies voltages higher than 150 volts are limited to (b)(1) and (2) whereas (A)(1) permits voltage up to 600. Any receptacle or plug is interchangeable, i.e., can be removed and replaced. Present (A)(4)(b) implies that single receptacles can only be used under condition (1) and (2) whereas there is no prohibition against their general use.
Panel Meeting Action: Reject
Panel Statement: The panel recognizes that 517.160(A)(2) is extracted material and the panel intends to maintain continuity with NFPA 99. The panel contends that the other changes suggested by the submitter would significantly alter the intent of this section. The submitter has not presented data to support his substantiation that replacement receptacles may be installed incorrectly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-123 Log #2031 NEC-P15 **Final Action: Accept**
(517.160(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "or circuit breaker" after "switch" in the first sentence.
Substantiation: While a circuit breaker may be used as a switch, it is still a circuit breaker. Both terms are used in 404.2(B), 404.3(A), 404.4, 404.7, and 404.8 which indicates they are not one and the same.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-124 Log #3256 NEC-P15 **Final Action: Reject**
(517.160(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute:
Each isolated power circuit shall be controlled by a switch or circuit breaker that simultaneously disconnects all conductors of the circuit it controls. Conductors of isolated power circuits shall not be installed in cables, raceways, or enclosures containing conductors of another system.
Substantiation: Circuit breakers are suitable disconnecting means. Isolated power circuits should be separate from conductors of other systems.
Panel Meeting Action: Reject
Panel Statement: The panel action on Proposal 15-123 made by the same submitter addresses the concern with regard to circuit breakers used as disconnects. The panel contends that the remainder of the submitters proposal would significantly alter the intent of this section by omitting the entire second sentence. The submitter has not provided any technical data to substantiate this change.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

15-125 Log #566 NEC-P15 **Final Action: Accept**
(517.160(A)(5))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
(5) Conductor Identification. The isolated circuit conductors shall be identified as follows:
(1) Isolated Conductor No. 1 - Orange with <u>at least one distinctive</u> colored stripe other than white, green, or gray <u>along the entire length of the conductor.</u>
(2) Isolated Conductor No. 2 - Brown with at least one distinctive colored stripe other than white, green, or gray <u>along the entire length of the conductor.</u>
For 3-phase systems, the third conductor shall be identified as yellow with <u>at least one</u> distinctive colored stripe other than white, green, or gray <u>along the entire length of the conductor.</u>
Substantiation: The revision in the 2008 edition of the NEC provided a new requirement to distinguish branch circuit conductors of isolated power systems from other branch circuits in the same building. The problem is that the requirement for a distinctive stripe is unclear as to the physical characteristics of the stripe. As written, a distinctive stripe can be applied to the conductor using vinyl marking tape or other means. It appears that the intentions of the submitter and Code-Making Panel 15 are to require this distinctive marking along the entire length of the conductor as is already the requirement in 200.7.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11
Ballot Not Returned: 1 Lau, L.

ARTICLE 518 — PLACES OF ASSEMBLY

15-126 Log #2967 NEC-P15 **Final Action: Accept in Principle**
(518.3(B))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise as follows:
518.3 Other Articles.
[518.3(A) unchanged by this Proposal]
(B) Temporary Wiring. In exhibition halls used for display booths, as in trade shows, the temporary wiring shall be permitted to be installed in accordance with Article 590. Flexible cables and cords approved for hard or extra-hard usage shall be permitted to be laid on floors where protected from contact by the general public. <u>Except where ground-fault circuit-interrupter protection for personnel is required elsewhere in this *Code* other than Article 590, t</u>he ground-fault circuit-interrupter requirements of 590.6 shall not apply.
[remainder of 518.3(B) and 518.3(C) unchanged by this Proposal]
Substantiation: NOTE: This proposal is separate from another proposal I submitted for 518.3(B) involving portable GFCI protection in plug-and-cord-connected applications.
Throughout the *Code*, where ground-fault circuit-interrupter protection for personnel is mandated, ground faults arise from two causes:
· internally, insulation systems or materials of the installation have ***gradually degraded*** due to aging, exposure, and wear-and-tear
· externally, insulation systems or materials of connected equipment have been ***suddenly compromised*** by accidental events (immersion, penetration, mishandling, etc.)
The 590.6 requirements for temporary wiring, where similar requirements do not exist for corresponding permanent wiring installations, are based more predominantly on the greater likelihood of that gradual degradation. Where the *Code* elsewhere does mandate ground-fault circuit-interrupter protection for personnel that also encompasses permanent wiring (near sinks and kitchen countertops in 210.8(A) and 210.8(B), adjacent to swimming pools in 680.22 and 680.32, in conjunction with vending machines in 422.51, etc.), sudden accidental events are the more prevalent reasons for those other GFCI requirements in the *Code*.
590.6 on temporary wiring installations imposes requirements for ground-fault circuit-interrupter protection for personnel that would not be mandated generally for the same installations connected to permanent wiring. The unmodified last sentence of 518.3(B) was predicated on the duration of temporary wiring being far shorter and on the rewiring frequency and the re-inspection incidence of temporary wiring being far greater for tradeshows than for most temporary wiring installations (construction sites, seasonal retailing, outdoor holiday displays, etc.).
Although the last sentence of 518.3(B) is ***intended*** to focus at those 590.6 temporary wiring installations where GCFI protection would NOT be required for similar installations to permanent wiring, the mere ***use of temporary wiring connections at tradeshows*** and ***citation of the last sentence of 518.3(B)*** have been used to rationalize completely ignoring of the other essential GFCI protection requirements elsewhere throughout the *Code* that apply, regardless of permanent or temporary wiring.
Given the hasty set up of tradeshow exhibits and booths, the absence of Qualified Persons* ***within*** the exhibitions and booths once temporary power has been established ***to*** the exhibitions and booths, and the general confusion and absence of supervision that occurs once a tradeshow is opened to attendees, the risk of sudden accidents resulting in ground faults is at least equal and arguably even greater than for permanent wiring installations where GFCI protection is mandated.
* (Article 100 "Qualified Persons: One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.")
How can the **ambiguous** and **equivocal** last sentence of 518.3(B), as is, be allowed to serve as a pusillanimous rationale for NOT providing essential GFCI protection at a swimming pool tradeshow or as a rationale for NOT providing essential GFCI protection at the kitchen countertop sink of a food kiosk at a tradeshow, all by pulling the "tradeshow temporary wiring" card?
The Proposal is intentionally written to correlate the GFCI requirements elsewhere in the *Code* (other than Article 590), when applied to tradeshows, to the GFCI requirements of 590.6 because many tradeshow exhibits and booths ***demonstrate*** permanent installations (which might include GFCI receptacles or circuit breakers intended for permanent wiring as a component of the equipment being demonstrated) but are ***actually connected*** to temporary power by means of ***cordsets*** that must have fault circuit-interrupter protection for personnel identified for portable use to prevent loss of GFCI protection due to open- or intermittent-neutral.
Panel Meeting Action: Accept in Principle
Reword proposed added language to state: "... The ground-fault circuit-interrupter requirements of 590.6 shall not apply. <u>All other ground-fault circuit-interrupter requirements of this Code apply."</u>
Panel Statement: Revised wording meets the proposer's intent and provides additional clarification.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15
Ballot Not Returned: 1 Lau, L.

15-127 Log #3600 NEC-P15 **Final Action: Accept**
(518.3(B))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
518.3 Other Articles.
[518.3(A) unchanged by this Proposal]
(B) Temporary Wiring. In exhibition halls used for display booths, as in trade shows, the temporary wiring shall be permitted to be installed in accordance with Article 590. Flexible cables and cords approved for hard or extra-hard usage shall be permitted to be laid on floors where protected from contact by the general public. The ground-fault circuit-interrupter requirements of 590.6 shall not apply. Where ground-fault circuit interrupter protection for personnel is supplied by plug-and-cord-connection to the branch circuit or to the feeder, the GFCI protection shall be listed as portable GFCI protection or provide a level of protection equivalent to a portable GFCI, whether assembled in the field or at the factory.
[remainder of 518.3(B) and 518.3(C) unchanged by this Proposal]
Substantiation: NOTE: This proposal is separate from another proposal I submitted for 518.3(B) involving GFCI protection required elsewhere in the *Code*.

"Portable GFCIs" are required by the trinational *Standard for Ground-Fault Circuit-Interrupters, NMX-J-520-ANCE-2006* 1, *CSA C22.2 No. 144.1-06* 2, *ANSI/UL943-2005* 3, Clause 6.7.2.1, and construction-site portable power-distribution equipment is similarly required by standard *Portable Power-Distribution Equipment, UL1640* 3, Clauses 53.3 - 53.5 and 63.3 - 63.4, additionally to de-energize the "load" output contacts and terminals when one or more of the following defects occurs:

the grounded conductor to the power supply is opened

the grounded conductor is transposed with an ungrounded conductor to the power supply

one of the ungrounded conductors to the power supply on a polyphase system or on a single-phase, 3-wire system is opened

When Underwriters Laboratories (in UL product category KCXS) and CSA International (in CSA product class 1451-81) list such products, both certifiers specifically identify these as "portable GFCIs" to differentiate them from other GFCIs. Listed portable GFCIs can be embodied not only as GFCI plugs and in-line GFCI cord sets but even some GFCIs for permanent wiring such as SOME faceless GFCI receptacles can be additionally Listed and identified as portable GFCIs.

[1] Asociación de Normalización y Certificación (Association of Standardization and Certification),
[2] Canadian Standards Association
[3] Underwriters Laboratories Inc.

When conventional GFCIs intended for permanent, inspected hard-wiring are used in what should be portable GFCI applications, where the any of the indicated defect conditions occur, the ground-fault-detection circuitry is NOT powered and the GFCI protection cannot operate but power is nonetheless delivered UNinterrrupted EVEN IN THE PRESENCE OF A GROUND-FAULT. Any GFCI protection the user assumes is present is in fact UNAVAILABLE.

Amongst those NOT directly involved in GFCI manufacture who are nonetheless involved with this *Code*, there is a significant misperception that GFCI protection of personnel will provide a panacea against ALL causes of lethal electric shock. Due to their misunderstanding of the differences between GFCIs for permanent installation and portable GFCIs, a significant number of cord reel manufacturers unwittingly extrapolated their Listings for portable (cord-and-plug-connected) cord reels [having ordinary receptacles as outlet components] and their Listings for HARD-WIRED cord reels acceptably having GFCI receptacles as outlet components, without the overt knowledge of at least two major certifiers, to incorrectly encompass portable (cord-and-plug-connected) cord reels having GFCI receptacles (no open neutral protection) as outlet components where portable GFCI protection (with open neutral protection) was warranted.

It is also common to find cord-and-plug-connected field assemblies employing GFCI receptacles (no open neutral protection) as outlet components rather than portable GFCI protection (with open neutral protection) of the outlets. Some times, these are field repairs misperceived as safety upgrades where conventional receptacles in plug-and-cord-connected equipment are replaced with conventional GFCI receptacles. Furthermore, field repairs of plug-and-cord-connected equipment are occasionally encountered where portable GFCIs (faceless-receptacle-type) have been field-replaced with more-readily available, conventional GFCI receptacles under the mistaken belief that they are equivalent. In either situation, where the indicated defects occur, the user has a false sense of security because power is still delivered.
Companion proposals have been made to 100 "Ground-Fault Circuit Interrupter (GFCI), *Portable (as applied to ground-fault circuit interrupters)*" [NEW], to 210.8, to 215.9, and to 590.6.
Panel Meeting Action: Accept
Panel Statement: The panel notes that the added wording follows the changes made in the panel action and statement in Proposal 15-126.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15
Ballot Not Returned: 1 Lau, L.

15-128 Log #837 NEC-P15 **Final Action: Reject**
(518.4(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
The wiring method itself shall qualify as an equipment grounding conductor ~~according to 250.118~~ or shall contain an insulated equipment grounding conductor ~~sized in accordance with Table 250.122~~ or shall be provided with an equipment bonding conductor.
Substantiation: Reference to 250.118 and Table 250.122 is superfluous, they already apply. Equipment bonding jumpers should also be permitted which maintain the ground-fault current path between equipment grounding conductors.
Panel Meeting Action: Reject
Panel Statement: The current edition of the code recognizes the term "equipment grounding conductor" in both definitions and Article 250. The intent of this requirements is that the wiring method be or contain a properly sized equipment grounding conductor, not an equipment bonding jumper.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15
Ballot Not Returned: 1 Lau, L.

15-129 Log #844 NEC-P15 **Final Action: Reject**
(518.4(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
The wiring method itself shall qualify as an equipment grounding conductor ~~according to 250.118~~ or shall contain an insulated equipment grounding conductor ~~sized in accordance with Table 250.122~~ or shall be provided with an equipment bonding conductor.
Substantiation: Reference to 250.118 and 250.122 is superfluous as they already apply. Equipment bonding conductors should be included which maintain the ground-fault current path.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 15-128.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15
Ballot Not Returned: 1 Lau, L.

15-130 Log #966 NEC-P15 **Final Action: Reject**
(518.4(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: The wiring method shall qualify as an equipment grounding conductor ~~according to 250.118~~ or shall contain an insulated equipment grounding conductor or be provided with an equipment bonding conductor ~~sized in accordance with Table 250.122.~~
Substantiation: Reference to 250.118 and Table 250.122 is superfluous; they apply unless amended. A bonding jumper is suitable for maintaining the ground path between equipment or wiring methods that qualify as a grounding means.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 15-128.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15
Ballot Not Returned: 1 Lau, L.

15-131 Log #2274 NEC-P15 **Final Action: Reject**
(518.4(B))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise section 518.4(B) as follows: **Nonrated Construction.** ~~In addition to the wiring methods of 518.4(A), nonmetallic-sheathed cable, Type AC cable, electrical nonmetallic tubing, and rigid nonmetallic conduit~~ Any wiring method approved by this code shall be permitted to be installed in those buildings or portions thereof that are not required to be of fire-rated construction by the applicable building code.
Substantiation: The current text of section 518.4(B) omits types LFMC and LFNC as acceptable wiring methods. In non-fire-rated construction, which is the construction type addressed in this section, wiring-method "fuel load" is not a concern and should therefore permit any of the wiring methods covered in chapter 3 of the NEC, especially since the current text expressly permits, for example, nonmetallic-sheathed cable. This proposed change simplifies and clarifies the code and makes it more user friendly.
Panel Meeting Action: Reject
Panel Statement: Not all wiring methods are the same. Wholesale substitution is an inappropriate method to add LFMC and LFNC without including some substantiation for their inclusion. This will allow the panel to make an informed decision on including it in the code.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 1
Ballot Not Returned: 1 Lau, L.

Explanation of Negative:

SAMPSON, M.: I respectfully request that the panel accept this proposal. In buildings or portions of buildings permitted to be of non-rated construction, there are no restrictions on the wiring methods that can be used. It is unnecessary to create and maintain a list of permitted wiring methods.

15-132 Log #2185 NEC-P15 **Final Action: Accept**
(518.5)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

518.5 Supply.

Portable switchboards and portable power distribution equipment shall be supplied only from listed power outlets of sufficient voltage and ampere rating. Such power outlets shall be protected by overcurrent devices. Such overcurrent devices and power outlets shall not be accessible to the general public. Provisions for connection of an equipment grounding conductor shall be provided. The neutral conductor of feeders supplying solid-state phase control, 3-phase, 4-wire dimmer systems shall be considered a current-carrying conductor for purposes of <u>ampacity adjustment</u> ~~derating~~. The neutral conductor of feeders supplying solid-state sine wave, 3-phase, 4-wire dimming systems shall not be considered a current-carrying conductor for purposes of <u>ampacity adjustment</u> ~~derating~~.

Exception: The neutral conductor of feeders supplying systems that use or may use both phase-control and sine-wave dimmers shall be considered as current-carrying for purposes of <u>ampacity adjustment</u> ~~derating~~.

FPN: For definitions of solid-state dimmer types, see 520.2.

Substantiation: The term “ampacity adjustment factor” is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15

Ballot Not Returned: 1 Lau, L.

15-133 Log #3005 NEC-P15 **Final Action: Accept**
(518.5)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

518.5 Supply.

Portable switchboards and portable power distribution equipment shall be supplied only from listed power outlets of sufficient voltage and ampere rating. Such power outlets shall be protected by overcurrent devices. Such overcurrent devices and power outlets shall not be accessible to the general public. Provisions for connection of an equipment grounding conductor shall be provided. The neutral conductor of feeders supplying solid-state phase control, 3-phase, 4-wire dimmer systems shall be considered a current-carrying conductor for purposes of <u>ampacity adjustment</u> ~~derating~~. The neutral conductor of feeders supplying solid-state sine wave, 3-phase, 4-wire dimming systems shall not be considered a current-carrying conductor for purposes of <u>ampacity adjustment</u> ~~derating~~.

Exception: The neutral conductor of feeders supplying systems that use or may use both phase-control and sine-wave dimmers shall be considered as current-carrying for purposes of <u>ampacity adjustment</u> ~~derating~~.

FPN: For definitions of solid-state dimmer types, see 520.2.

Substantiation: The term “adjustment factor” is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15

Ballot Not Returned: 1 Lau, L.

15-134 Log #3006 NEC-P15 **Final Action: Reject**
(518.5, FPN)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

518.5 Supply.

Portable switchboards and portable power distribution equipment shall be supplied only from listed power outlets of sufficient voltage and ampere rating. Such power outlets shall be protected by overcurrent devices. Such overcurrent devices and power outlets shall not be accessible to the general public. Provisions for connection of an equipment grounding conductor shall be provided. The neutral conductor of feeders supplying solid-state phase control, 3-phase, 4-wire dimmer systems shall be considered a current-carrying conductor for purposes of derating. The neutral conductor of feeders supplying solid-state sine wave, 3-phase, 4-wire dimming systems shall not be considered a current-carrying conductor for purposes of derating.

Exception: The neutral conductor of feeders supplying systems that use or may use both phase-control and sine-wave dimmers shall be considered as current-carrying for purposes of derating.

~~FPN: For definitions of solid-state dimmer types, see 520.2.~~

Substantiation: A definition contained in the.2 section of an article applies only to the article containing the definition. If the definitions in 520.2 are important to article 518, the definition must be moved to article 100. Referring to a definition in another article makes no sense, because the definition does not apply.

Panel Meeting Action: Reject

Panel Statement: 518.2(C) indicates certain areas within assembly occupancies shall comply with Article 520. Therefore, references to definitions in Article 520 are appropriate. Also, this equipment is highly specialized and the panel believes the definitions should remain within these articles and not Article 100.

Fine print notes are for guidance only; they are not requirements. Removal of this FPN would make this portion of the code harder to use for people unfamiliar with this type of dimmer.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15

Ballot Not Returned: 1 Lau, L.

ARTICLE 520 — THEATRES, AUDIENCE AREAS OF MOTION PICTURE AND TELEVISION STUDIOS, AND SIMILAR LOCATIONS

15-135 Log #3296 NEC-P15 **Final Action: Reject**
(520.2)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete and substitute: Electrical apparatus intended to be moved from one place to another and connected to a supply circuit with flexible cords or cables.

Substantiation: Edit. Present wording indicates the cords or cables are the items to be moved.

Panel Meeting Action: Reject

Panel Statement: The proposal does not meet the requirements of 4.3.3(b) the Regulations Governing Committee projects Additionally, the submitter did not identify which definition, but it appears to be for “portable equipment.” Proposed definition does not provide additional clarity.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-136 Log #965 NEC-P15 **Final Action: Reject**
(520.2.Stand Lamp (Work Light))

Submitter: Dan Leaf, Seneca, SC

Recommendation: STAND LAMP (WORK LIGHT). Revise: A portable stand that contains a general-purpose an identified luminaire or lampholder...”. (remainder unchanged)

Substantiation: “General purpose” is not defined; the luminaire should be identified for the use.

Panel Meeting Action: Reject

Panel Statement: “General-purpose” is easily understood and used throughout the code.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-137 Log #151 NEC-P15 **Final Action: Accept**
(520.5(A) Exception)

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Change “communication” to “communications”.

Substantiation: Section 3.3.3 of the NEC Style Manual States: “**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all* components or parts of a given type or class.” Changing “communication” to “communications” will correlate with the title of Chapter 8, “Communications Systems”.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-138 Log #866 NEC-P15 **Final Action: Reject**
(520.5(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
The non-fixed supply wiring for portable switchboards, stage lighting, stage effects and other wiring equipment not fixed as to location, except listed portable lamps and equipment with integral cords shall be ~~permitted~~ with extra-hard usage or hard usage type flexible cords or cables identified for the use ~~as provided elsewhere in Article 520~~.
Substantiation: Edit. The provision should be limited to non-fixed wiring since "wiring for portable switchboards" literally includes other feeders and service conductors. Listed portable equipment with integral cords should be exempted. This provision is not a requirement; "permitted" per 90.5 identifies "permitted" as something allowed but not required. "Approved" is not the same as "identified". Cords should be identified for the use; not all cords are suitable; e.g., electric vehicle cables, for wet locations, sunlight resistance, oil, etc.
Panel Meeting Action: Reject
Panel Statement: 520.5(A) covers fixed wiring, (B) is for portable equipment. The addition of "non-fixed supply" provides no clarity. Portable wiring is required to be Listed extra-hard usage unless specifically excepted as noted in several sections of 520, so the general reference to other parts of 520 is appropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-139 Log #2275 NEC-P15 **Final Action: Reject**
(520.5(C))

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Revise section 520.5 (C) as follows: **Nonrated Construction.** ~~Nonmetallic-sheathed cable, Type AC cable, electrical nonmetallic tubing, and rigid nonmetallic conduit~~ Any wiring method approved by this code shall be permitted to be installed in those buildings or portions thereof that are not required to be of fire-rated construction by the applicable building code.
Substantiation: The current text of section 520.5(C) omits types LFMC and LFNC as acceptable wiring methods. In non-fire-rated construction, which is the construction type addressed in this section, wiring-method "fuel load" is not a concern and should therefore permit any of the wiring methods covered in chapter 3 of the NEC, especially since the current text expressly permits, for example, nonmetallic-sheathed cable. This proposed change simplifies and clarifies the code and makes it more user friendly.
Panel Meeting Action: Reject
Panel Statement: Not all wiring methods are the same. Wholesale substitution is an inappropriate method to add LFMC and LFNC without including some substantiation for their inclusion. This will allow the panel to make an informed decision on including it in the code.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SAMPSON, M.: I respectfully request that the panel accept this proposal. In buildings or portions of buildings permitted to be of non-rated construction, there are no restrictions on the wiring methods that can be used. It is unnecessary to create and maintain a list of permitted wiring methods.

15-140 Log #1887 NEC-P15 **Final Action: Reject**
(520.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Conductor fill is already specified elsewhere in the Code and applies unless amended. Conductor fill of 366.22 and 376.22 are presumably for safety per 90.1(A) and apply whether current is continuous, intermittent, or short-time; why should it be different for certain premises?
Panel Meeting Action: Reject
Panel Statement: This variance from the conductor fill requirements from Chapter 3 is due to the high density of distinct circuits and the diversity in loading in this special location. For example, it is not unusual for a connector strip to have a density of one receptacle per foot, each receptacle on a different circuit. Not all these receptacles may have a connected load at one time. Not all general requirements of the Code apply to a 520 occupancy.
Additionally, the submitter did not supply any technical documentation that indicates this exception to the Chapter 3 conductor limitations should be removed.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-141 Log #3936 NEC-P15 **Final Action: Accept**
(520.6)

Submitter: Mitchell K. Hefter, Entertainment Technology - a Philips group brand
Recommendation: Revise text to read as follows:
520.6 Number of Conductors in Raceway. The number of conductors permitted in any metal conduit, rigid nonmetallic conduit as permitted in this article, or electrical metallic tubing for ~~border or stage pocket~~ circuits or for remote-control conductors shall not exceed the percentage fill shown in Table 1 of Chapter 9. Where contained within an auxiliary gutter or a wireway, the sum of the crosssectional areas of all contained conductors at any cross section shall not exceed 20 percent of the interior crosssectional area of the auxiliary gutter or wireway. The 30-conductor limitation of 366.22 and 376.22 shall not apply.
Substantiation: Existing Section 520.6 refers to conductors for border or stage pocket circuits. This has been mistakenly interpreted as not addressing connector strips or drop boxes which are also stage circuits. Drop boxes are stage pockets fed by extra-hard usage multiconductor cables (see 520.46). Connector strips are similar to drop boxes, except they are generally larger and either "hard-wired" as stage pockets are or fed by extra-hard multiconductor cable (again see 520.46) and in fact are analogous to border lights with receptacles for connection of portable luminaires rather than integral lamps.
Section 520.44 addresses borders and proscenium sidelights and includes cords and cables for border lights. 520.46 is titled Connector Strips, Drop Boxes, Floor Pockets, and Other Outlet Enclosures. It states that the supply cables for connector strips and drop boxes shall be as specified in 520.44 (B).
Therefore, the reference to conductors in 520.6 also refers to Connector Strips and Drop Boxes in addition to the specific language of border or stage pocket circuits. By changing the text of 520.6, this circuitous route to application of the 30-conductor exception in stage venues is simplified.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-142 Log #3254 NEC-P15 **Final Action: Accept in Principle in Part**
(520.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Portable stage and studio lighting and power equipment and ~~portable power distribution equipment~~ not identified for outdoor use shall be permitted for temporary use outdoors, provided the equipment is supervised by qualified personnel while energized and ~~barriered from~~ not accessible to the general public and not subject to weather which has an adverse effect on the equipment.
Substantiation: This provision should apply to equipment not suitable for outdoor use, since if approved for outdoor use should not be restricted to temporary use. Methods other than barriers such as elevation or personnel can prevent access to the general public. Weather conditions are factors which should be considered.
Panel Meeting Action: Accept in Principle in Part
Change the title of 520.10 to read Portable Equipment Used Outdoors.
Accept the language "not identified for outdoor use," the rest of the language of the proposal is rejected.
Revise text to read as follows:
520.10 **Portable Equipment Used Outdoors**. Portable stage and studio lighting equipment and portable power distribution equipment not identified for outdoor use shall be permitted for temporary use outdoors, provided the equipment is supervised by qualified personnel while energized and barriered from the general public.
Panel Statement: The section only describes restrictions for portable equipment use outdoors.
Portable power distribution equipment is an appropriate term because UL Standard 1640, Portable Power Distribution Equipment is the standard this equipment is evaluated to. These products are not consumer grade and are supervised by qualified personnel. There is no reason that portable equipment not identified for outdoor use should not be able to be used under such supervision in non-adverse weather conditions.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
WHITE, A.: This proposal allows the use of certain electrical equipment in a manner in which they are not listed/identified. This condition is inherently unsafe. Furthermore, it is unclear how the supervision of qualified person somehow permits the use of equipment not identified for the purpose. The panel should analyze this proposal closely.
Comment on Affirmative:
KRAMER, E.: A common practice in backyards across the country is to put a stereo, radio, ect. outside during the day while using the backyard; if it rains, it gets brought inside or covered. This is the same thing that happens when equipment that is not marked suitable for wet or damp locations is permitted to be temporarily used outdoors.

This practice is summed up nicely in the Code handbook. "In accordance with 520.10, portable indoor stage or studio equipment that is not marked suitable for wet or damp locations is permitted to be used temporarily in outdoor locations. If rain occurs, this equipment is typically de-energized, and a protective cover is installed before it is re-energized. At the end of the day, this equipment is either de-energized and protected or dismantled and stored."

15-143 Log #851 NEC-P15 **Final Action: Reject**
(520.21)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "and listed".
Substantiation: Article 400 does not require listing.
Panel Meeting Action: Reject
Panel Statement: Proposal does not address the content in 520.21 and the panel cannot identify which section the proposer is addressing. The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee projects.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-144 Log #881 NEC-P15 **Final Action: Reject**
(520.27(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: SINGLE FEEDER. Each stage switchboard shall be supplied by a dedicated set of feeder conductors provided with an identified disconnecting means that simultaneously disconnects all ungrounded conductors of the feeder.
Substantiation: Edit.
Panel Meeting Action: Reject
Panel Statement: Proposed change does not provide additional clarity.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-145 Log #916 NEC-P15 **Final Action: Reject**
(520.27(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: SINGLE FEEDER. Each stage switchboard shall be supplied by a dedicated set of feeder conductors provided with an identified disconnecting means that simultaneously disconnects all ungrounded conductors of the feeder.
Substantiation: Edit.
Panel Meeting Action: Reject
Panel Statement: Proposed change does not provide additional clarity.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-146 Log #2186 NEC-P15 **Final Action: Accept**
(520.27(B))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(B) Neutral Conductor. For the purpose of <u>ampacity adjustment</u> ~~derating~~, the following shall apply:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
Substantiation: The term "ampacity adjustment factor" is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-147 Log #3007 NEC-P15 **Final Action: Accept**
(520.27(B))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(B) Neutral Conductor. For the purpose of <u>ampacity adjustment</u> ~~derating~~, the following shall apply:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-148 Log #912 NEC-P15 **Final Action: Reject**
(Table 520.44)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "Listed" in the heading.
Substantiation: Edit. Article 400 does not specify listing for cords.
Panel Meeting Action: Reject
Panel Statement: The special occupancies covered by Article 520 require Listed Cords and Cables. Article 520 modifies Article 400 in this case.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-149 Log #914 NEC-P15 **Final Action: Reject**
(520.44)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "listed" in (B)(1) and (B)(2) to "identified".
Substantiation: Edit. Article 400 does not specify listing for cords.
Panel Meeting Action: Reject
Panel Statement: The special occupancies covered by Article 520 require Listed Cords and Cables. Article 520 modifies Article 400 in this case.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-150 Log #3255 NEC-P15 **Final Action: Reject**
(Table 520.44)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change right hand column heading to "Ampacity".
Substantiation: Edit. Table relates to ampacity not overcurrent devices.
Panel Meeting Action: Reject
Panel Statement: The headings of the columns are correct. The purpose of the right- hand column is to limit the maximum amount current for the wire size given in the table.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-151 Log #3937 NEC-P15 **Final Action: Accept**
(520.44)

TCC Action: The Technical Correlating Committee directs that the panel clarify 520.44(B)(2) as it applies to "listed for the purpose".
This action will be considered by the panel as a public comment.
Submitter: Mitchell K. Hefter, Entertainment Technology - a Philips group brand
Recommendation: Revise Section 520.44 as follows:
520.44 Borders ~~and~~<u>,</u> Proscenium Sidelights<u>, Drop Boxes, and Connector Strips</u>.
(A) General. Borders and proscenium sidelights shall be as follows:
(1) Constructed as specified in 520.43
(2) Suitably stayed and supported
(3) Designed so that the flanges of the reflectors or other adequate guards protect the lamps from mechanical damage and from accidental contact with scenery or other combustible material
<u>**(B) Connector Strips and Drop Boxes.** Connector Strips and Drop Boxes shall be as follows:</u>
<u>(1) Suitably stayed and supported</u>
<u>(2) Listed for the purpose</u>
~~(B)~~<u>(C)</u> Cords and Cables for Border Lights<u>, Drop Boxes, and Connector Strips</u>.
(1) General. Cords and cables for supply to border lights<u>, drop boxes, and connector strips</u> shall be listed for extra-hard usage. The cords and cables shall be suitably supported. Such cords and cables shall be employed only where flexible conductors are necessary. Ampacity of the conductors shall be as provided in 400.5.
(2) Cords and Cables Not in Contact with Heat-Producing Equipment. Listed multiconductor extra-hard usage-type cords and cables not in direct contact with equipment containing heat-producing elements shall be permitted to have their ampacity determined by Table 520.44. Maximum load current in any conductor with an ampacity determined by Table 520.44 shall not exceed the values in Table 520.44.
<u>**(3) Identification of conductors in multiconductor extra-hard usage cords and cables.** Grounded (neutral) conductors shall be white without stripe or shall be identified by a distinctive white marking at their terminations. Grounding conductors shall be green with or without yellow stripe or shall be identified by a distinctive green marking at their terminations.</u>
Substantiation: Section 520.46 refers back to 520.44 with respect to supply cables for drop boxes and connector strips, but these items are not mentioned in 520.44. Due to the special nature of the installations, it is necessary that the proper application of cords and cables for multiconductor extra-hard usage cords and cables is addressed clearly in this section.

Standard extra-hard usage multiconductor cord, including product from Carol (General), Royal (Omni), and Leviton AIW, uses ICEA/NEMA Method 1 color coding. This is for Type SO, Extra Hard Usage (hard service) required under Article 520. However, this color coding method only provides for one white conductor and one green conductor per 21 conductors (see attached excerpt from the AIW catalog - *mkh520-44proposalExhibit_AIW_SOOW_PortControlCab.pdf*), and this has led to confusion and misapplication - one recent case where the inspector required connector strips to be "hard-wired" and another where the engineer called for Tray Cable to be used in theatre.

In summary from Section 200.6 Paragraph (E) Grounded Conductors of Multiconductor Cables, and by extension, 200.7, any insulated conductor can be re-identified as a grounded (neutral) conductor except a solid green conductor.

"Exception No. 1: Where the conditions of maintenance and supervision ensure that only qualified persons service the installation, grounded conductors in multi-conductor cables shall be permitted to be permanently identified at their terminations at the time of installation by a distinctive white marking or other equally effective means."

Similar language in Section 250.119 Identification of Equipment Grounding Conductors, Paragraph (B) Multiconductor Cable states that is permissible to permanently re—identify conductors as equipment grounding conductors at time of installation.

Despite the existence of language in other parts of the Code, the unique nature of installation under Article 520 continues to lead to confusion among inspectors and engineers. The added language clarifies the application of extra-hard usage multiconductor cord and cable in venues subject to Article 520.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-152 Log #2302 NEC-P15 **Final Action: Accept in Principle**
(Table 520.44, Footnote)

Submitter: John Marshall, Underwriters Laboratories Inc.

Recommendation: Table 520.44 (last footnote) – Revise to

On a 4-wire, 3 phase, (cord connected) wye circuit where the major portion of the load consists of nonlinear loads, ~~such as electronic-discharge lighting, electronic computer/data processing or similar equipment~~, there are harmonic currents in the neutral conductor, ~~and~~ therefore the neutral conductor shall be considered to be a current-carrying conductor.

Substantiation: Revised to agree with revised footnote to the definition - Nonlinear Load covered in a companion proposal. Remove "such as" examples as they would best be contained in the footnote to the definition.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

On a 4-wire, 3 phase wye circuit where the major portion of the load consists of nonlinear loads, ~~such as electronic-discharge lighting, electronic computer/data processing or similar equipment~~, there are harmonic currents in the neutral conductor~~, and~~. Therefore, the neutral conductor shall be considered to be a current-carrying conductor.

Panel Statement: The panel maintains the intent, however, revised the language to improve readability.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-153 Log #913 NEC-P15 **Final Action: Accept**
(520.45)

TCC Action: The Technical Correlating Committee directs that this action be reconsidered and correlated with the existing text in 520.46 and 520.62(B).

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete.

Substantiation: Edit. Ampere ratings are covered in 406.2(B) (which includes cord connectors). Articles 310 and 400 apply unless modified.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-154 Log #911 NEC-P15 **Final Action: Reject**
(520.47)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Lamps (bare bulbs) installed backstage and ancillary areas where they can or are likely to come in contact with scenery shall be located and/or guarded so as to be ~~free~~ not likely to be subject to physical damage and shall be provided an air space...". (remainder unchanged).

Substantiation: "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections. Location OR guarding, not both, should be acceptable if one or the other is effective.

Panel Meeting Action: Reject

Panel Statement: "Not likely" is not prescriptive enough in the harsh environment. "Likely" is to be avoided per the NEC Style Manual. Current wording clearly describes proven, industry-specific safe practice.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-155 Log #4639 NEC-P15 **Final Action: Accept**
(520.50(A))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Change "terminate in" to "originate from".

Substantiation: This rule requires the point where a circuit is connected to consist of an inlet that matches, by current and voltage, that of the receptacle supplied at the other end of the wiring. This proposal is editorial. The submitter believes the intent is more clearly conveyed through the use of "originate from" because that is the direction of power transfer. Otherwise the "inlet" would be powered when not in use, which would violate 406.6(D).

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-156 Log #848 NEC-P15 **Final Action: Accept**
(520.50(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action because the modified language that was accepted contains changes from the existing text that have not been identified.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise last sentence:

~~The individual~~ Each supplemental circuit within the road show connection point and theater shall be protected by branch circuit overcurrent protective devices ~~of suitable ampacity~~ installed within the road show connection panel.

Substantiation: "Individual" may imply a single load. Branch circuit overcurrent devices are not rated by ampacity which 3.2.5.1 of the Style Manual applies to conductors only. "Suitable" is a term to be avoided per the Style Manual. Ratings of overcurrent devices is covered elsewhere in the code.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-157 Log #4640 NEC-P15 **Final Action: Reject**
(520.51)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Delete the word "only" from the first sentence.

Substantiation: This limitation conflicts with 520.51(H)(1) and particularly 520.51(K). Further, 520.53(P) provides for qualified personnel to make the connections, and the power outlet option only appears in the exception. Power outlets are simply not the "only" source for connecting this equipment.

Panel Meeting Action: Reject

Panel Statement: A power outlet is defined as an assembly used to provide and control power. The reason for "only" is to ensure that power is derived from a proper power outlet.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-158 Log #1767 NEC-P15 **Final Action: Accept in Principle**
(520.52)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise last sentence: Circuits for lampholders rated over 300 watts shall be permitted where ~~overcurrent protection complies is~~ in accordance with ~~Article~~ 210.23.

Substantiation: Edit. Reference should not be made to an entire article. Section 210.23 is specific. 210.23(A), (B), and (C) is applicable; Table 210.24 does not preclude 15- and 20-ampere circuits from supplying heavy duty lampholders.

Panel Meeting Action: Accept in Principle

Delete entire section and replace with:

520.52 **Overcurrent Protection for Branch Circuits**. Portable switchboards shall contain overcurrent protection for branch circuits. Section 210.23 shall not apply.

Panel Statement: There are sections of Article 210, including portions of 210.23, that are not applicable to the overcurrent protection of branch circuits from portable switchboards on stage. Distinctions regarding 300 watts originated with obsolete equipment and are not applicable to current technology and industry practice.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

15-159 Log #839 NEC-P15 **Final Action: Reject**
(520.53)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (H)(3)(3) last sentence:
The ~~supply conductors~~ cords and cables shall be ~~adequately~~ protected by approved means where likely to be subject to physical damage.
Revise (H)(4)(4):
The supply ~~conductors~~ flexible cords and cables shall not penetrate ~~walls, floors, or ceilings,~~ structural members or finishes of buildings or structures or be run through door openings or regularly used traffic areas unless protected by approved means.
Substantiation: Supply conductors include all conductors from the source of power. This section relates to flexible cords and cables. Cords and cables should not be run through any structural members or finishes, not just walls, floors, and ceilings. Protective mats and coverings are available for cord and cable protection that are suitable for some foot traffic areas.
Panel Meeting Action: Reject
Panel Statement: The title of 520.53(H) is Supply Conductors. It is part of Part IV - Portable Switchboards on stage. It is obvious to users of the Code that it does not pertain to all conductors from the source of power. “Walls, floors, or ceilings” are intentionally more specific than “structural members or finishes of buildings of structures.” This section addresses all traffic areas, not just “regularly used.” The existing wording is clear as to intent or meaning.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-160 Log #847 NEC-P15 **Final Action: Reject**
(520.53(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter portion:
...Or otherwise ~~properly~~ coated with identified material to prevent corrosion or be made of a corrosion resistant material.
Substantiation: Edit. “Properly” is subjective and a term to be avoided per the Style Manual. “Identified” is “suitable for the use”.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 15-161.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-161 Log #1766 NEC-P15 **Final Action: Reject**
(520.53(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Enclosures of ~~wood~~ combustible material shall be completely lined with sheet metal of not less than 0.51 mm (0.020 in.) thickness and shall be ~~that is well~~ galvanized, enameled, or otherwise ~~properly~~ coated with noncombustible material to ~~prevent~~ minimize corrosion, or be of a corrosion resistant nonflammable material identified for the use.
Substantiation: Edit. Dimensions should be specified as thickness. Galvanizing and coating may minimize, but not prevent corrosion. Coating and corrosion resistant material should be nonflammable.
Panel Meeting Action: Reject
Panel Statement: The existing wording describing wood construction is correct but may not be representative of all combustible materials, the characteristics of lining material are based on wood construction.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-162 Log #1768 NEC-P15 **Final Action: Accept**
(520.53(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete: “all control wiring shall comply with Article 725”.
Substantiation: Edit. Reference should not be made to an entire article. Article 725 already applies where applicable and applies to remote control wiring.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-163 Log #846 NEC-P15 **Final Action: Accept in Part**
(520.53(F) and (H))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence of (F):
Conductors shall be enclosed in approved raceways or shall be... (remainder unchanged).
In (H)(1), delete “listed” and revise last sentence:
The supply cords or cables (and connector assembly) shall have ~~sufficient ampacity~~ current ratings not less than the total load connected to the switchboard and shall be protected by overcurrent devices.
In (H)(2), revise fourth sentence:
Where single conductors are paralleled ~~for increased ampacity the paralleled conductors shall be of the same size and length~~. They shall comply with 310.4 in (H)(3) and (4) and (4)(4) delete “adequately” and “suitably”.
Substantiation: Approved raceways other than metal raceways should be permitted. “Sufficiently”, “adequately”, and “suitably” are subjective and terms to be avoided per the Style Manual. “Ampacity” is a term to be used with conductors only (not connector assemblies) per the Style Manual. Present wording can be construed as amending the provisions for parallel conductors in 310.4 re: conductor material, insulation type and terminations. Conductors may be paralleled for reasons other than increased ampacity, such as ease in handling, availability.
Panel Meeting Action: Accept in Part
Accept the part in 520.53(H)(1): The supply cords or cable (and connector assembly) shall have ~~sufficient ampacity to carry~~ current ratings not less than the total load connected to the switchboard and shall be protected by overcurrent devices.
Reject all other proposed changes.
Panel Statement: In 520.53(H)(1), listing is a valid requirement. In 520.53(H)(2) existing language is clear and correct. 520.53(F) contains the words “metal wireways” because they are the intended and appropriate method for interior construction of portable switchboards.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-164 Log #973 NEC-P15 **Final Action: Reject**
(520.53(H)(1) and (2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
(1) The non-fixed wiring to a portable switchboard shall be by means of extra-hard usage flexible cords or cables identified for the use. The supply cords and cables shall terminate at the switchboard enclosure in a manually externally operable fused main switch or circuit breaker, or in a connector assembly identified for the purpose. The supply cords and cables, connector assembly fused switch and circuit breaker shall have a rating not less than the calculated load and the supply cords and cables shall be provided with overcurrent protection.
(2) Single conductor supply cords and cables shall not be smaller than 2 AWG and be Type SC, SCE, SCT, PPE, or W. An equipment grounding conductor other than type SC, SCE, SCT, PPE flexible cord or cable, shall be a stranded type. Single conductor neutral supply conductors shall be sized in accordance with 520.53(O)(2). Cables shall be grouped together but not bundled.
Substantiation: Extra-hard usage cords and cables should be suitable for the use since all such types are not suitable for all the “use” considerations in Table 400.4. Single conductor equipment grounding conductors other than types indicated in the proposal (building wire) should be stranded for flexibility. Requirements for identification of conductors and systems is already covered elsewhere in the Code and apply unless modified.
Panel Meeting Action: Reject
Panel Statement: Proposed wording removes required headings from (H)(1) and (H)(2). Proposed language does not add clarity. Enumeration of single-conductor cable types excludes future additions to this category.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-165 Log #1888 NEC-P15 **Final Action: Reject**
(520.53(H) and (L))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise fourth sentence of (H)(2): Where single conductors are paralleled ~~for increased ampacity,~~ the paralleled conductors shall comply with 310.4.~~ shall be of the same size and length.~~
In (H)(1)(3) and (4) and in (L), insert: “from the power outlet” after “supply” in the first sentences.
Substantiation: Parallel conductors may be installed for reasons other than increased ampacity, such as ease in handling or availability. The provisions should only apply to certain portions of supply conductors, not feeders or service conductors. 520.51 requires power outlets. 310.4 has additional requirements which may be deemed modified by only requiring the same size and length.
Panel Meeting Action: Reject
Panel Statement: The existing language is appropriate for this application and clearly describes proven, industry-specific safe practice.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-166 Log #1764 NEC-P15 **Final Action: Reject**
(520.53(H)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: The supply cord or cable (and connector assembly) shall have ~~sufficient~~ an ampacity ~~to carry the total load connected to the switchboard~~ not less than the rating of the master switch or circuit breaker and shall be protected by overcurrent devices.
Substantiation: "Sufficient" is subjective and a term to be avoided per the Style Manual. Ampacity of the supply conductors should be determined by the master switch or circuit breaker as loads connected to a switchboard may vary.
Panel Meeting Action: Reject
Panel Statement: Proposed wording would not allow the "tap rules" of 520.53(H)(3) and (4).
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-167 Log #3354 NEC-P15 **Final Action: Reject**
(520.53(H)(1)and (2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (1) and substitute:
The non-fixed wiring supply to a portable switchboard shall be extra-hard usage type flexible cords or cables identified for the use. The supply cords and cables shall terminate at the switchboard enclosure within an externally operable fused main (master) switch or circuit breaker, or in a connector assembly identified for the purpose. The master switch or circuit breaker, supply cords and cables (and connector assembly) shall have ratings not less than the rating of the switchboard and shall be provided with overcurrent devices.
Revise text of (2):
Single conductor portable supply cable sets shall be Type G, GC, or W and shall not be smaller than 2 AWG. The equipment grounding conductor shall not be smaller than 6 AWG. ~~conductor.~~ Single conductor grounded neutral conductors shall be sized in accordance with 520.23(O)(2). ~~Where single conductors are paralleled for increased ampacity the paralleled conductors shall be the same length and size.~~ Single-conductor supply cables shall be grouped together but not bundled. The equipment grounding conductor(s) shall be permitted to be of a different type, provided ~~it~~ they meet the other requirements of this section ~~and it shall be permitted to be reduced in size as permitted by 250.122~~. Grounded ~~(neutral)~~ circuit conductors and equipment grounding conductors shall be identified in accordance with applicable provisions of 200.6, 250.119, and 310.12.
~~Conductors shall be permitted to be identified by marking at least the first 150 mm (6 in.) from both ends of each length of conductor with white or gray. Equipment grounding conductors shall be permitted to be identified by marking at least the first 150 mm (6 in.) from both ends of each length of conductor with green or green with yellow strips. Where more than one nominal voltage exists within the same promises, each ungrounded conductor shall be identified by system.~~
Substantiation: In (B) (1), "supply" should be clearly specified as the non-fixed wiring; "supply" includes feeders and service conductors. The switch or circuit breaker where the supply terminates may not be within the switchboard. "Sufficient" is a term to be avoided per the Style Manual. "Permitted to be" does not impose a requirement per 90.5 and Article 499 does not specify listing. The supply cord or cable should have ratings not less than the switchboard since it is likely to accompany the portable switchboard and the load may vary from use to use.
In (B) (2), portable supply cable sets are not specifically defined; per Table 400.4 Types G, GC, and W appear to be the appropriate types. The provision for single parallel conductors is already covered in 310.4 and is not limited to single conductors and increased ampacity. Conductors may be paralleled for other reasons such as ease in handling or availability. Identification of equipment grounding conductors and grounded circuit conductors is covered elsewhere in the Code which includes being bare or stripped...which could be the "different" type...Where the grounded conductor is a circuit conductor it should be so noted; equipment grounding conductors are grounded conductors per the definition of Grounded in Article 100. The provision for identification of systems seems unwarranted since portable cables for this use are unlikely to be confused with other systems.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 15-164. Also, it is clear that this is non-fixed wiring because the text is part of 520 Part IV - Portable Switchboards On Stage. Marking for different systems is critical, since that is a typical use for Article 520 venues. Current wording clearly describes proven, industry-specific safe practice.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-168 Log #4641 NEC-P15 **Final Action: Accept**
(520.53(H)(3)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action relating to the use of the phrase "overcurrent protection device" vs. "overcurrent protective device".
This action will be considered by the panel as a public comment.
Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "the ampacity of the supply overcurrent protection device" to "the current rating of the supply overcurrent protection device."
Substantiation: Overcurrent devices do not possess ampacity. This wording violates 3.2.5.1 of the NEC Style Manual. Only conductors have ampacities.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-169 Log #4642 NEC-P15 **Final Action: Accept**
(520.53(H)(4)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action relating to the use of the phrase "overcurrent protection device" vs. "overcurrent protective device".
This action will be considered by the panel as a public comment.
Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "the ampacity of the supply overcurrent protection device" to "the current rating of the supply overcurrent protection device."
Substantiation: Overcurrent devices do not possess ampacity. This wording violates 3.2.5.1 of the NEC Style Manual. Only conductors have ampacities.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-170 Log #4643 NEC-P15 **Final Action: Accept**
(520.53(H)(4)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "the supply neutral terminal," to "the current rating of the supply neutral terminal and the ampacity of".
Substantiation: Terminals do not possess ampacity. This wording violates 3.2.5.1 of the NEC Style Manual. Only conductors have ampacities.
Panel Meeting Action: Accept
Panel Statement: The panel point outs that the actual section to be revised is 520.53(O)(1).
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-171 Log #2003 NEC-P15 **Final Action: Reject**
(520.53(L))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Superfluous; already covered by 110.27(B), 400.8(7), 520.53(H)(4)(3). "Approved" is inherent in the requirement per 110.2.
Panel Meeting Action: Reject
Panel Statement: Article 520 applications specifically require the protection described in 520.53(L). In addition, the clarification that such protection need not be a raceway is also required. Current wording clearly describes proven, industry-specific safe practice.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-172 Log #2187 NEC-P15 **Final Action: Accept**
(520.53(O)(2))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(2) Supply Neutral Conductor. The power supply conductors for portable switchboards utilizing solid-state phase-control dimmers shall be sized considering the neutral conductor as a current-carrying conductor for ampacity adjustment ~~derating~~ purposes. The power supply conductors for portable switchboards utilizing only solid-state sine wave dimmers shall be sized considering the neutral conductor as a non–current-carrying conductor for ampacity adjustment ~~derating~~ purposes. Where single-conductor feeder cables, not installed in raceways, are used on multiphase circuits feeding portable switchboards containing solid-state phase-control dimmers, the neutral conductor shall have an ampacity of at least 130 percent of the ungrounded circuit conductors feeding the portable switchboard. Where such feeders are supplying only solid-state sine wave dimmers, the neutral conductor shall have an ampacity of at least 100 percent of the ungrounded circuit conductors feeding the portable switchboard.
Substantiation: The term "ampacity adjustment factor" is a term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-173 Log #3008 NEC-P15 **Final Action: Accept**
(520.53(O)(2))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(2) Supply Neutral Conductor. The power supply conductors for portable switchboards utilizing solid-state phase-control dimmers shall be sized considering the neutral conductor as a current-carrying conductor for ampacity adjustment ~~derating~~ purposes. The power supply conductors for portable switchboards utilizing only solid-state sine wave dimmers shall be sized considering the neutral conductor as a non–current-carrying conductor for ampacity adjustment ~~derating~~ purposes. Where single-conductor feeder cables, not installed in raceways, are used on multiphase circuits feeding portable switchboards containing solid-state phase-control dimmers, the neutral conductor shall have an ampacity of at least 130 percent of the ungrounded circuit conductors feeding the portable switchboard. Where such feeders are supplying only solid-state sine wave dimmers, the neutral conductor shall have an ampacity of at least 100 percent of the ungrounded circuit conductors feeding the portable switchboard.
Substantiation: The term “adjustment factor” is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-174 Log #853 NEC-P15 **Final Action: Accept in Part**
(520.53(P) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In the *Exception*, change “ampacity” to “current rating”.
In (a), change “suitable” to “identified”.
In (c), change “suitable for the type of” to “not less than the load”.
Substantiation: Per the Style Manual, “ampacity” is to be applied only to conductors. “Suitable” is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Accept in Part
Accept the first and last recommendations:
In the *Exception*, change “rated ampacity” to “current rating”.
In (c), change “suitable for the type of” to “not less than the load”.
Reject the second recommendation:
In (a), change “suitable” to “identified”.
Panel Statement: The existing language of (a) to the exception is appropriate. While “suitable” is normally to be avoided, it is the best choice in this section.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-175 Log #850 NEC-P15 **Final Action: Reject**
(520.61(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(D) FLANGED SURFACE DEVICES. ~~INLETS~~ Flanged surface devices ~~inlets that are used to accept the power~~ shall be rated in amperes.
(E) CABLE ARRANGEMENT Flexible cords and cables shall be ~~adequately~~ protected by approved means where they pass through enclosures and be ~~arranged~~ installed or provided with identified strain relief fittings so that tension on the flexible cord or cable is not transmitted to the terminations.
Substantiation: Flanged surface outlets should be included, also flexible cables... Means to prevent tension on terminations should be identified for the use, not looping or tying the cord or cable.
Panel Meeting Action: Reject
Panel Statement: The proposal does not match the text of 520.61.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-176 Log #2045 NEC-P15 **Final Action: Reject**
(520.62(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change “current-carrying” to “live”.
Substantiation: Edit. Current-carrying may be deemed to mean capable of carrying current or actually energized. “Live” is explicit and defined.
Panel Meeting Action: Reject
Panel Statement: The meaning is clear. The nature of environment means some parts could be live sometimes and not others. “Current-carrying” is common usage and identified as suitable in the NEC Style Manual.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-177 Log #852 NEC-P15 **Final Action: Accept in Part**
(520.62(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
Flexible cords or cables supplying pendant receptacle or cord connectors shall be ~~listed for~~ extra-hard usage types identified for the use.
Substantiation: Pendant cord connectors should be included. Flexible cords and cables should be identified as suitable for the conditions of use. Article 400 does not specify listing.
Panel Meeting Action: Accept in Part
Accept the introduction of the word “flexible” and the phrase “or cord connectors.”
The panel rejects all other proposed changes.
Flexible Cords or cables supplying pendant receptacles or cord connectors shall be listed for extra-hard usage.
Panel Statement: The panel contends that listed cord or cable is required for this article.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-178 Log #840 NEC-P15 **Final Action: Reject**
(520.62(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. This section covers portable power distribution units, defined as an enclosure containing receptacles and overcurrent devices, not specifically related to cords or cables. “Adequately” is subjective and a term to be avoided per the Style Manual. Flexible cord and cable protection is covered elsewhere in the Code. Section 406.6 covers ratings for flanged surface devices.
Panel Meeting Action: Reject
Panel Statement: Paragraphs (D) and (E) are clearly within the scope of portable power distribution units and contain valid requirements.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-179 Log #2044 NEC-P15 **Final Action: Reject**
(520.65)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence and substitute:
The connections of permanently attached leads of pendant lampholders to festoon conductors shall be staggered.
Substantiation: Edit. Clarification of apparent intent.
Panel Meeting Action: Reject
Panel Statement: All joints in a festoon assembly are subject to the staggering requirement, not just joints of pendant lampholders.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-180 Log #4644 NEC-P15 **Final Action: Accept**
(520.65)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following sentence after the first sentence: “Where such lampholders have terminals of a type that puncture the insulation and make contact with the conductors, they shall be attached only to conductors of the stranded type.”
Substantiation: This is an important rule that is necessary to properly apply this equipment. It appears in 225.24. This section correctly incorporated the portion of the rule regarding staggered joints, but fails to bring in the stranding rule. Since this wiring is usually indoors, 225.24 does not automatically apply.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-181 Log #835 NEC-P15 **Final Action: Reject**
(520.68(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
(1) Flexible conductors including cable extensions used to supply portable stage equipment shall be ~~listed~~ hard usage types identified for the use except as permitted in (A)(2).
Exception: Flexible cords that are an integral part of listed floor or table lamps or appliances shall be permitted.
(2) Listed hard usage type flexible cord shall be permitted to supply stand lamps where the cord is not likely to be subject to physical damage and is protected by an overcurrent device in accordance with 240.5(A) but not over 20 amperes.

Substantiation: Article 400 does not require listing. Cords should be identified as suitable for the use such as wet or oil conditions, direct sunlight, etc. electric vehicle cords may not be suitable. Section 240.5(A) is not specifically amended by this section.
Panel Meeting Action: Reject
Panel Statement: The proposed wording is not correct (material omitted and not shown as such in legislative format). Listed extra-hard usage cords and cables are the only type permitted for general use. "Not likely" is not prescriptive enough and is to be avoided per the NEC Style Manual.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-182 Log #2043 NEC-P15 **Final Action: Reject**
(520.73)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete last sentence.
Substantiation: Superfluous: The first sentence specifies which outlets are to be switched, which then doesn't apply to other outlets.
Panel Meeting Action: Reject
Panel Statement: The current wording is correct. Only outlets adjacent to mirrors must be switched.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-183 Log #2042 NEC-P15 **Final Action: Reject**
(520.81)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "metal sheathed" to "metal enclosed".
Substantiation: Edit. "Metal-sheathed" may be deemed not to include Type AC and MC cables which don't have "sheaths".
Panel Meeting Action: Reject
Panel Statement: The existing wording is adequate. Metal sheathed cable does not exclude type AC and MC cable.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 522 — CONTROL SYSTEMS FOR PERMANENT AMUSEMENT ATTRACTIONS

15-184 Log #2800 NEC-P15 **Final Action: Accept**
(522.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~522.3 Other Articles~~
~~Wherever the requirements of other articles of this Code and Article 522 differ, the requirements of Article 522 shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 522.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-185 Log #4289 NEC-P15 **Final Action: Accept**
(522.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~522.3 Other Articles.~~
~~Wherever the requirements of other articles of this Code and Article 522 differ, the requirements of Article 522 shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 522.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-186 Log #901 NEC-P15 **Final Action: Reject**
(522.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Only qualified persons shall install, service, and maintain electrical control systems.
Substantiation: Edit. "Permanent amusement attractions" includes non-electrical components while 522.1 indicates this article covers electrical wiring.
Panel Meeting Action: Reject
Panel Statement: Section 522.7 covers maintenance and does not cover the installation of control systems for permanent amusement attractions. The panel contends that the existing language is more appropriate.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-187 Log #2648 NEC-P15 **Final Action: Reject**
(522.22)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Conductors sized 16 AWG and smaller shall not exceed the continuous current values provided ampacity specified in Table 522.22.
Substantiation: Edit. Table 522.22 specifies but does not provide ampacity; that is determined by the conductor, material, insulation, and conditions of use. "Continuous" is superfluous; the definition of ampacity specifies continuous current.
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects. The panel does not understand the submitters intent.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-188 Log #1624 NEC-P15 **Final Action: Reject**
(522.23)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "Table 310.16" to "Table 310.15(B)(1)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: The references made by the submitter will be automatically addressed if the lead proposal is accepted by Panel 6.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-189 Log #2649 NEC-P15 **Final Action: Reject**
(522.23)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows: Conductors larger than 16 AWG shall have overcurrent protection in accordance with applicable provisions of Article 725. ~~the appropriate conductor ampacity in Table 310.16.~~
Substantiation: Edit. Since this section relates to control circuits, Article 725 seems to be an appropriate reference since 725.43 doesn't apply derating factors and Table 310.16 does (allowable ampacities). Class 2 circuit conductors are not specified in Article 725 to be provided with overcurrent protection.
Panel Meeting Action: Reject
Panel Statement: The requirement is for the overcurrent protection of conductors, per the ampacity table, Table 310.16. This proposed change is not editorial and the submitter has not provided any substantiation for this change.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-190 Log #865 NEC-P15 **Final Action: Reject**
(522.24(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (3) IN a MANHOLE or HANDHOLE Control circuits and power and lighting circuits shall only be permitted in the same manhole or handhole in accordance with at least one of the following:
(1) The power and lighting or control circuits or all system conductors are in a separate dedicated identified raceway, metal covered cable, or type UF multiconductor cable.
Make present (B)(3)(4) bold (4) and revise:
CABLE TRAYS. In cable trays where the control circuit conductors and power and lighting conductors not functionally associated with them are separated by a solid fixed barrier of a material compatible with the cable tray, or where the power and lighting or control circuit conductors are in a separate dedicated identified raceway or metal-covered cable.
Substantiation: Handholes should be included. “Permitted” without “only” is not a requirement per 90.5 but identifies actions not required. The present (B)(3)(3) should have a heading since it doesn’t relate to (B)(3) in a manhole.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any technical substantiation for the proposed changes.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

15-191 Log #857 NEC-P15 **Final Action: Reject**
(522.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
(1) Continuity of power is required for orderly shutdown and where a ground-fault is likely to result in a hazardous condition.
(2) Ground detectors are installed on the control system at an approved location.
Add: FPN: See *Exception No. 2* for 250.162(A) for rectifier-derived dc systems.
Substantiation: The provision should apply where interruption of power is likely to result in a hazard. *Exception No. 2* for 250.162(A) is not modified by this provision and also applies. Ground detectors should be installed at a location occupied by a person during hours of operation.
Panel Meeting Action: Reject
Panel Statement: The present wording is clear and the reference to a hazardous condition is unnecessary. A requirement for the location of the ground detectors to be installed at approved (unspecified) locations is unnecessary.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 525 — CARNIVALS, CIRCUSES, FAIRS, AND SIMILAR EVENTS

15-192 Log #834 NEC-P15 **Final Action: Reject**
(525.5(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Open individual conductors and multiconductor cables shall have a vertical clearance ~~to ground~~ in accordance with 225.18.
Substantiation: Edit. Section 225.18 includes vertical clearances from platforms or projections and limits the provision to open type conductor which may not be perceived as cords.
Panel Meeting Action: Reject
Panel Statement: “Conductors” is a more inclusive term. The recommendation does not enhance the usability of the Code.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-193 Log #3511 NEC-P15 **Final Action: Accept**
(525.5(B)(2))

TCC Action: The Technical Correlating Committee directs that the panel clarify the action taken on this proposal relating to the phrase “and extending vertically to grade” by placing it after the word “horizontally” in the text.
This action will be considered by the panel as a public comment.
Submitter: Mark R. Hilbert, Wolfeboro, NH
Recommendation: Revise 525.5(B)(2) as follows:
(B) Clearance to Portable Structures.
(2) Over 600 Volts. Portable structures shall not be located under or within a space that is 4.5 m (15 ft) horizontally of conductors operating in excess of 600 volts and extending vertically to grade.
Substantiation: Since the 2008 NEC, 525.5(B)(2) has applied to concessions and other portable structures and in many cases there is limited space at fairgrounds, etc. With the expansion of this section in 2008, the interpretation of this section has become significantly more important. Although I have always had some questions regarding the literal wording of this section, I have interpreted it to mean that a ride or attraction or now a portable structure cannot be located in the space under the 15 ft horizontal measurement. However, when this section only applied to rides and attractions (prior to 2008) there were not as many questions from the industry.
The current language in 525.5(B)(2) states: “portable structures cannot be located under or within 12 ft horizontally of conductors operating in excess of 600 volts.” If taken literally, as demonstrated in Figure 1, it could be reasonably interpreted that a portable structure could be located in a manner that meets the 12 ft horizontal measurement and not be located under the conductors, but still have a portion that is located within a space that is under the 15 ft horizontal measurement.
If 525.5(B)(2) intends that the portable structure not be located in the space under the 15 ft horizontal measurement, as shown in Figure 2, then the proposed revision will clarify how the section is to be interpreted.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-194 Log #855 NEC-P15 **Final Action: Reject**
(525.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:...with ~~mechanical~~ approved protection where such equipment or wiring methods are likely to be subject to physical damage.
Substantiation: Edit. “Mechanical” implies machinery or tools. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: “Likely” is not prescriptive enough and is to be avoided per the NEC Style Manual. “Mechanical” is imperative as part of the application.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-195 Log #1923 NEC-P15 **Final Action: Reject**
(525.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where likely to be subject to physical damage electrical equipment and wiring methods in or on portable structures shall be provided with ~~mechanical~~ identified means of protection. ~~where such equipment or wiring methods are subject to physical damage.~~
Substantiation: Edit. “Mechanical” implies tools or machinery. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: “Likely” is not prescriptive enough and is to be avoided per the NEC Style Manual. “Mechanical” is imperative as part of the application.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-196 Log #1782 NEC-P15 **Final Action: Reject**
(525.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Service equipment shall not be installed in a location ~~that is~~ where accessible to ~~unqualified~~ unauthorized persons unless the equipment enclosure is locked or under the continuous observation and control of an authorized person.
Substantiation: The equipment should be actually locked not just have the potential for being locked. If an enclosure is locked, it need not be inaccessible to unqualified persons. Many locked switches, transformer enclosures, etc., in public areas are accessible. A person can exercise control without be “qualified”.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 15-197.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-197 Log #2041 NEC-P15 **Final Action: Reject**
(525.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Service equipment shall not be installed in a location that is accessible to unqualified persons unless the equipment is ~~lockable~~ locked or under the continuous supervision of a qualified person.
Substantiation: Edit. The equipment should not only be lockable, but actually locked.
Panel Meeting Action: Reject
Panel Statement: The existing wording is adequate. The term locked is not enforceable.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-198 Log #854 NEC-P15 **Final Action: Accept in Principle in Part**
(525.10(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (A):
Service equipment shall not be installed in a location that is accessible to unqualified persons unless the equipment is ~~lockable~~ provided with identified integral permanent means for locking in the open (off) position and kept locked.
Revise text of (B):
Service equipment shall be ~~mounted on solid backing~~ securely fastened in place and if installed in a wet location be weatherproof or protected from the weather by approved means ~~and be installed so as to be protected from the weather unless of weatherproof construction~~.
Substantiation: "Lockable" is not specific and allows for makeshift methods; does not specifically require equipment to be locked. Free standing equipment secured to concrete slabs are not mounted on backing. Protection from weather should be "approved".
Panel Meeting Action: Accept in Principle in Part
Reject proposed change to paragraph (A). See action and statement on Proposal 15-197.
Accept in principle the wording in (B).
The revised wording to read:
(B) Mounting and Location. Service equipment shall be securely fastened to a ~~mounted on~~ solid backing and be installed so as to be protected from the weather, unless of weatherproof construction.
Revised wording meets the submitter's intent and provides clarity.
Panel Statement: See the panel action and statement for Proposal 15-197 for the part being rejected. The revised wording in (B) meets the submitters intent and provides additional clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-199 Log #2040 NEC-P15 **Final Action: Reject**
(525.10(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (B) and reference to 525.10(A) and (B) in the first paragraph.
Substantiation: Unnecessary redundant rule; already covered by 110.12 and 110.13(A). Additionally, some premises covered by this article are permanent and have switchboards mounted and secured to floors or concrete bases. Weatherproof requirements are also covered elsewhere in the Code.
Panel Meeting Action: Reject
Panel Statement: Requirements of 525.10(B) must be clearly called out in Article 525. 110.12 and 110.13(A) do not eliminate the need for 525.10(B).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-200 Log #1704 NEC-P15 **Final Action: Reject**
(525.11 Exception (New))

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Add an exception to 525.11 Multiple Sources of Supply, for portable structures that are non-metallic, like a tent.
Where multiple services or separately derived systems, or both, supply portable structures, the equipment grounding conductors of all the sources of supply that serve such structures separated by less than 3.7 m (12 ft) shall be bonded together at the portable structures. The bonding conductor shall be copper and sized in accordance with Table 250.122 based on the largest overcurrent device supplying the portable structures, but not smaller than 6 AWG.
Exception: This bonding requirement will not apply to nonmetallic portable structures such as tents.
Substantiation: It would be pointless to bond canvas or wood structures to each other.
Panel Meeting Action: Reject
Panel Statement: 525.11 requires equipment grounding conductors of separate supplies supplying different structures less than 12 ft apart to be bonded together. Equipment located within non-metallic structures should not be exempt from this requirement. The requirement is to bond the equipment grounding conductors of both electrical supply sources, preventing a difference in potential between equipment energized from two separate sources, even though the equipment supplied may be located under a canopy or tent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-201 Log #2680 NEC-P15 **Final Action: Reject**
(525.20(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Where flexible cords or cables are used they shall be ~~listed for~~ extra-hard usage types and identified for the use, such as wet locations and sunlight resistant. Where flexible cords are used and not subject to physical damage they shall be permitted to be ~~listed for~~ hard usage. Where used outdoors flexible cords and cables shall also be ~~listed~~ identified for wet locations and be sunlight resistant. Extra-hard usage flexible cords or cables shall be permitted for use as ~~permanent~~ fixed wiring on portable amusement rides and attractions where not likely to be subject to physical damage.
Substantiation: Article 400 does not require listing. Cords should be identified as suitable for the use. All extra-hard usage and hard usage types are not suitable, e.g., electric vehicle cable. "Permanent" is not defined.
Panel Meeting Action: Reject
Panel Statement: Listing is required for Article 525 venues. Cords listed for extra -hard usage are suitable for wet locations and sunlight are resistant. The phrase "subject to physical damage" is self-explanatory.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-202 Log #2647 NEC-P15 **Final Action: Reject**
(525.20(A), (D), and (G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete texts and substitute: (A) Flexible cords and cables shall be permitted for temporary wiring and permanent wiring on portable amusement rides and attractions and portable structures. Flexible cords and cables shall be extra-hard usage types identified for the purpose and sunlight resistant where exposed to direct sunlight. Where likely to be subject to physical damage they shall be protected by identified means. Where passing through doorways or other pinch points approved protection shall be provided. (D) Flexible cords and cables shall be continuous without splice or taps between terminations. (G) Flexible cords and cables accessible to the public shall be arranged to minimize the tripping hazard and shall be covered with an identified nonconductive matting where installed on the ground in areas of pedestrian travel. It shall be permitted to bury flexible cords or cables used for temporary wiring where not likely to be subject to physical damage and not installed under a building or structure. The requirements of 300.5(A) shall not apply.
Substantiation: Edit. Article 400 does not specify listing. Where use outdoors under cover such as tents or awnings and not exposed to direct sunlight cords and cables should not have to be sunlight resistant. Direct burial should only be where not under buildings or structures and not likely to be disturbed or damaged by foot or vehicle traffic or animal confinement areas. Covering for cords or cables laid on the ground in traffic areas should be a requirement.
Panel Meeting Action: Reject
Panel Statement: Listing is required. Current wording clearly describes proven, industry-specific safe practice. The proposed wording does not provide clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-203 Log #4756 NEC-P15 **Final Action: Accept in Principle**
(525.21)

Submitter: Kim Jones, Funtastic Shows / Rep. O.A.B.A. Outdoor Amusement Businessmans Assoc.
Recommendation: Add new text to read as follows:
(c) Portable structure disconnecting means.
Wiring and equipment in portable disconnecting means shall conform to the section applying to permanently fixed structures, but, due to the limited space available, the working spaces shall be permitted to be reduced, provided that the equipment shall be arranged so that the operator can work safely and so that other persons in the vicinity cannot accidently come into contact with current-carrying parts or bring conducting objects into contact with them while they are energized.
Substantiation: This proposal allows the NEC to recognize that Art. 525 Portable structures have the same limited space available as other portable industries do. The wording was plagiarized from Art. 530.62. The proposal would bring into compliance the vast majority of portable structures that cannot meet existing space requirements.
Panel Meeting Action: Accept in Principle
Revise beginning of proposal text - entire added text now reads:
(c) Working Space for Electrical Equipment in Portable Structures
In portable structures where electrical equipment is installed, and the working space of 110.26 applies, the working spaces shall be permitted to be reduced, provided that the equipment shall be arranged so that work can be performed safely and so that persons in the vicinity cannot accidentally come into contact with energized parts or bring conducting objects into contact with energized parts.
Panel Statement: The revised wording meets the intent of the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
SAMPSON, M.: I respectfully request that the panel reject this proposal. Section 110.26 establishes the minimum safe working clearances around electrical equipment. To compromise that minimum for the disconnecting means for a portable structure would expose carnival and festival workers to unnecessary electrical hazards. Note that the phrase “shall be permitted to be reduced” provides no limit whatsoever and would allow the complete elimination of the safe working clearances. Electrical work on and in portable structures is often done “hot” and almost always done by the owners, operators or their unlicensed employees who may not fully understand the hazards involved. For the safety of those who work on this equipment, the minimum working clearance should not be negotiable.
WHITE, A.: The proposal as written presents a dangerous precedent. The clearance requirements of 110.26 are critical to worker safety and should not be reduced due to space limitations. Workers installing and preforming maintenance on this equipment are deserving of the same safety considerations as those workers preforming the very same work on permanent structures. Safety is paramount and should not be superceded by convenience.

15-204 Log #1326 NEC-P15 **Final Action: Reject**
(525.21(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise third sentence:
Where accessible to ~~unqualified~~ unauthorized persons the ~~enclosure for~~ switch or circuit breaker shall be ~~of the lockable type~~ provided with an identified permanent integral means for locking in the open (off) position and kept locked when the operator is not present.
Substantiation: “Lockable type” is not specific. Locking the enclosure doesn’t prevent operation of the disconnecting means external handle. Operators are usually authorized but “unqualified”. Present wording does not require a lockable type when the operator is present; can it be installed when not present? The disconnecting means should be kept locked when the operator is not present.
Panel Meeting Action: Reject
Panel Statement: “Authorized” does not mean “qualified”, and qualified is required (therefore the term “unqualified” is appropriate). The intent of the remainder of proposal is met by the panel action on Proposal 15-205.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-205 Log #1569 NEC-P15 **Final Action: Accept**
(525.21(A))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the proposal and correlate with the action taken on Proposal 1-63.
This action will be considered by the panel as a public comment.
Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(A) Disconnecting Means. **A means to disconnect e**ach portable structure **from all ungrounded conductors** shall be provided**.** ~~with a~~ **The** disconnect**ing means shall be** ~~switch~~ located within sight of and within 1.8 m (6 ft) of the operator’s station. The disconnecting means shall be readily accessible to the operator, including when the ride is in operation. Where accessible to unqualified persons, the **disconnecting means shall be lockable.** ~~enclosure for the switch or circuit breaker shall be of the lockable type~~. A shunt trip device that opens the fused disconnect or circuit breaker when a switch located in the ride operator’s console is closed shall be a permissible method of opening the circuit.
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for “Disconnecting Means, Lockable.”
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-206 Log #581 NEC-P15 **Final Action: Reject**
(525.21(B))

Submitter: Mitch Feininger, North Dakota State Electrical Board
Recommendation: Delete the following text:
~~All lamps for general illumination shall be protected from accidental breakage by a suitable luminaire or lampholder with a guard.~~
Substantiation: I think that the first part of the paragraph, which requires protection for lamps that are subject to physical damage is sufficient. If it is not subject to physical damage, breakage is unlikely.
Panel Meeting Action: Reject
Panel Statement: The first sentence covers wiring and does not automatically imply lamps. The second sentence addressing lamps is necessary.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-207 Log #1922 NEC-P15 **Final Action: Reject**
(525.21(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Electrical wiring ~~for lighting~~ where installed in or on tents and concessions shall comply with 525.20(G) and be securely supported ~~installed. and~~ Where likely to be subject to physical damage identified means of protection shall be provided. ~~With mechanical protection.~~ All lamps for general illumination shall be protected from accidental breakage by ~~a suitable~~ an identified luminaire or lampholder or guard.
Substantiation: The provision should also apply to the outside surfaces of tents and concessions and to wiring for other than lighting. “Suitable” is a term to be avoided per Style Manual; “likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The proposed wording does not improve or clarify current wording. In addition, it would allow a lamp to be installed without a guard.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-208 Log #1891 NEC-P15 **Final Action: Accept**
(525.22(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Boxes shall be designed so that no live parts are exposed ~~to accidental contact~~ except when necessary for examination, adjustment, servicing, or maintenance by qualified persons.
Substantiation: “Accidental” is superfluous. Exposed live parts may be necessary during examination, adjustment, or servicing.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-209 Log #2533 NEC-P15 **Final Action: Accept in Principle in Part**
(525.23)

Submitter: Marcus R. Sampson, Lysistrata Electric
Recommendation: Revise text to read as follows:
525.23 Ground-Fault Circuit-Interrupter (GFCI) Protection.
(A) Where GFCI Protection Is Required. ~~The ground-fault-circuit-interrupter shall be permitted to be an integral part of the attachment plug or located in the power supply cord, within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating ground-fault-circuit-interrupter for personnel shall be permitted.~~
~~(1) 125-volt, single-phase, 15- and 20-ampere non-looking type receptacles used for disassembly and reassembly or readily accessible to the general public.~~
~~(2) Equipment that is readily accessible to the general public and supplied from a 125 volt, single-phase, 15- or 20-ampere branch circuit~~
~~**(B) Where GFCI Protection Is Not Required.** Receptacles that only facilitate quick disconnecting and reconnecting of electrical equipment shall not be required to be provided with GFCI protection. These receptacles shall be of the looking type.~~
All 125-volt, single-phase, 15- and 20-ampere receptacles.
~~**(C)**~~ **(B) Where GFCI Protection Is Not Permitted.** Egress lighting shall not be protected by a GFCI.
Substantiation: GFCI is a time-tested technology and this protection was expanded in the 2008 Code cycle to apply to all 125-volt, single-phase, 15- and 20-ampere outdoor receptacles. This same level of personal safety must be extended to the workers and patrons of carnivals, festivals and events.
Panel Meeting Action: Accept in Principle in Part
The panel rejects the revisions to Part (A) of 525.23 and accepts in principle the intent of the changes to part (B) with the revised wording as follows:
(B) **Where GFCI Protection Is Not Required**. Receptacles that are not accessible from grade level and that only facilitate quick disconnecting and reconnecting of electrical equipment shall not be required to be provided with GFCI protection. These receptacles shall be of the locking type.
Panel Statement: For part (A) see panel action and statement on proposal 15-213. Panel action on (B) reinforces the intent to limit the receptacles not requiring GFCI protection for personnel to those used in very specific applications.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-210 Log #503 NEC-P15 **Final Action: Accept in Part**
(525.23(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in two places and add an "a" in the second sentence so it reads: "Listed cord sets incorporating a ground-fault circuit-interrupter for personnel shall be permitted."
Substantiation: The addition of the hyphen will correlate with the title of 525.23 and provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
The addition of the "a" is grammatical.
Panel Meeting Action: Accept in Part
Accept the part to add a hyphen in two locations. The remainder of the proposal is rejected.
Panel Statement: Addition of the 'a' is supplanted by revised language as accepted in panel action on Proposal 15-213.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-211 Log #1307 NEC-P15 **Final Action: Accept in Principle**
(525.23(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add to first paragraph:
Ground-fault circuit interrupter protection shall be provided for receptacles and equipment described in 525.23(A)(1) and (2).
Substantiation: Edit. The text has no specific requirement to provide GFCI protection.
Panel Meeting Action: Accept in Principle
See panel action on Proposal 15-213.
Panel Statement: The panel action and statement on Proposal 15-213 incorporates the intent of the submitter's proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-212 Log #1890 NEC-P15 **Final Action: Accept in Principle**
(525.23(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Ground-fault circuit interrupter protection shall be provided for the following:
(1) no change.
(2) no change.
The ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug or located in the power supply cord within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating a ground-fault circuit interrupter for personnel shall be permitted.
Substantiation: Edit. Since the heading refers to where protection is required, (1) and (2) should immediately follow, as the first paragraph relates to types.
Panel Meeting Action: Accept in Principle
See panel action on Proposal 15-213.
Panel Statement: The panel action and statement on 15-213 incorporates the intent of the submitters proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-213 Log #2188 NEC-P15 **Final Action: Accept**
(525.23(A))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
525.23 Ground-Fault Circuit-Interrupter (GFCI) Protection.
(A) Where GFCI Protection Is Required. GFCI protection for personnel shall be provided for the following: ~~The ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug or located in the power-supply cord, within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating ground-fault circuit interrupter for personnel shall be permitted.~~
(1) All 125-volt, single-phase, 15- and 20-ampere non-locking-type receptacles used for disassembly and reassembly or readily accessible to the general public.
(2) Equipment that is readily accessible to the general public and supplied from a 125-volt, single-phase, 15- or 20-ampere branch circuit.
The ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug or located in the power-supply cord, within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating ground-fault circuit interrupter for personnel shall be permitted.
Substantiation: A careful reading of the existing code language will show that 525.23(A) contains no enforceable requirement, as the text contains no rule.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-214 Log #3009 NEC-P15 **Final Action: Accept**
(525.23(A))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
525.23 Ground-Fault Circuit-Interrupter (GFCI) Protection.
(A) Where GFCI Protection Is Required. GFCI protection for personnel shall be provided for the following: ~~The ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug or located in the power-supply cord, within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating ground-fault circuit interrupter for personnel shall be permitted.~~
(1) All 125-volt, single-phase, 15- and 20-ampere non-locking-type receptacles used for disassembly and reassembly or readily accessible to the general public
(2) Equipment that is readily accessible to the general public and supplied from a 125-volt, single-phase, 15- or 20-ampere branch circuit
The ground-fault circuit interrupter shall be permitted to be an integral part of the attachment plug or located in the power-supply cord, within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating ground-fault circuit interrupter for personnel shall be permitted.
Substantiation: A careful reading of the existing code language will show that 525.23(A) contains no enforceable requirement, as the text contains no rule.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-215 Log #4799 NEC-P15 **Final Action: Reject**
(525.23(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
525.23 ~~Ground-Fault Circuit-Interrupter (GFCI)~~ Power Safe Protector Protection.
(A) Where ~~GFCI~~ power safe protector Protection Is Required. The ~~ground-fault circuit interrupter~~ power safe protector shall be permitted to be an integral part of the attachment plug or located in the power-supply cord, within 300 mm (12 in.) of the attachment plug. Listed cord sets incorporating ~~ground-fault circuit interrupter~~ power safe protector for personnel shall be permitted.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle is actively supplying power to an appliance, it provides traditional GFCI protection.
2. PSP receptacles monitor the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There are no product standard requirements for the PSP receptacle and as such it is inappropriate to consider adding such requirements to the code. A study of wiring device failure mechanisms along with evidence that the technology can mitigate the hazards claimed is necessary before further consideration can be given.
The Panel notes that there is nothing in the NEC prohibiting installation of these devices.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-216 Log #3010 NEC-P15 **Final Action: Reject**
(525.30)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Delete the following text:
~~525.30 Equipment Bonding.~~
~~The following equipment connected to the same source shall be bonded:~~
~~(1) Metal raceways and metal-sheathed cable~~
~~(2) Metal enclosures of electrical equipment~~
~~(3) Metal frames and metal parts of portable structures, trailers, trucks, or other equipment that contain or support electrical equipment~~
~~The equipment grounding conductor of the circuit supplying the equipment in items (1), (2) or (3) that is likely to energize the metal frame or part shall be permitted to serve as the bonding means.~~
Substantiation: All of this is already covered in Article 250. The problem that arises with having the same technical requirements under the purview of two different code making panels is that eventually the requirements begin to differ. This creates major problems for all users of the code, and can be avoided by simply keeping the grounding and bonding requirements in article 250, unless they need to be modified or supplemented (90.3).
Panel Meeting Action: Reject
Panel Statement: The special nature of Article 525 venues warrants reiteration of these requirements in Article 525.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-217 Log #1889 NEC-P15 **Final Action: Reject**
(525.31)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. The requirements of this section are already covered by provisions of Article 250 which apply unless amended.
Panel Meeting Action: Reject
Panel Statement: The special nature of Article 525 venues warrants reiteration of these requirements in Article 525.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-218 Log #3011 NEC-P15 **Final Action: Reject**
(525.31)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Delete the following text:
~~525.31 Equipment Grounding.~~
~~All equipment to be grounded shall be connected to an equipment grounding conductor of a type recognized by 250.118 and installed in accordance with Parts VI and VII of Article 250. The equipment grounding conductor shall be connected to the system grounded conductor at the service disconnecting means or, in the case of a separately derived system such as a generator, at the generator or first disconnecting means supplied by the generator. The grounded circuit conductor shall not be connected to the equipment grounding conductor on the load side of the service disconnecting means or on the load side of a separately derived system disconnecting means.~~
Substantiation: All of this is already covered in Article 250. The problem that arises with having the same technical requirements under the purview of two different code making panels is that eventually the requirements begin to differ. This creates major problems for all users of the code, and can be avoided by simply keeping the grounding and bonding requirements in article 250, unless they need to be modified or supplemented (90.3).
Panel Meeting Action: Reject
Panel Statement: The special nature of Article 525 venues warrants reiteration of these requirements in Article 525.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

15-219 Log #3012 NEC-P15 **Final Action: Reject**
(525.32)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Delete the following text:
~~525.32 Grounding Conductor Continuity Assurance.~~
~~The continuity of the grounding conductor system used to reduce electrical shock hazards as required by 250.114, 250.138, 406.3(C), and 590.4(D) shall be verified each time that portable electrical equipment is connected.~~
Substantiation: Unless you work at the circus, this job is unenforceable. How, as the AHJ, am I to verify compliance with this, without spending all day at the circus, watching people plug and unplug equipment?
Panel Meeting Action: Reject
Panel Statement: This section improves safety. Verification can be accomplished by an assured equipment grounding program such as described in 590.6(B)(2). It requires written records to be maintained and made available to the AHJ's, therefore, the AHJ does not have to work in the circus.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

(Note: Sequence 15-220 was not used)

ARTICLE 530 — MOTION PICTURE AND TELEVISION STUDIOS AND SIMILAR LOCATIONS

15-221 Log #3328 NEC-P15 **Final Action: Reject**
(530.12(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The wiring for stage set lighting and other supply wiring not fixed in place ~~as to location~~ shall be done with ~~listed~~ extra-hard usage ~~or hard usage~~ type flexible cords or cables identified for the use. ~~Where subject to physical damage, such wiring shall be listed extra hard usage flexible cords and cables.~~ Splices or and taps in cables shall be permitted where ~~such are~~ made with ~~listed~~ identified means and the circuit is protected at not more than 20 amperes.
Exception: Flexible cords that are an integral part of listed portable table or floor luminaries or lampholders or other appliances.
Substantiation: Edit. Listing is not specified in Article 400. Section 400.8(7) does not permit cords where subject to physical damage; there is no provision that modifies that section. Cords and cables should be identified for the use; all are not suitable for wet locations, sunlight resistance, etc., nor are electric vehicle cables. An exception should be provided for portable stage set lighting and appliances. Splices and taps may be made with solder which is not a listed means.
Panel Meeting Action: Reject
Panel Statement: The wording change does not offer any improvement to understanding. The panel intends these cables to be listed. Current wording clearly describes proven, industry-specific safe practice. The submitter failed to identify all of the changes he made in this section of his recommendation.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-222 Log #978 NEC-P15 **Final Action: Reject**
(530.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Switches used for studio ~~stage~~ set lighting and effects (on the stages and lots and on location) shall be of the ~~externally~~ manually operable type. Where contactors are used for the disconnecting means for fuses ~~an individual externally~~ a manually operable ~~suitably rated~~ switch identified for the use and control of each contactor shall be readily accessible and located at a distance of not more than 1.8 m (6 ft) from the contactor, in addition to any remote control switches for the contactor. A single ~~externally~~ manually operable switch shall be permitted to simultaneously disconnect all the contactors on any one location board where readily accessible and located at a distance of not more than 1.8 m (6 ft) from the location board.
Substantiation: Edit. Externally operable includes external remote control circuits. "Suitable" is subjective and a term to be avoided per the Style Manual. Readily accessible should be a requirement.
Panel Meeting Action: Reject
Panel Statement: Current wording clearly describes proven, industry-specific safe practice.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-223 Log #1837 NEC-P15 **Final Action: Reject**
(530.19(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A demand factor of 50 percent of ~~maximum possible connected~~ calculated load shall be permitted for all portable feeders.
Substantiation: If a portable feeder is rated for 200 amperes (maximum connected load), the demand would be amperes. If the calculated load for this feeder is 100 amperes, the demand would be 50 amperes. Since this load is applied to the service and other supply conductors and equipment, a phantom load would have to be provided for.
Panel Meeting Action: Reject
Panel Statement: Substantiation is incomprehensible. Current wording clearly describes proven, industry-specific safe practice.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-224 Log #972 NEC-P15 **Final Action: Reject**
(530.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Pendant and portable lamps, stage lighting, stage sound equipment, and other portable and special stage equipment operating at not over 150 volts to ground shall not be required to be grounded.
Substantiation: Grounding of metal raceways, cables and parts is already covered in Article 250 which applies unless modified. The provision should not be limited to dc. If the alternatives and exceptions to grounding permitted in Article 250 are not intended, the first sentence should be retained with the deletion of "as specified in Article 250".
Panel Meeting Action: Reject
Panel Statement: The grounding requirements for AC equipment were specifically added 20 years ago due to the special nature of the equipment. The submitter failed to provide any technical substantiation for the removal of grounding requirements for AC equipment operating at not over 150 volts to ground.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-225 Log #3326 NEC-P15 **Final Action: Reject**
(530.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
~~Type MC cable, Type MI cable~~ Metal-enclosed cables metal raceways, and all exposed non-current-carrying metal parts of electrical equipment shall be grounded ~~connected to an equipment grounding conductor~~. This shall not apply to listed stage props such as ~~pendant~~ portable lamps appliances or other equipment with integral or factory-provided flexible cords, or to stage lighting and stage sound equipment operating at ~~not over~~ 150 volts dc or less to ground.
Substantiation: All metal-enclosed cable, such as Type AC permitted in 530.11 should be included. That section requires an insulated equipment grounding conductor. Metal enclosed cables and metal raceways are equipment grounding conductors. This provision is unclear as to intent.
Panel Meeting Action: Reject
Panel Statement: Not all portable lamps in this occupancy are considered stage props. "Exposed" is already covered under the existing language "non-current-carrying" metal parts. Users of these venues understand the intent of this section. The submitter did not provide sufficient technical documentation for the suggested changes. See the panel action on Proposal 15-183 regarding the panel's decision concerning the term "metal enclosed" cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-226 Log #971 NEC-P15 **Final Action: Reject**
(530.21(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: The voltage rating of attachment plugs, receptacles, cord connectors, and flanged surface devices (inlets and outlets) shall not be less than the circuit voltage. Ampere ratings for such devices shall not be less than the ampere rating of the circuit to which such devices are connected. (remainder unchanged).
Substantiation: Attachment plugs, cord connectors and flanged surface devices are already required to be rated in amperes (406.2(A) and 406.6). The second sentence should also apply to other devices in the proposal. Present literal wording of the penultimate sentence indicates ampere ratings shall not be less than feeder or branch circuit overcurrent device ratings, which implies a choice between ratings.
Panel Meeting Action: Reject
Panel Statement: It is standard practice to use higher rated receptacles in theaters, motion picture studios, and television studios. These areas and specifically these connections are not accessible to the general public. The most common example - a 60 amp stage pin connector connected to a 50 amp circuit with a 5000 watt load.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-227 Log #4645 NEC-P15 **Final Action: Accept**
(530.51)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "rigid fixtures" to "rigid luminaires".
Substantiation: Luminaire is not the mandatory term of art in the NEC. This must have been overlooked.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 540 — MOTION PICTURE PROJECTION ROOMS

15-228 Log #385 NEC-P15 **Final Action: Accept**
(540.2.Professional Projector)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"A type of projector using 35- or 70-mm film that has a minimum width of 35 mm (1 in.) and has on each edge 212 perforations/meter ~~perforations per meter~~ (5.4 perforations/inch ~~perforations per inch~~), or a type using carbon arc, xenon, or other light source equipment that develops hazardous gases, dust, or radiation."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: Note: The submitter mistyped "35mm (1 in)" - it should be "35 mm (1 3/8 in.)"
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-229 Log #936 NEC-P15 **Final Action: Accept in Principle**
(540.11(A)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part: "...and ~~properly ventilated~~ with approved ventilation from a source of clean air.
Substantiation: Edit. "Properly" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Accept in Principle
Revise text to read:
(2) Separate Rooms or Housings. Be enclosed in separate rooms or housings built of noncombustible material constructed so as to exclude flyings or lint~~, and properly ventilated~~ with approved ventilation from a source of clean air.
Panel Statement: This wording better addresses submitter's intent.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

15-230 Log #935 NEC-P15 **Final Action: Reject**
(540.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "and deep" after "wide".
Substantiation: A minimum depth of working space is also necessary.
Panel Meeting Action: Reject
Panel Statement: Depth is inferred from the language "... at the rear thereof."
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

ARTICLE 545 — MANUFACTURED BUILDINGS

19-3 Log #1821 NEC-P19 **Final Action: Accept**
(545.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change the word "before" to "after".
Substantiation: Edit. It is unlikely that inspection cannot be performed during the manufacturing process before installation at the site.
Panel Meeting Action: Accept
Panel Statement: The panel makes the assumption that the submitter is referring to the text for "Closed Construction".
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-4 Log #934 NEC-P19 **Final Action: Reject**
(545.4(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
All identified ~~raceway and cable~~ wiring methods included in this Code...". (remainder unchanged)
Substantiation: Limitation to raceway and cable wiring methods does not permit the use of open wiring on insulators where the manufactured building is used for industrial or agricultural purposes (398.10) nor the use of individual open conductors in cable trays, nor the use of auxiliary gutters. All raceway and cable wiring methods appear to amend or negate "permitted" or "not permitted" use in wiring method articles.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to support the proposed revision.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-5 Log #906 NEC-P19 **Final Action: Reject**
(545.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Service entrance conductors shall be installed after erection of the building at the building site.
Substantiation: Edit.
Panel Meeting Action: Reject
Panel Statement: 545.6 Exception allows for service conductors to be installed when the point of attachment is known prior to manufacture. No technical substantiation has been provided to support the proposed revision.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-6 Log #2039 NEC-P19 **Final Action: Reject**
(545.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Unnecessary; the requirements of 230.70 already apply unless amended.
Panel Meeting Action: Reject
Panel Statement: The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this article is far more important than not using references where information could be overlooked.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-7 Log #2038 NEC-P19 **Final Action: Reject**
(545.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Bonding/grounding is already covered by Article 250 which applies unless modified. Since there are no specific requirements, it may be assumed all identified means and methods elsewhere in the code apply.
Panel Meeting Action: Reject
Panel Statement: Refer to panel statement on Proposal 19-6.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-8 Log #2037 NEC-P19 **Final Action: Reject**
(545.12)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where a grounding electrode is required, provisions shall be made to route...(remainder unchanged).
Substantiation: Edit. A grounding electrode is not always required. (250.32(A), Exception).
Panel Meeting Action: Reject
Panel Statement: The provision for the routing of the grounding electrode conductor needs to be provided at the time of manufacture regardless of whether a grounding electrode is required since the grounding requirements may not be known before the building is placed at the site.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

ARTICLE 547 — AGRICULTURAL BUILDINGS

19-9 Log #4177 NEC-P19 **Final Action: Accept**
(547.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: Marcus R. Sampson, Lysistrata Electric
Recommendation: Revise text to read as follows:
547.1 Scope. The provisions of this article shall apply to the following agricultural buildings or that part of a building or adjacent areas of similar or like nature as specified in 547.1(A) ~~and~~ or (B).
Substantiation: The provisions apply when the conditions of EITHER (A) or (B) are present. The current wording implies that BOH are necessary.
Panel Meeting Action: Accept
Panel Statement: CMP-19 notes that it is not authorized to revise the scope statement and respectfully requests the TCC consider the panel action to accept the proposed revision.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-10 Log #4410 NEC-P19 **Final Action: Reject**
(547.1)

Submitter: Dean Hunter, Hunter Electric
Recommendation: Add the following new text:
547.1 The provisions of this article shall apply to the following:
(A) Agricultural buildings, such as animal confinement and milking parlors
(B) Agricultural structures, such as grain handling facilities and bins
(C) Adjacent areas of similar nature as specified in (A) and (B).
Substantiation: Enforcement of the provisions of 547 is difficult when it is not clear whether the rules apply to grain handling facilities. There are occupancies where the only "ag" is the grain storage and processing.
Also, if any part of a building meets the provisions of 547.1(A) or (B) then the entire building shall meet the requirements.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add clarity or improve usability of the code. The existing scope is clear (also see the panel action on Proposal 19-9).
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-11 Log #933 NEC-P19 **Final Action: Reject**
(547.1(B)(1) and (2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (1) and (2) change "may" to "likely to".
Substantiation: Edit. "May" is a term to be avoided per the Style Manual. "Likely" is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The TCC has the authority to amend the scope of articles. "Likely to" is more inclusive than "may" and it is not the intent of CMP-19 to be more inclusive in this instance.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-12 Log #3415 NEC-P19 **Final Action: Reject**
(547.2.Distribution Point)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
547.2 Definitions.
Distribution Point. An electrical supply point from which service drops, service-entrance conductors, feeders, or branch circuits to buildings or structures utilized under single management are supplied. (The remaining text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Although the proposal has merit, CMP-19 defers to the action taken by CMP-4 on the definitions of the terms.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-13 Log #708a NEC-P19 **Final Action: Reject**
(547.2.Equipotential Plane)

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Delete text as follows:
~~547.2 Equipotential Plane. An area where wire mesh or other conductive elements are embedded in or placed under concrete, bonded to all metal structures and fixed nonelectrical equipment that may become energized, and connected to the electrical grounding system to prevent a difference in voltage from developing within the plane.~~
Substantiation: There are currently two definitions of Equipotential Plane in the NEC that contain slightly different terminology. 547.2 allow wire mesh or other conductive elements to be embedded in or placed under concrete without any dimensions as to where the conductive elements are to be placed and is only applicable if concrete is present. How far below the concrete is still going to create a safe equipotential plane? Where 680.2 will allow wire mesh or other conductive elements to be on, embedded in, or placed under the walking surface within 3 in. This definition is not specific to concrete as a walking surface and provides a prescriptive depth that it is to be installed below the area requiring the equipotential plane.
A common definition would not effect the location where the equipotential plane is required to be installed, because 547.10 and 682.33 still identify the required locations. It would benefit the AHJ by creating one definition for a common term.
I have also submitted proposals to delete this definition from 682.2 (CMP-17) and add it to Article 100 (CMP-5).
Panel Meeting Action: Reject
Panel Statement: It is necessary to maintain the separate definition of “equipotential plane” in Article 547. There are differences in requirements for equipotential planes used in other applications.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-14 Log #1720a NEC-P19 **Final Action: Reject**
(547.2.Equipotential Plane (New))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.
Recommendation: Move the existing definition of equipotential plane from 547.2 to Article 100.
Equipotential Plane. An area where wire mesh or other conductive elements are embedded in or placed under concrete, bonded to all metal structures and fixed nonelectrical equipment that may become energized, and connected to the electrical grounding system to prevent a difference in voltage from developing within the plane.
A companion proposal has been submitted to CMP-5 to move the definition to Article 100.
Substantiation: This term is used in Articles 547, 680, and 682 and should be located in Article 100 in accordance with the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-13.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-15 Log #3975 NEC-P19 **Final Action: Reject**
(547.2.Equipotential Plane)

Submitter: Donald W. Zipse, Electrical Forensics, LLC
Recommendation: Delete definition for Equipotential Plane.
Substantiation: It is suggested that the panel consider 547.10 first where the justification and substantiation for the complete removal of Equipotential Planes is given.
The State of Wisconsin has modified the adoption of the NEC several year ago by eliminating the Equipotential Plane requirement from the NEC as the dairy farmers soon found out after the requirement was first introduced, that the installation of an equipotential plane 1) prevented the cows from entering the milking parlor because the cows were receiving an electric shock, 2) reduced the milk production again because the dairy cows were getting an electric shock when being milked while standing on an equipotential plane, 3) injured the cows and resulted in death of the cows in the herd from stray current flowing uncontrolled through not only the legs injuring the ankle joints causing the joints swelled preventing the cow from standing along with other problems from the stray current entering the cow from the equipotential plane.
The continued insertion of this requirement in the NEC for the installation of an equipotential plane is hindering the milk production and is NOT PROTECTING THE COWS FROM ELECTRIC SHOCK, but is applying a condition where the dairy cows ARE GETTING ELECTRIC SHOCKS FROM STANDING ON AN EQUIPOTENTIAL PLANE.
The substation this cycle contains NEW REASONS for acceptance of this proposal than what was submitted last cycle. The attached Institute of Electrical and Electronics Engineers (IEEE) Technical paper titled “EQUIPOTENTIAL PLANES: A FIGMENT OF THE IMAGINATION” was peer reviewed and accepted. The paper explains the misunderstanding that exists today with respect to Equipotential Planes and how to correct the problem. PLEASE remember that three additional years of detailed data had been collected from many dairy farms since the paper was first written. Many changes, improvements have been made in the method of measuring the stray current flowing through the dairy cow.
Mr. Neubauer no longer uses a coil of copper tubing OR COPPER CONDUCTORS (Iron wire now used) or he no longer uses a bucket of water or feed to entice the cow to drink or eat from the bucket in order to obtain the measurement of the flow of stray current through the cow. Today he clips a nose ring onto the cow’s muzzle and makes the measurement of the stray current flowing uncontrolled through the dairy cow.
In summary the paper concludes:
“It is opined that the equipotential plane is no more than an earth electrode, which lacks any ability to maintain or to have zero voltage gradient across it when any amount of electrical current flows over, across or through the equipotential plane. As an electrode-earthing element, the equipotential plane has the potential for uncontrolled stray current from the multigrounded neutral electrical distribution system to flow across the equipotential plane generating a dangerous and hazardous voltage to drive the stray current into and through humans and cows and pigs with devastating results.
“It is opined that the mis-guided agriculture personnel and the NEC Making Panels failed to recognize the three difference conditions between 1) momentary flow of fault current and 2) the continuous flow from stray current emanating from the multigrounded neutral electrical distribution system and 3) the condition where there is no current flow across the equipotential plane.
“It is a fact that there are two methods that stray current enters the so-called equipotential plane. One is the direct primary neutral to secondary neutral connection at the vast majority of utility transformers in North America that has a solid electrical connection between the primary neutral to the equipment grounding conductor and thus to the equipotential plane. The other source of

stray current is the multiple connections, at least 4 per mile, connecting the primary neutral to earth allowing additional stray current to flow uncontrolled over and through the earth.

"Mr. Neubauer's test proved conclusively, that the equipotential plane was just a figment of the imagination by using an instrumented plastic water bucket and plastic feed container and cows, leaving no doubt in the opinion of this author that the so called equipotential plane does not prevent a voltage gradient as proclaimed by the agriculture personnel and the NEC."

Thus the above words in the definition are incorrect and MUST be removed from the NEC in order that the NEC will no longer be incorrect and appear to be foolish.

The paper mentioned above has been provided with this proposal.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: It is necessary to maintain the definition of "equipotential plane" because it is used in Article 547.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

(Note: Sequence 19-16 moved to follow 19-31 on page 721)

19-17 Log #1344 NEC-P19 **Final Action: Reject**
(547.5(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Type UF, Type NMC, copper Type SE cables jacketed Type MC cables, copper or stainless steel Type MI cables, rigid nonmetallic conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metallic conduit, Type NTRC conduit, nonmetallic wireways and auxiliary gutters, rigid metal conduit and intermediate metal conduit encapsulated in factory-applied polyvinyl chloride, open wiring on insulators, or other cables and raceways shall be the wiring method(s) employed. The wiring methods of Article 502 shall be permitted for areas described in 547.1(A). All wiring methods shall be identified for the use.

Alternatively delete present text and substitute:

Wiring methods identified as suitable for the use in areas covered by 547.1(A) and (B) shall be employed.

Substantiation: The present list does not include liquidtight flexible metal conduit, flexible connectors, or cords permitted in (D) and modifies and negates open wiring on insulators permitted in 398.10 "or other cables or raceways" permits other methods such as indicated in the proposal.

Panel Meeting Action: Reject

Panel Statement: No technical substantiation has been provided to justify the expanded list of wiring systems.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-18 Log #2697 NEC-P19 **Final Action: Reject**
(547.5(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Open wiring on insulators, Types UF, NMC, Copper SE cables, jacketed type MC cable, rigid nonmetallic conduit, liquidtight flexible nonmetallic conduit, Type MI cable, or other identified cables or raceways ~~suitable for the location~~ with ~~approved~~ identified fittings shall be the wiring method employed. (remainder unchanged)

Substantiation: Open wiring on insulators is permitted by 398.10 for agricultural establishments in wet or corrosive conditions. This section appears to modify and negate 398.10 Liquidtight flexible metal conduit is as suitable as jacketed type MC cable and type MI cable also appears suitable.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 19-17.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-19 Log #900 NEC-P19 **Final Action: Reject**
(547.5(C)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change "listed" to "identified".

Substantiation: Edit. All fittings such as straps, clamps, threaded conduit couplings and the like are specifically listed for use in wet locations.

Panel Meeting Action: Reject

Panel Statement: Section 547.5(C)(2) is consistent with Section 314.15 and extends that same degree of protection where normal maintenance of the area creates similar wet conditions. Straps, clamps, and threaded conduit couplings are not included in the requirements of this section or in Section 314.15.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-20 Log #2696 NEC-P19 **Final Action: Reject**
(547.5(D))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence;

Where necessary to employ flexible connections listed dustight flexible connectors, liquidtight flexible metal conduit liquidtight flexible nonmetallic conduit, or flexible cord or cable identified for extra-hard usage or hard usage and the conditions shall be used.

Substantiation: Edit. Flexible connectors should be listed. Article 400 does not specify listing for cords and cables. Extra-hard usage types should be permitted, and cords and cables should be for the use. All cords and cables are not suitable; e.g., electric vehicle cable, wet locations, oil resistance, sunlight resistance.

Panel Meeting Action: Reject

Panel Statement: The last sentence of this section already requires all fittings and connectors to be listed for the systems for which they are intended to be used. Section 547.5(D) modifies the requirement in Article 400 by requiring the flexible cord to be "listed." The submitter offers no substantiation to change the requirement. Most other cables do not lend to the flexibility addressed by this subsection.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-21 Log #1447 NEC-P19 **Final Action: Reject**
(547.5(D), (E) and (F))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence of (D): Where necessary to employ flexible connections, listed dusttight flexible connectors, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit, or flexible cord or cable ~~listed~~ identified for extra-hard usage or hard usage and the use shall be used and shall include an equipment grounding conductor. (remainder unchanged)

Revise text of (E): All electrical wiring and equipment likely to be subject to physical damage shall be identified for the use or protected by approved means.

Revise text of (F): Where an equipment grounding conductor or a bonding conductor is installed ~~within~~ in a location falling ~~under~~ within the scope of Article 547 it shall be a copper conductor. Where an equipment grounding conductor or a bonding conductor is installed underground in a location within the scope or Article 547 it shall be insulated or covered copper.

Substantiation: Edit. Flexible connectors should be listed. Flexible cables should be permitted and flexible cords and cables should be permitted to be extra-hard usage types. Cords and cables should be identified for the use, (exposure to water, sunlight, etc.) and not for electrical vehicle charging some of which are extra-hard usage types. Article 400 does not require listing.

Panel Meeting Action: Reject

Panel Statement: (D): The last sentence of this section already requires all fittings and connectors to be listed for the systems for which they are intended to be used. Section 547.5(D) modifies the requirement in Article 400 by requiring the flexible cord to be "listed." The submitter offers no substantiation to change the requirement. Most other cables do not lend to the flexibility addressed by this subsection. Section 250.118 contains requirements for equipment grounding conductors. The submitter has offered no substantiation to modify those requirements.

(E): No substantiation has been provided to support the proposed changes. There is no particular identification means for wiring systems that are suitable where "subject to physical abuse," with the exception of flexible cord.

(F): No substantiation has been provided to support the proposed change to add "a bonding conductor." The panel does not believe that the other proposed editorial changes add substantively to clarity.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-22 Log #1461 NEC-P19 **Final Action: Reject**
(547.5(D),(E) and (F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence of (D) as follows:
(D) Where necessary to employ flexible connections, listed dusttight flexible connectors, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit, or flexible cord or cable ~~listed~~ identified for extra-hard usage or hard usage and the use shall be used and shall include an equipment grounding conductor. (remainder unchanged).
Revise text of (E): All electrical wiring and equipment likely to be subject to physical damage shall be identified for the use or protected by approved means.
Revise text of (F): Where an equipment grounding conductor or a bonding conductor is installed within in a location falling under within the scope of Article 547 it shall be a copper conductor. Where an equipment grounding conductor or a bonding conductor is installed underground in a location within the scope or Article 547 it shall be insulated or covered copper.
Substantiation: Edit. Flexible connectors should be listed. Flexible cables should be permitted and flexible cords and cables should be permitted to be extra-hard usage types. Cords and cables should be identified for the use, (exposure to water, sunlight, etc.) and not for electrical vehicle charging some of which are extra-hard and hard usage types. Article 400 does not require listing. Bonding conductors should be included in the copper and insulated or covered requirement.
Panel Meeting Action: Reject
Panel Statement: (D): The last sentence of this section already requires all fittings and connectors to be listed for the systems for which they are intended to be used. Section 547.5(D) modifies the requirement in Article 400 by requiring the flexible cord to be “listed.” The submitter offers no substantiation to change the requirement. Most other cables do not lend to the flexibility addressed by this subsection. Section 250.118 contain requirements for equipment grounding conductors. The submitter has offered no substantiation to modify those requirements.
(E): No substantiation has been provided to support the proposed changes. There is no particular identification means for wiring systems that are suitable where “subject to physical abuse,” with the exception of flexible cord.
(F): No substantiation has been provided to support the proposed change to add “a bonding conductor.”
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-23 Log #583 NEC-P19 **Final Action: Reject**
(547.5(G))

Submitter: Mitch Feininger, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
GFCI protection shall not be required for an accessible receptacle supplying a permanently installed dedicated load where a GFCI protected receptacle is located within 900 mm (3 ft) of the non-GFCI protected receptacle.
Substantiation: 1) The term “dedicated load” is not defined in the NEC and could be misinterpreted.
2) Nothing in the 2008 NEC prohibits relocation of the “dedicated load” from one or more receptacles fed by this circuit which supplies this “dedicated load.” More than 1 receptacle could be installed for a single dedicated load, leaving non-GFCI protected receptacles with nothing plugged into them.
Panel Meeting Action: Reject
Panel Statement: A “dedicated load” attached to a receptacle is by nature, not “permanently installed.” The proposed language does not add to enforceability of the requirement.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-24 Log #3081 NEC-P19 **Final Action: Accept**
(547.5(G))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(G) Receptacles. All 125-volt, single-phase, 15- and 20-ampere general-purpose receptacles installed in the locations listed in (1) through (4) shall have ground-fault circuit-interrupter protection:
(1) Areas having an equipotential plane
(2) Outdoors
(3) Damp or wet locations
(4) Dirt confinement areas for livestock
~~GFCI protection shall not be required for an accessible receptacle supplying a dedicated load where a GFCI protected receptacle is located within 900 mm (3 ft) of the non-GFCI-protected receptacle.~~
Substantiation: This new allowance that was added to the 2008 NEC flies in the face of the general rules for GFCI-protection discussed in 210.8. Because equipment that is functioning correctly should operate fine on a GFCI-protected outlet, there is no reason for this allowance. A GFCI doesn’t open until the circuit has a leakage current of 4-6mA, and, considering that listed equipment should have no more than 0.5mA of leakage current, this allowance just doesn’t make sense.
Panel Meeting Action: Accept
Panel Statement: CMP-19 has remained sensitive to the special needs of agricultural facilities through many Code cycles. The life saving benefits of GFCI protection for personnel is well documented and the technology has significantly improved to reduce the instances of nuisance tripping and CMP-2 has eliminated many of the exceptions in 210.8 to GFCI use over the last two Code cycles.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 7 Negative: 1
Explanation of Negative:
BAUMAN, B.: As new equipment is purchased the existing option for non-GFCI receptacles is needed at fewer locations. There is fully functional older equipment on farmsteads that will trip a GFCI. Also electric fence controllers will trip a GFCI. Not having the option to install a non-GFCI receptacle adjacent to a GFCI receptacle, will result in customers replacing the GFCI receptacle with a non-GFCI receptacle the first time the GFCI trips on a properly operating appliance. This proposal needs to be rejected to retain the option of installing a non-GFCI receptacle where needed. Having this option increases safety.

19-25 Log #3688 NEC-P19 **Final Action: Accept**
(547.5(G))

Submitter: Joseph P. Fello, Eaton Corp.
Recommendation: Delete the following text:
~~GFCI protection shall not be required for an accessible receptacle supplying a dedicated load where a GFCI protected receptacle is located within 900 mm (3 ft) of the non-GFCI protected receptacle.~~
Substantiation: The existing language is modified to extend GFCI protection to all receptacles in the area. Having a non-GFCI protected receptacle available may cause a safety issue with a potentially hazardous tool.
Panel Meeting Action: Accept
Panel Statement: See the panel statement on Proposal 19-24.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 7 Negative: 1
Explanation of Negative:
BAUMAN, B.: As new equipment is purchased the existing option for non-GFCI receptacles is needed at fewer locations. There is fully functional older equipment on farmsteads that will trip a GFCI. Also electric fence controllers will trip a GFCI. Not having the option to install a non-GFCI receptacle adjacent to a GFCI receptacle, will result in customers replacing the GFCI receptacle with a non-GFCI receptacle the first time the GFCI trips on a properly operating appliance. This proposal needs to be rejected to retain the option of installing a non-GFCI receptacle where needed. Having this option increases safety.

19-26 Log #1343 NEC-P19 **Final Action: Reject**
(547.5(G)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (4):
Dirt or concrete slab confinement areas for livestock.
Substantiation: The requirement should also apply where the confinement area is a concrete slab on grade.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to support the proposed revision. 547.5(G)(2) “Outdoors” would include concrete slabs.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-27 Log #3013 NEC-P19 **Final Action: Reject**
(547.6)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Delete the following text:
~~547.6 Switches, Receptacles, Circuit Breakers, Controllers, and Fuses. Switches, including pushbuttons, relays, and similar devices, receptacles, circuit breakers, controllers, and fuses, shall be provided with enclosures as specified in 547.5(C).~~
Substantiation: This section serves no purpose, since compliance with 547.5(C) is already required.
Panel Meeting Action: Reject
Panel Statement: 547.5(C) does not contain the requirement that the devices addressed in 547.6 be enclosed.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-28 Log #932 NEC-P19 **Final Action: Reject**
(547.8(B) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Insert "likely to be" ahead of "exposed".
Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The use of the phrase "likely to be" is not appropriate in this instance as the condition of being exposed to physical damage or exposed to water are either evident, or not, at the point of inspection.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-29 Log #3809 NEC-P19 **Final Action: Accept in Principle**
(547.8(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal as it relates to the existing "building cleansing water" vs. "building cleaning water" as accepted in the proposal.
This action will be considered by the panel as a public comment.
Submitter: Mike Weitzel, Bechtel
Recommendation: 547.8(C) Exposed to Water. Luminaires exposed to water from condensation, building cleaning water, or solution shall be ~~watertight~~ weatherproof.
Substantiation: This change simply makes the language consistent 547.5(C)(2) where weatherproof is used for a wet location - where water may be present.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
547.8(C) Exposed to Water. Luminaires exposed to water from condensation, building cleaning water, or solution shall be ~~watertight~~ listed as suitable for use in wet locations.
Panel Statement: Luminaires are listed for wet locations, not "weatherproof" or "watertight." The present requirement "watertight" as defined in Article 100 is unenforceable.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-30 Log #898 NEC-P19 **Final Action: Reject**
(547.9)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (A)(3):
The site-isolating device shall simultaneously disconnect all ungrounded ~~service~~ supply conductors from the premises wiring.
Delete (4) and substitute:
GROUNDING and BONDING. Grounding and bonding shall comply with applicable provisions of Part II of Article 250.
Revise first sentence of (8):
Where the site isolating ~~device~~ disconnecting means is not readily accessible it shall be ~~capable of~~ provided with an identified means for being ~~remotely~~ manually operated by a readily accessible operating handle. ~~Installed at a readily accessible location.~~
Substantiation: Supply conductors are not necessarily service conductors since they may supply site isolating equipment (disconnecting means) without overcurrent protection per (A)(4) whereby it doesn't meet the definition of service equipment. Proposal for (4) provides for more comprehensive requirements for bonding, size and installation of grounding and bonding conductors and grounding electrodes. In (8), "capable" is subjective and not defined, and does not specifically prohibit makeshift methods.
Panel Meeting Action: Reject
Panel Statement: (3): The specific purpose of the site-isolating device is to permit disconnection of the main service to an agricultural property.
(4): Subsections (4) and (5) address bonding and grounding separately and are specific to the site-isolating device.
(8): The editorial proposal does not add substantially to the clarity of the requirement.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-31 Log #3215 NEC-P19 **Final Action: Reject**
(547.9(A)(1))

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Revise 547.9(A)(1) as follows:
A site-isolating device shall be installed at each ~~the~~ distribution point where two or more agricultural buildings or structures are supplied from the distribution point.
Substantiation: The NEC does not limit the number of distribution points on an agricultural premises. 547.9(E) contains rules for permanent identification plaques or directories when more than one distribution point is on the same agricultural premises. The proposed revision in the wording will be better correlated with 547.9(E).
Panel Meeting Action: Reject
Panel Statement: The proposed revision could be interpreted as requiring site isolation devices in series.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-16 Log #4412 NEC-P19 **Final Action: Accept**
(547.9(A)(2))

TCC Action: The Technical Correlating Committee understands that the text accepted in proposal 19-16 is 547.9(A)(2) not 547.2(A)(2), as written.
Submitter: Dean Hunter, Hunter Electric
Recommendation: Revise text as follows:
547.2(A)(2) Location. The site isolating device shall be pole-top mounted and the conductors shall meet the clearance requirements of 230.24
Substantiation: As written, this requirement contradicts 547.9(A)(8) which requires the site isolating device to be readily accessible – which would seem to allow a grade level switch. But 547.9(A)(2) clearly requires the site-isolating device to be a "pole-top" switch.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-32 Log #3214 NEC-P19 **Final Action: Accept in Principle**
(547.9(A)(2))

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Revise 547.9(A)(2) as follows:
The site-isolating device shall be pole top-mounted and shall meet the clearance requirements of 230.24.
Substantiation: A simple revision to the wording will make it very clear that the site-isolating device is required to be installed at or near the "top" of the pole. This proposed revision will eliminate any ambiguity. Lacking a thorough understanding of all of the fundamentals of Article 547, or having not read the commentary in the NEC Handbook, more than one installer has made the mistake of installing a site-isolating device on a center yard pole at "grade level" not at the top of the pole.
Panel Meeting Action: Accept in Principle
See the panel action on Proposal 19-16.
Panel Statement: The panel action on Proposal 19-16 meets the submitter's intent.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-33 Log #3427 NEC-P19 **Final Action: Reject**
(547.9(A)(3))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
547.9(A).
(3) Operation. The site-isolating device shall simultaneously disconnect all ungrounded service-entrance conductors from the premises wiring.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and

"Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: Although the proposal has merit, CMP-19 defers to the action taken by CMP-4 on the definitions of the terms.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-34 Log #3218 NEC-P19 **Final Action: Accept**
(547.9(A)(8))

Submitter: John I. Williamson, Maple Grove, MN

Recommendation: Revise 547.9(A)(8) as follows:

~~Where~~ The site-isolating device ~~is not readily accessible, it~~ shall be capable of being remotely operated by an operating handle installed at a readily accessible location. The operating handle of the site-isolating device, when in its highest position, shall not be more than 2.0 m (6 ft 7 in.) above grade or a working platform.

Substantiation: Site-isolating devices are required to be installed at or near the top of the pole on which they are mounted. They are not readily accessible. However, the operating handle for the site-isolating device shall be readily accessible.

Panel Meeting Action: Accept

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-35 Log #2051 NEC-P19 **Final Action: Reject**
(547.9(B)(3))

Submitter: Larry T. Smith, National Electrical Seminars, Inc.

Recommendation: Add new text to read as follows:

(3) The grounded circuit conductor is not connected to a grounding electrode or to any equipment-grounding conductor on the load side of the distribution point.

Substantiation: In the 2005 NEC, this was 547.9(B)(3)(b)(4); it was deleted from the 2008 NEC and should be reinstated.

- Table 250.3 advises readers of Additional Bonding and Grounding Requirements and specifically points to 547.9,
- 250.24(C) requires a main bonding jumper in the service disconnecting means which bonds the grounded conductor to the equipment grounding conductor,
- 547.9(B)(3)(2) requires the equipment grounding conductor to be connected to the grounded circuit conductor in the site-isolating device at the distribution point, and
- Unless 547.9(B)(3)(b)(4) is reinstated, the grounded and equipment grounding conductor are required by 250.24(C) to be bonded together in the service disconnecting means at the building and 549.9(B)(3) also requires the grounded conductor and the equipment grounding conductor to be bonded together at the site-isolating device which produces a parallel path between the grounded conductor and the equipment grounding conductor.

Reinstatement of 547.9(B)(3)(b)(4) will (1) eliminate installation of the main bonding jumper at the building or structure service disconnecting means as presently required in 250.24(C), (2) retain the connection between the grounded conductor and equipment grounding conductor at the site-isolating device, and (3) get rid of the connection which puts the grounded conductor and equipment grounding conductor in parallel.

Panel Meeting Action: Reject

Panel Statement: The action taken on Proposal 19-26 during the 2008 cycle was specific to eliminating the requirement from 547.9(B)(3). The panel statement clearly indicates that the requirement continues to be covered by 250.32.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-36 Log #941 NEC-P19 **Final Action: Accept in Principle**
(547.9(B)(3)(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change "same size" to "not smaller".

Substantiation: Edit. Literal wording does not permit a larger equipment grounding conductor.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(1) The equipment grounding conductor is ~~the same size as~~ not smaller than the largest supply conductor...".

Panel Statement: The revised wording of the proposal meets the intent of the submitter and permits the use of a larger equipment grounding conductor.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-37 Log #830 NEC-P19 **Final Action: Accept**
(547.9(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Where the service disconnecting means and overcurrent protection for each set of feeders or branch circuits are located at the distribution point the feeders or branch circuits to buildings or structures shall ~~meet~~ comply with the ~~requirements~~ provisions of 250.32 and Article 225 Parts I and II.

Substantiation: Branch circuits used as supply conductors should be included. Some provisions of 250.32 are not requirements but "permitted" such as the exceptions for 250.32(A) and (B).

Panel Meeting Action: Accept

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-38 Log #1342 NEC-P19 **Final Action: Reject**
(547.9(D))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Where livestock is housed, any portion of a direct-buried equipment grounding or bonding conductor run to or within the building or structure shall be insulated or covered copper.

Substantiation: Bonding conductors should be included and the provision should also apply to conductors within the building or structure, not just conductors run to it.

Panel Meeting Action: Reject

Panel Statement: See the panel action on Proposal 19-40.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-39 Log #3881 NEC-P19 **Final Action: Reject**
(547.9(D))

Submitter: Gene Garcia, E Light Electric Services

Recommendation: Revise text as follows:

Where livestock is housed, any portion of a direct buried grounding conductor ~~run~~ ran to the building or structure shall be insulated or covered copper.

Substantiation: Correction to make proper English usuage.

Panel Meeting Action: Reject

Panel Statement: See the panel action on Proposal 19-40.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-40 Log #4413 NEC-P19 **Final Action: Accept**
(547.9(D))

Submitter: Dean Hunter, Hunter Electric

Recommendation: Delete the following text:

547.9(D) Direct Buried Equipment Grounding Conductors. Where livestock is housed, any portion of a direct buried equipment grounding conductor run to the building or structure shall be insulated or covered copper.

Substantiation: This section is unnecessary because it is already required by 547.5(F).

Panel Meeting Action: Accept

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-41 Log #940 NEC-P19 **Final Action: Accept in Part**
(547.9(E))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 19-42.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

Where a site is supplied by more than one service ~~with any two services located a distance of 150 m (500 ft) or less apart measured in a straight line~~ a permanent durable plaque or directory shall be installed at each ~~distribution point~~ of these services denoting the location of each of the other ~~distribution points~~ service and the building or structures or other areas served by each.

Substantiation: The provision should apply whether or not the services are within 500 ft of each other; if located 510 ft apart the requirement does not apply. On large area premises wiring from multiple services may enter areas served by more than one service.

Panel Meeting Action: Accept in Part

Revise text to read as follows:

(E) Identification. Where a site is supplied by more than one service ~~with any two services located a distance of 150 m (500 ft) or less apart, as measured in a straight line~~, a permanent plaque or directory shall be installed at each of these distribution points denoting the location of each of the other distribution points and the buildings or structures served by each.

Panel Statement: No substantiation has been provided for adding "durable," replacing "distribution points" with "service" or adding "or other areas."

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-42 Log #1705 NEC-P19 **Final Action: Accept in Part**
(547.9(E))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 19-41.

This action will be considered by the panel as a public comment.

Submitter: Mike Theisen, St. Cloud, MN

Recommendation: Revise the nomenclature to be consistent with the title in 547.9 Electrical Supply to Building(s) or Structure(s) from a Distribution Point.

(E) Identification. Where a site is supplied by more than one ~~service~~ distribution point with any two ~~services~~ distribution points located a distance of 150 m (500 ft) or less apart, as measured in a straight line, a permanent plaque or directory shall be installed at each of these distribution points denoting the location of each of the other distribution points and the buildings or structures served by each.

Substantiation: The term "Distribution Point" is used in the title and the term "Service" is not,, the introduction of the term "service" could be confusing. The site electrical service could be located at some distance from the distribution point. Unless the actual location or proximity of the services to each other is the main concern, we are talking about distribution points in 547.9.

Panel Meeting Action: Accept in Part

Revise text to read as follows:

(E) Identification. Where a site is supplied by more than one ~~service~~ distribution point with any two services distribution points located a distance of 150 m (500 ft) or less apart, as measured in a straight line, a permanent plaque or directory shall be installed at each of these distribution points denoting the location of each of the other distribution points and the buildings or structures served by each.

Panel Statement: The panel action accepts replacing the first "service" with "distribution point," and rejects the second revision based on the panel action on Proposal 19-41, which deletes the text.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-43 Log #2964 NEC-P19 **Final Action: Reject**
(547.10)

Submitter: Donald Hillman, Michigan State University

Recommendation: Delete 547.10 Equipotential Planes and Bonding of Equipotential Planes.

Substantiation: See the material I have provided regarding "Animal and Human Response To Induced and Contact Ground Currents".

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The submitter's substantiation provides insufficient technical justification for removing the requirement for equipotential planes. The use of equipotential planes is an accepted practice in various industries for reducing step-touch potential. Removing equipotential planes will reduce the level of safety afforded to livestock and personnel. No practical alternative methods have been proposed to provide an equivalent level of safety.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-44 Log #3587 NEC-P19 **Final Action: Reject**
(547.10)

Submitter: Richard H. Schulte, Modified Genetics, SC

Recommendation: Delete Section 547.10 Equipotential Planes and Bonding of Equipotential Planes.

Substantiation: I have been a practicing veterinarian for over 37 years. I have dealt with the objectionable current issues on dairy farms for the past 15 years. In not one instance have I seen improved cattle health with the installation of an equipotential plane. I have seen quite the opposite. In a new installation in Minnesota I saw the systematic decline in health of a herd that had been prosperous before. I have dealt locally with a freestall barn with a plane and the farmer went to the expense of jack hammering out all of the concrete with the plane and replacing just the concrete. The cows are the ultimate judge of what is healthy for them and the response was monumental when the plane was removed. We know from published research that an inflammatory reaction is initiated through the release of interleukin 1 when cows are exposed to imperceptible current levels for as little as 2 weeks. The premise that a cow must perceive electricity to be harmed is as absurd as saying that a human must perceive carbon monoxide to be harmed or must perceive ionizing radiation to be harmed. It is imperative that Section 547.10 be removed.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 19-43.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-45 Log #3976 NEC-P19 **Final Action: Reject**
(547.10)

Submitter: Donald W. Zipse, Electrical Forensics, LLC

Recommendation: Delete Section 547.10 Equipotential Planes and Bonding of Equipotential Planes.

Substantiation: I congratulate the Code Making Panel 19 on their courageous, audacious and valiant try at preserving the term Equipotential Plane(s). The object appears to be somehow to protect the dairy cows from (an imaginary) accidental contact with an electrically energized conductor or surface. It is assumed that the false use of bonding an equipotential plane to the equipment grounding conductor, which is already done and is the problem, will allow a fault current contacting the floor or metal surface or a dairy cow to flow over the concrete encased re-bar (equipotential plane) and open the protective device.

How many cows have been electrocuted from contact with an electrically energized surface? Since when has this been a problem?

The panel has developed a reason that is questionable to preserve equipotential planes. However, the panel has not eliminated the everyday 24/7 hour/days hazardous condition of continuous flowing stray current using the equipotential plane to harm the dairy cows. You have managed to concoct, contrive and fabricate a reason to maintain the equipotential plane, which is a figment of the imagination.

Alright, so I have managed to tick you off with the truth. But what you have done is to continue the hazard of existing stray current that cannot be stopped from flowing continuously uncontrolled over the earth and into the equipotential plane (except in Wisconsin and California) and harming the dairy cows continuously.

Evidential you have not visited a FREE STALL DAIRY BARN. Such a dairy facility can be 100 or more feet long with no ground mounted electrical outlets. Overhead fans and lights over 8 feet into the air mounted on usually wooded construction. There is no reason to have an equipotential plane is such an area, except to continuously inflict harm onto the dairy cows. At least remove the requirement for equipotential planes from dairy housing areas.

Recognize that every outlet is required to have an equipment grounding conductor which if an electrical fault should occur would carry the fault current back to the source on the green equipment grounding conductor, which has an exceptionally low impedance path as compared to the concrete / re-bar equipotential plane circuit. The equipment grounding conductor affords a quick and efficient opening of the protective device. So are we now turning a dairy barn into a hospital level redundant equipment grounding system?

The State of Wisconsin years ago modified the adoption of the NEC by eliminating the Equipotential Plane requirement from the NEC as the dairy farmers soon found out that the installation of an equipotential plane 1) prevented the cows from entering the milking parlor because the cows were receiving an electric shock when stepping unto the equipotential plane, 2) reduced the milk production because the dairy cows were getting an electric shock when being milked while standing on an equipotential plane, 3) injured the cows and resulted in death of the cows in the herd and more. Your modification of 547.10 last cycle does NOT do anything to correct the shocking hazard from equipotential planes except continue the hazard.

The continued insertion of the requirement in the NEC for the installation of an equipotential plane is hindering the milk production and is NOT PROTECTING THE COWS FROM ELECTRIC SHOCK from stray continuous flow of stray current, but is applying a condition where the dairy cows ARE GETTING ELECTRIC SHOCKS FROM STANDING ON AN EQUIPOTENTIAL PLANE.

The substation this cycle contains NEW REASONS for acceptance of this proposal than what was submitted last cycle. The attached Institute of Electrical and Electronics Engineers (IEEE) Technical paper titled "EQUIPOTENTIAL PLANES: A FIGMENT OF THE IMAGINATION" was peer reviewed and accepted. The paper explains the misunderstanding that exists today with respect to Equipotential Planes and how to correct the problem.

PLEASE remember that three additional years of detailed data has been collected from many dairy farms since the paper was first written. Many changes, improvements have been made in the method of measuring the stray current flowing through the dairy cow.

Mr. Neubauer no longer uses a coil of copper tubing OR COPPER CONDUCTORS (Iron wire now used) or he is no longer using a bucket of water or feed to entice the cow to drink or eat from the bucket in order to obtain the measurement of the flow of stray current through the cow. Today he clips a nose ring onto the cow's muzzle and makes the measurement of the stray current flowing uncontrolled through the dairy cow immediately.

Note: Supporting material is available for review at NFPA Headquarters.

In summary the paper concludes:

"It is opined that the equipotential plane is no more than an earth electrode, which lacks any ability to maintain or to have zero voltage gradient across it when any amount of electrical current flows over, across or through the equipotential plane. As an electrode-earthing element, the equipotential plane has the potential for uncontrolled stray current from the multigrounded neutral electrical distribution system to flow across the equipotential plane generating a dangerous and hazardous voltage to drive the stray current into and through humans and cows and pigs with devastating results.

"It is opined that the mis-guided agriculture personnel and the NEC Making Panels failed to recognize the three difference conditions between 1) momentary flow of fault current and 2) the continuous flow from stray current emanating from the multigrounded neutral electrical distribution system and 3) the condition where there is no current flow across the equipotential plane.

"It is a fact that there are two methods that stray current enters the so-called equipotential plane. One is the direct primary neutral to secondary neutral connection at the vast majority of utility transformers in North America that has a solid electrical connection between the primary neutral to the equipment grounding conductor and thus to the equipotential plane. The other source of stray current is the multiple connections, at least 4 per mile, connecting the primary neutral to earth allowing additional stray current to flow uncontrolled over and through the earth.

"Mr. Neubauer's test proved conclusively, that the equipotential plane was just a figment of the imagination by using an instrumented plastic water bucket and plastic feed container and cows, leaving no doubt in the opinion of this author that the so called equipotential plane does not prevent a voltage gradient as proclaimed by the agriculture personnel and the NEC."

Thus the above words contained in 547.10 are incorrect and MUST be removed from the NEC in order that the NEC will no longer be incorrect and appear to be foolish.

Section 547.10 FPN No. 1 & 2 are no longer correct since they still recommend equipotential planes and have not been re-affirmed as to their correctness in light of recent findings and to the age of the document. The document has fallen into disrepute based on recent studies showing the resistance of cows is less than 50 percent of the values found in the "Red Book", Document 696 and in light of equipotential plane findings. In additions one of the authors was involved in a law suit based on it is believed, questioning the accuracy of his data found in the Red Book. Financial support has come under attack and the document bias has been revealed.

The attached paper begins as follows:

Preface – Prelude – Prologue
(Take your pick)
to the Institute of Electrical and Electronic Engineers' (IEEE) paper
EQUIPOTENTIAL PLANES, A FIGMENT OF THE IMAGINATION

You may use this paper providing you cite "**Copyright Material IEEE"**

Donald W. Zipse, P.E.
Life Fellow, IEEE
Electrical Forensics, LLC
PO Box 7052
Wilmington DE 19803-0052
USA
don.zip@ieee.org

Mr. Donald W. Zipse offered a very controversial technical paper on equipotential planes stating that the National Electrical Code Sections 547 on Agriculture Buildings and 680 Swimming Pools were incorrect when they state that equipotential planes "... Prevent a difference in voltage from developing within the plane." In addition, Mr. Zipse also states in his paper that four agriculture professors were incorrect in their three papers published in the early 1980s. It appears that they did not understand the difference between IEEE Standard 80 Substation Grounding And Step-Touch Potentials based on high levels of fault current for extremely short time and steady state continuous flowing stray current of very low magnitude flowing continuously.

The IEEE's Industrial and Commercial Power Systems committee at first rejected Mr. Zipse's paper offering. However, cooler heads prevailed stating that the IEEE was the place for new ideas and discussion. The I&CPS Committee went out to 23 persons who were opponents in court cases or were utility employees or agriculture professors requesting that they rebut Mr. Zipse's paper.

Three papers were submitted in rebuttal. The first was authored by one of the original professors, Robert J. Gustafson and co-author LaVerne E. Stetson. The other time slot had two papers by employees of Alabama Power, Keith Wallace and Don Parker. The Alabama papers were no more than regurgitation of the Agriculture Red book, Document 696 and should be totally disregarded.

Dr. Gustafson completely disregards the multigrounded neutral electrical distribution system circuit that connects the primary neutral with solid copper conductors to the equipotential plane. It is this circuit that supplies approximately 50 percent of the stray current flowing in swimming pools and dairy farms. Note that EPRI, the Electrical Power Research Institute, the utilities brain trust, state that 60 percent of the return neutral current on multigrounded neutral electrical distribution system circuits returns over the earth. Only 40 percent returns over the neutral conductor.

Between the draft of Zipse's paper and the presentation Mr. Zipse suggested to Mr. Neubauer, Master Electrician who makes all the electrical measurements, to switch to iron rebar wire which was used for the test conductors and iron plates for contact with the floor, thus eliminating any suggestion of galvanic cell generating the direct current. The section on direct current was inserted to show that three actions were taking place simultaneously, galvanic cell action and rectification of the ac by rebar in concrete as noted in IEEE Standard 80 and the flow of harmful alternating current in the equipotential plane.

What Dr. Gustafson completely ignores is the alternating current measurements that were recorded that harm dairy cows causing decreased milk production, injury, and death to the cows. What is not in the paper is last week we disconnected the phase and neutral and the telephone grounds to a dairy, and still had current flowing over earth and into the equipotential plane and into the cow proving stray current flows over and through the earth and equipotential plane in sufficient magnitude to harm a cow or human. Tests at the Allen Dairy and court records also confirm the flow of uncontrolled current in earth.

See the IEEE paper that was provided to Code-Making Panel 19 with Log 3975 for section 547.2 to delete the definition of "Equipotential Plane".

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-43.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-46 Log #4400 NEC-P19 **Final Action: Reject**
(547.10)

Submitter: David Rogers, Stray Voltage Services
Recommendation: Delete Section 547.10 Equipotential Planes and Bonding of Equipotential Planes
Substantiation: 1. The Canadian Electrical Code Rule 10-200 states that concerning "The Rule (for grounding and bonding conductors) does not intend there be current flowing through the bonding and grounding system during normal operation." Its Subrule (3) of Chapter 10-200 states that: "Where by using multiple grounds objectionable flow of current occurs over the grounding conductor:

- One or more of the grounds shall be abandoned;
- The location of the grounds shall be changed;
- The continuity of the conductor between the grounding connections shall be suitably interrupted;
- Other effective action shall be taken to limit the current."

Dairy farm milking parlour equipotential grounding grids do exactly what Rule 10-200 says they should not by creating a situation where objectionable electrical current will normally flow through the grounding system during normal operation.

2. Farm Equipotential Grounding Grids Create a Parallel Circuit Ground Loop

A ground loop can be defined as any objectionable electrical current flowing in a circuit's ground or return path. When the electrical code was written about dairy farm equipotential grounding grids, clamp-on ground resistance testers were not available. We were one of the first to discover a 0.7 Ω reading with a mA reading using an AEMC 3731 on the #6 copper bonding wire connecting an equipotential grid to the main electrical service. These readings confirmed that the instrument identified a ground loop which is a parallel circuit. Objectionable flows of electricity for a cow are as low as 1 mA. Sometimes as much as 900 mA with this 0.7 Ω reading were found on some dairy farms Ref. 4 and 5. In compliance with the Canadian Electrical Code Subrule #3, this #6 wire was disconnected. Many dairy farmers said that after this disconnection they saw the greatest improvement in milking cows they had witnessed in over 20 years.

A dairy herd's average somatic cell count (SCC) is an indicator of the extent to which they are fighting a mastitis infection. In B.C. if there are three consecutive readings which equal or exceed 500,000 SCC per ml, the farm will be ordered not to sell milk by the B.C. milk inspector. One farm which never had high somatic cell counts reached over 400,000 per ml SCC after a new parlour was installed. Many farm experts were called in to discover the cause however all attempts to correct the high SCC level failed. We found a ground loop between the equipotential ground grid and the farm's main service. This parallel circuit only had 9 mA however when it was disconnected their was an immediate drop to 200,000 per ml in SCC's within a week and lower later.

Most farmers wish to keep their average herd's SCC level to about 100,000 counts per ml or less.

3. Farm Equipotential Grounding Grids Do Not Deal with Microsecond mA Events

My farm field tests showed that short duration electrical events such as those caused by electric fence discharges upon contact, were detectable between equipotential grids and remote grounds. These short duration voltage bursts were also detected as direct animal contact between cows' hoofs and the equipotential grid floor they stood on. Initially we measured these events using a Fluke 105B Scopemeter on the 5 ms per division scale but these events were more clearly observable on the 200 µs per division scale. A 500 Ω resistor placed in parallel across the scopemeter's voltage measurement probes confirmed that mA current was present.

Similar short duration voltage readings were then viewed in the equipotential grids and on all bonding conductors including farm's stainless steel milk lines. It was clear the standard methods of mitigating stray voltage in using equipotential grounding grids and bonding conductors failed to deal with short duration Neutral to Earth Voltage events. In removing these short duration NEV events, farmers noticed improvements to cow and goat herd health and productivity and milk let-down. In chickens and pigs they also noticed improved water and feed intakes plus in increased feed conversion ratios.

4. Farm Equipotential Grounding Grids Create Step Potential at Grid Perimeter

The idea behind equipotential grounding grids is that while animals are on them their points of contact kept at the same electrical potential difference which inhibits flow of electrical current. However, even if this is the case, when an animal first steps on to the grid its front legs will be at a different potential difference than its rear legs. For this reason farms often have difficulty getting their cows to enter milking parlours which have equipotential grids for this reason. It's possible to see some cows even stop and sniff the perimeter of the grid. Cows are sensitive to very small amounts of electrical discomfort and being shocked each time they enter and leave their milking parlour discourages them from moving to and from them. It may also create stress in them which could lessen their performance, milk let-down and affect their general health.

5. Farm Equipotential Grounding Grids Do Not Deal With Induction

The inductive force of an Electromagnetic Field (emf) is inversely proportional to the square of its distance from its source, as well as to the contact surface area. With a cow standing under say a faulty fluorescent lamp ballast which emits emf, her large surface area plus distance from the source may create significant ac voltage induction. Even though the floor may have an equipotential grid, the cow will be at a higher potential than it. Where we found such localized emf, cows often won't feed and milk-out poorer and defecate more. In our experience some farmers have faced stress from this problem. It was recognized that our services in assisting farmers to mitigate electrical induction helped prevent herd and farmers' stress plus financial losses occurring from it.

6. Farm Equipotential Grounding Grids Attract Stray Electrical Currents to Cows

Electricity takes the path of least resistance. The low resistance offered by a farm's equipotential grounding grids represents a serious threat to cows in that it provides a low resistance path to where cows are being milked. A classic demonstration of this is in the case where an electric fence controller has a high resistance ground either from a poor installation or through drying or frozen ground conditions. When an animal or object touches the electric fence the normal circuit design is that for a very short duration of time the electricity will flow from the fence to this object through the ground and back to the controller. With a high resistance of the controller's ground, the electricity may head straight for the low resistance equipotential grid of the milking parlour floor bonded to the neutral and then back to the controller through the neutral. Many farmers with electric fences often that the say times when their animals SCC's were highest were during the dry summer months or cold winters.

Result of the Technical Failure of Equipotential Grids in Resolving Stray Voltage

Reliance in equipotential grounding grids dealing with stray voltage is not proved effective and will eventually result in negative outcomes.

Panel Meeting Action: Reject

Panel Statement: Some references in the submitter's substantiation specifically indicate that proper engineering of the system is needed to ensure the intended performance of the equipotential plane. See the panel statement on Proposal 19-43.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-47 Log #4785 NEC-P19 **Final Action: Reject**
(547.10)

Submitter: Russ Allen, DePere, WI

Recommendation: Delete Section 547.10 Equipotential Planes and Bonding of Equipotential Planes

Substantiation: I am a victim of the Equipotential Plane and Bonding of Equipotential Plane. Cows kick of milking devices often hard injuring me and my employees, it was very severe at times. I interrupted approximately 20 of our utilities down grounds. After a year and a half our utility reconnect the down grounds and hell returned to our milking parlor proving that the Equipotential Plane and Bonding of the Equipotential Plane does more harm than good. Please listen to what our cows are telling us and delete 547.10.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposals 19-43 and 19-46.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-48 Log #3014 NEC-P19 **Final Action: Reject**
(547.10, FPN 3)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Delete the following text:

~~FPN No. 3: Low grounding electrode system resistances may reduce potential differences in livestock facilities.~~

Substantiation: This statement is not accurate. The resistance of the grounding electrode system has absolutely nothing to do with reducing potential differences.

Panel Meeting Action: Reject

Panel Statement: No technical substantiation has been provided to support the proposed revision.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-49 Log #710 NEC-P19 **Final Action: Accept in Principle**
(547.10(B))

Submitter: Teri Dwyer, Wyoming, MN

Recommendation: Revise text to read as follows:

(B) Bonding. Equipotential planes shall be connected to the electrical grounding system. The bonding conductor shall be copper, insulated, covered or bare, and not smaller than <u>solid</u> 8 AWG. The means of bonding to wire mesh or conductive elements shall be by pressure connectors or clamps of brass, copper, copper alloy, or an equally substantial approved means. Slatted floors that are supported by structures that are a part of an equipotential plane shall not require bonding.

Substantiation: By adding the word "solid" this promotes consistency with sections 680.26 and 682.33 that currently require a #8 solid AWG copper conductor be used for equipotential bonding. In addition to consistency with other sections of the NEC, the solid conductor will be able to better withstand the harsh environment created by the containment of livestock.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(B) Bonding. Equipotential planes shall be connected to the electrical grounding system. The bonding conductor shall be <u>solid</u> copper, insulated, covered or bare, and not smaller than 8 AWG. The means of bonding to wire mesh or conductive elements shall be by pressure connectors or clamps of brass, copper, copper alloy, or an equally substantial approved means. Slatted floors that are supported by structures that are a part of an equipotential plane shall not require bonding.

Panel Statement: The panel action clarifies its, and meets the submitter's intent.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-50 Log #939 NEC-P19 **Final Action: Accept in Principle**
(547.10(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Insert "solid" ahead of "bonding conductor".

Substantiation: The bonding conductor should be solid because of potential corrosion, as required in 680.26.

Panel Meeting Action: Accept in Principle

See the panel action on Proposal 19-49.

Panel Statement: The panel statement on Proposal 19-49 meets the submitter's intent.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-51 Log #4391 NEC-P19 **Final Action: Accept**
(547.10(B))

Submitter: John R. Kovacik, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(B) Bonding. Equipotential planes shall be connected to the electrical grounding system. The bonding conductor shall be solid copper, insulated, covered or bare, and not smaller than 8 AWG. The means of bonding to wire mesh or conductive elements shall be by pressure connectors or clamps of brass, copper, copper alloy, or an equally substantial approved means. Slatted floors that are supported by structures that are a part of an equipotential plane shall not require bonding.
Substantiation: The solid conductor will be able to better withstand the harsh environment created by the containment of livestock. By adding the word solid this promotes consistency with sections 680.26 and 682.33 that currently require an 8 AWG solid copper conductor to be used for equipotential bonding.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

ARTICLE 550 — MOBILE HOMES, MANUFACTURED HOMES, AND MOBILE HOME PARKS

19-52 Log #1877 NEC-P19 **Final Action: Reject**
(550.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: The conductors from the mobile home service equipment, including the grounding equipment conductor, together with all the necessary fittings and equipment identified for the purpose of supplying current to the main disconnecting means in the mobile home.
Substantiation: Proposed wording include under-chassis and power supply cord conductors. "Source" of electrical energy is too broad; it includes utility source, generators, and distribution equipment in the mobile home park distribution system. The feeder assembly may terminate in a separate single circuit breaker or fused switch, not a panelboard.
Panel Meeting Action: Reject
Panel Statement: It is not clear what the submitter intends to delete and substitute with the proposed language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-53 Log #2081 NEC-P19 **Final Action: Reject**
(550.2 Appliances and 551.2 Appliances)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Move the definitions in section 680.2 for "EQUIPMENT, FIXED," "EQUIPMENT, PORTABLE," and "EQUIPMENT, STATIONARY" to Article 100, and delete those definitions from Article 680.
Also consider the deletion of similar definitions for "appliances" from Articles 550 and 551 as the existing definition in Article 100 for EQUIPMENT already includes appliances.
A companion proposal has been sent to CMP-17 for the suggested definitions in 680.2.
Substantiation: The concept of "fixed," "portable," and "stationary" equipment is used throughout the NEC and is not defined in a central location such as Article 100. Some examples of places where this occurs are found in: Article 100 "Electric Signs;" sections 210.23(B) and (C); section 220.53 ("fastened in place"); and the titles to Articles 424, 426, and 427 to name a few. The outcome of the acceptance of this proposal is a more coherent and user friendly code by locating important definitions in only one location. The opportunity would then exist to streamline other parts of the code, thereby, increasing usability.
Panel Meeting Action: Reject
Panel Statement: Section 680.2 is not in the scope of CMP-19. The panel prefers that definitions for "Appliances" pertaining to mobile homes and manufactured homes remain in Article 550 as the terms are used within the article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-54 Log #1875 NEC-P19 **Final Action: Reject**
(550.2.Distribution Panelboard)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: DISTRIBUTION EQUIPMENT ~~PANELBOARD~~. The panelboard, fused switch, or circuit breaker supplied by the feeder assembly.
FPN: No Change.
Substantiation: Edit. The definition should include equipment that is not a panelboard such as a single enclosed main circuit breaker or fused switch. These are not prohibited.
Panel Meeting Action: Reject
Panel Statement: There is currently a definition of the term "panelboard" in Article 100; use of "equipment" will lead to confusion. The term "distribution panelboard" is used in Article 550, not the term 'distribution equipment;' therefore the definition is not necessary. The submitter has provided inadequate substantiation to support the revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-55 Log #938 NEC-P19 **Final Action: Reject**
(550.2.Manufactured Home)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "voluntarily" in the second sentence.
Substantiation: Edit. If the certificate is required by the regulating agency it is not voluntary.
Panel Meeting Action: Reject
Panel Statement: The definition of "manufactured home" comes from NFPA 501, *Standard on Manufactured Housing*.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-56 Log #2437 NEC-P19 **Final Action: Reject**
(550.2.Power Safe Protector (PSP))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If wording for PSP are accepted in 550.13(B), 550.13(E)(3) and 550.32(E) a definition may be required if not in Article 100. There is a proposal for PSP in 100 also.
Panel Meeting Action: Reject
Panel Statement: The panel action on Proposal 19-69 precludes the need for a definition in this article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-57 Log #2080 NEC-P19 **Final Action: Reject**
(550.2 and 551.2.Appliance, Fixed; Appliance, Portable; and Appliance, Stationary)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Relocate current identical definitions for "Appliance, Fixed," "Appliance, Portable," and "Appliance, Stationary" to Article 100 as these definitions are in two NEC articles. This change proposal is in compliance with the NEC Style Manual section 2.2.2.1.
Substantiation: The current 2008 NEC text does not agree with the NEC Style Manual, and the proposed changes would help to make the NEC more user friendly.
Panel Meeting Action: Reject
Panel Statement: Additions to Article 100 are not within the scope of CMP-19. See the panel statement on Proposal 19-53.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-58 Log #1880 NEC-P19 **Final Action: Reject**
(550.2.Manufactured Home, Mobile Home)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In the definition of Manufactured Home and Mobile Home delete the last paragraph.
Substantiation: A manufactured home and mobile home are not the same, one is erected on the site, the other is on wheels without a permanent foundation. All of the provisions of this article are not suitable or applicable for both, e.g., power supply cords, one receptacle per 550.13(D)(1) vs. 210.52(C)(1)(2), 550.32(A) vs. (B), and 550.323(D).
Panel Meeting Action: Reject
Panel Statement: "For the purpose of this code," as stated in both places, permits the requirements to apply to both "unless otherwise indicated."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-59 Log #937 NEC-P19 **Final Action: Reject**
(550.4(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
All electrical material, appliances, fittings and other electrical equipment <u>for which standards have been established</u> shall be listed or labeled by a qualified testing agency...". (remainder unchanged)
Substantiation: All materials and fittings such as straps and hangers and clamps may not have standards by which they are listed.
Panel Meeting Action: Reject
Panel Statement: The requirements in the code for listing drive the development of standards. The AHJ has ultimate authority to approve an installation. The proposed language is unnecessary; the definitions of 'listed' and 'labeled' are located in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-60 Log #887 NEC-P19 **Final Action: Reject**
(550.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
<u>Receptacles and switches shall not be installed in a face-up position in any countertop in the living areas.</u>
Substantiation: The provisions of 550.13(F)(2) should apply.
Panel Meeting Action: Reject
Panel Statement: There is no Section 550.5 in Article 550.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-61 Log #1320 NEC-P19 **Final Action: Reject**
(550.5 (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
<u>550.XX SERVICE and SERVICE EQUIPMENT. For the purposes of this Article the provisions for services shall also apply where supplied by a system that is not utility owned or operated.</u>
Substantiation: Edit. Where the mobile home park has a distribution system not owned or operated by a utility, the supply conductors are not service conductors per the definition of service.
Panel Meeting Action: Reject
Panel Statement: The provisions of Part III, Services and Feeders already provide the requirements for service and service equipment. The proposal may add confusion to existing requirements.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-62 Log #1820 NEC-P19 **Final Action: Reject**
(550.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: rated not less than 50 amperes.
Substantiation: Edit. Though a permanently installed feeder is covered by "feeder assembly", proposal emphasizes the minimum rating also applies to it.
Panel Meeting Action: Reject
Panel Statement: It is not clear where the submitter intends to add the proposed language in 550.10(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-256a Log #CP1906 NEC-P19 **Final Action: Accept**
(550.10(A))

Submitter: Code-Making Panel 19,
Recommendation: Revise 550.10(A) as follows:
550.10 Power Supply.
(A) Feeder. The power supply to the mobile home shall be a feeder assembly consisting of not more than one listed 50-ampere mobile home power-supply cord ~~with an integrally molded or securely attached plug cap~~ or a permanently installed feeder.
Substantiation: The construction of the supply end of the supply cord is clearly stated in 550.10(C). The secure attachment of the plug is also addressed in 550.10(C).
Panel Meeting Action: Accept
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-63 Log #1378 NEC-P19 **Final Action: Reject**
(550.11)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
The branch circuit <u>distribution</u> equipment shall be permitted to be combined with the <u>main</u> disconnecting means as a single assembly.
Substantiation: Edit. Branch circuit equipment encompasses many things; the intended disconnecting means should be specified.
Panel Meeting Action: Reject
Panel Statement: The existing language is adequate. The proposed language does not add clarity or improve usability of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-64 Log #970 NEC-P19 **Final Action: Reject**
(550.11(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete second sentence and substitute: The main circuit breaker or switch shall be plainly and durably marked "main disconnect"; the maximum ampere rating of main fuses shall be plainly and durably marked on the main fuse(s) enclosure with letters at least 6 mm (1/4 in.) high.
Substantiation: Literal wording requires the marking (main) to be on the circuit breaker or fuses rather than the enclosure.
Panel Meeting Action: Reject
Panel Statement: The submitter has offered no substantiation for more prescriptive marking. The AHJ is not equipped to qualify "durability."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-65 Log #1878 NEC-P19 **Final Action: Reject**
(550.11(A))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete second paragraph and substitute: Where the feed assembly terminates in a panelboard, the panelboard shall have an ampere rating not less than the ampacity of the feeder assembly. The main disconnecting means and overcurrent protection shall have ratings in accordance with the ampacity of the feeder assembly. The outside of the enclosure for the main disconnecting means shall be plainly and durably marked "Main Disconnect". The outside of the enclosure for main fuses shall be plainly and durably marked with the maximum ampere rating of the fuses to be used.
Revise third paragraph: The distribution <u>equipment</u> ~~panelboard~~ shall be ~~located in an~~ readily accessible ~~location~~ but shall not be located in a bathroom, <u>toilet compartment</u>, or ~~clothes~~ closet. A clear working space at least not less than 750 mm (30 in.) wide <u>and not less than the width of the distribution equipment</u> shall be provided. This space shall extend from the floor or standing surface to the top of the distribution <u>equipment</u> ~~panelboard~~, <u>but not less that 750 mm (30 in.)</u>.
Substantiation: Edit. Proposal incorporates present provisions in a less detailed manner. It included provisions for permanently installed (fixed) feeder assemblies covered in 550.10(I). Present wording requires the main current breaker or fuses (not the enclosure) to be marked "main". Closets for utilities storage and other uses than clothes should be included. There should be a minimum height for working space.

~~**Panel Meeting Action: Reject**~~

Panel Statement: Distribution panelboard is the term used in the applications covered by Article 550. There is insufficient substantiation provided to broaden the means of distribution. Where not amended in Article 550, the rules in Chapters 1 through 4 apply. The proposal does not add clarity or increase usability and is not technically substantiated.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-66 Log #1964 NEC-P19 **Final Action: Reject**

(550.11(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete second paragraph and substitute: Where the feeder assembly terminates in a panelboard, the panelboard shall have an ampere rating not less than the ampacity of the feeder assembly. The main disconnecting means and overcurrent protection in accordance with the ampacity of the feeder assembly The outside of the enclosure for the main disconnecting means shall be plainly and durably marked "Main Disconnect"... The outside of the enclosure for main fuses shall be plainly and durable marked with the maximum ampere rating of the fuses to be used.

Revise third paragraph: The distribution equipment panelboard shall be located in an accessible location readily accessible, but shall not be located in a bathroom, toilet compartment, or clothes closet. A clear accessible working space at least not less than 750 mm (30 in.) wide and not less than the width of the distribution equipment shall be provided. This space shall extend from the floor or standing surface to the top of the distribution equipment panelboard, but not less than 750 mm (30 in.).

Substantiation: Edit. Proposal incorporates present provisions and includes provisions for permanently installed (fixed) feeder assemblies covered in 550.10(I). Present wording requires the main circuit breaker or fuses, not the enclosure, to be marked "Main". Closets for utilities, storage, and other uses should be included. There should be a minimum height for working space.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 19-65.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-67 Log #4922 NEC-P19 **Final Action: Reject**

(550.13)

Submitter: Robert Kopelman, Rockville Centre, NY

Recommendation: Revise text to read as follows:

550.13 Receptacle Outlets. (Shall be thermally protected or combination GFI thermally protected)

(D) Receptacle Outlets Required 1-9

(E) Pipe Heating Cable(s) Outlet. 1-4.

Substantiation: There is a major problem called a glowing connection. As UL 1699 Scope states – AfCI's " 1.3 These devices are not intended to detect glowing connections" Glowing connections are a major cause of fires. There is a new UL document 498 with thermal protection that states that device shall detect abnormal heating in 8 locations in an outlet. These 8 locations are where overheating can and does occur. Attached are documents showing that an AFCI starts to detect Arcs at 5 amps. Also attached are forensic documents showing that the glowing connection can occur with 1 amp. Most electricians and inspectors have never seen a glowing connection because it happens inside the wall. But take an outlet and put a load on it, loosen the screw terminal in a dark room and it is freighting. The screw terminals loosen up over time do to the differential of expansion and contraction of the metals involved. A minute air gap is formed and the natural vibrations of the earth and the vibrations caused by normal living circumstances help to create the glowing connections.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The submitter's recommendation is unclear. A mandatory requirement is not permitted to be included in a section title in accordance with the NEC Style Manual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-68 Log #3552 NEC-P19 **Final Action: Reject**

(550.13(A)(4) (New))

Submitter: Steven R. Montgomery, 2D2C Inc.

Recommendation: Add new (4) as follows:

550.13 Receptacle Outlets.

(A) Grounding-Type Receptacle Outlets. All receptacle outlets shall comply with the following:

(1) Be of grounding type

(2) Be installed according to 406.3

(3) Except where supplying specific appliances, be 15- or 20-ampere, 125-volt, either single or multiple type, and accept parallel-blade attachment plugs

(4) Be Electrical Fault Circuit Interrupter protected.

Substantiation: Based on data from the 2006 U.S. Fire Administration Report titled, "Live Safely in your Manufactured Home: A Factsheet on Manufactured Home Safety", manufactured homes have a fire death rate per 100,000 housing units 32-50 percent higher than the rate for other dwellings. Over one-fifth of the deaths are young children. Electrical system malfunctions and heating fires are the leading causes of fire and together account for one third of manufactured home fires.

Resistive heating and arcing faults ignite most of the major residential electrical fires. Resistive heating faults ignite 59% of the fires, in spite of branch circuit over-current protection (see "Electrical Ignition Causes of Fires in Ontario 2002-2007," Electrical Safety Authority (ESA) report, 2008). The latest code enhancements, including Arc Fault Circuit Interrupters (per UL Std. 1699), are not designed to protect against resistive heating from current flowing through poor branch circuit connections (high resistance points), overloaded appliances and open neutral conditions. New homes may have aged and potentially faulty appliances, extension cords and lighting fixtures brought in by homeowners. The 2006 NFPA report titled "Selected Residential Electrical Fires" indicates these faults have resulted in numerous fire fatalities.

Electrical Fault Circuit Interrupter (EFCI) technology is designed to provide primary protection against resistive heating ignition mechanisms including high resistance points in branch circuit wiring (cause of 23% of residential electrical fires, per the attached ESA 2008 report), appliance overloads (cause of 17% of the electrical fires), and open neutral conditions (cause of 2% of the electrical fires). EFCI also provides supplementary protection against overloaded circuits (cause of 7% of the electrical fires) and insulation damage that leads to arc tracking (cause of 7% of the electrical fires). A large portion of residential electrical ignitions are caused by resistive heating that cannot be protected by branch circuit overcurrent devices but can be protected by EFCI.

EFCI protection must be located at the junction between the load and branch circuit wiring to detect these faults and cannot be located at the panelboard. EFCI technology is a superior approach compared all relevant alternatives. (see "Alternatives to Electrical Fault Circuit Interrupter (EFCI) Technology", Wayne Hartill, 2D2C Inc., 2008.)

The complete protection of EFCI technology has been previously referred to as the combination of Overload Fault Circuit Interrupter (OFCI) and Power Fault Circuit Interrupter (PFCI) technologies. For simplicity, OFCI and PFCI technologies have been renamed Electrical Fault Circuit Interrupter (EFCI). Some previous documentation refers to the old nomenclature.

Two Fact Finding Reports from independent NRTL's substantiate the performance of EFCI technology. (see "Descriptive Report and Test Results", Todd Hamden, CSA International, Feb 2006 & "Descriptive Report and Test Results", Intertek Testing Services NA Ltd., Jan 2006). A third NRTL Fact Finding Report has been request from Underwriters Laboratories (UL).

Products containing EFCI technology have NRTL certification against UL 498 and UL 498A standards and have been available for sale in the marketplace since 2006. Multiple producers of EFCI technology exist in the marketplace. With a mandate more producers will likely enter the marketplace.

A mandate of EFCI technology is required because the net safety benefit to society is far greater than that of voluntary sales alone.

\ Note that a sister proposal for Electrical Fault Circuit Interrupter (EFCI) has been submitted for a new definition in article 100.

Please review submitted documents of support from the following fire forensics experts including:

- Vytenis Babrauskas, Ph.D., President of Fire Science and Technology Inc. and author of the "Ignition Handbook".
- John S. Robison, President of Robison Forensic Consulting, previously Alabama State Fire Marshal, and previous President of International Fire Marshals Association.
- Chris W Korinek, P.E., President of Synergy Technologies and author of Chapter 10 of "Kirks Fire Investigation" book.
- Doug Crawford, Deputy Fire Marshal of the Ontario Office of the Fire Marshal.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There are currently no testing standards for this product. Any testing standards noted in the substantiation are for receptacles in general. The testing reports provided are based on performance results for a specific product.

Installation of this device is not currently prohibited by the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-69 Log #2438 NEC-P19 **Final Action: Reject**
(550.13(B))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
550.13 Receptacle Outlets.
(B) ~~Ground-Fault Circuit-Interrupters (GFCI)~~ Power Safe Protectors. All 125-volt, single-phase, 15- and 20-ampere receptacle outlets installed outdoors, in compartments accessible from outside the unit, or in bathrooms, including receptacles in luminaries, shall have ~~GFCI~~ power safe protector protection. ~~GFCI~~ Power safe protector protection shall be provided for receptacle outlets serving countertops in kitchens, and receptacle outlets located within 1.8 m (6 ft) of a wet bar sink.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There are currently no testing standards for this product. Any testing standards noted in the substantiation are for receptacles in general. The testing reports provided are based on performance results for a specific product.
This proposal is brand-specific. The NEC cannot require a specific brand in any article in the code.
Installation of this device is not currently prohibited by the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-70 Log #1446 NEC-P19 **Final Action: Reject**
(550.13(B) and Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise exception and last paragraph as follows:
Exception: GFCI protection shall not be required for appliances in dedicated spaces, such as for dishwashers, disposals refrigerators, freezers, and trash compactors, ~~laundry equipment~~.
Feeders supplying branch circuits for such receptacles shall be permitted to be protected...(remainder unchanged).
Substantiation: Receptacles for laundry equipment within 1.8 m (6 ft) of a sink should not be excluded and modify 210.8(A)(7), which should govern. If that section is necessary for safety, it should apply for this article. Feeders with GFCI protection should be specified as supplying the outlets specified. Proposed revised exception is a complete statement.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 19-71. There is no technical substantiation for making the requirement more restrictive for receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-71 Log #2399 NEC-P19 **Final Action: Accept in Principle**
(550.13(B) Exception)

Submitter: Douglas A. Lee, U.S. Consumer Product Safety Commission
Recommendation: Revise text to read as follows:
550.13(B) Exception: ~~Receptacles installed for appliances in dedicated spaces, such as for dishwashers, disposals, refrigerators, freezers, and laundry equipment~~. Exceptions listed in 210.8 shall be permitted.
Substantiation: During the development of the 2008 NEC, CMP-2 recognized that present-day ground-fault circuit-interrupter (GFCI) devices are compatible with electrical appliances in the home and that there is no need to exclude refrigerators, freezers, and laundry equipment from GFCI protection. Exceptions shall only be permitted as recognized in 210.8 to provide users with the optimum electric shock protection by extending this expansion of GFCI protection to manufactured housing.
Panel Meeting Action: Accept in Principle
Revise the proposal by eliminating the exception completely and adding the following as an additional sentence to the first paragraph in 550.13(B):
"The exceptions in 210.8(A) shall be permitted."
Panel Statement: The panel action restricts the permitted exceptions to dwelling units and meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-72 Log #3551 NEC-P19 **Final Action: Reject**
(550.13(C))

Submitter: Steven R. Montgomery, 2D2C Inc.
Recommendation: Revise text to read as follows:
Cord-Connected Fixed Appliance. A grounding-type receptacle outlet with Electrical Fault Circuit Interrupter protection shall be provided for each cord-connected fixed appliance installed.
Substantiation: Based on data from the 2006 U.S. Fire Administration report title, "Live Safely in your Manufactured Home: A Factsheet on Manufactured Home Safety", manufactured homes have a fire death rate per 100,000 housing units 32-50 percent higher than the rate for other dwellings. Over one-fifth of the deaths are young children.
Based on data from the 2007 U.S. Fire Administration report titled "Clothes Dryer Fires in Residential Buildings", 12,700 clothes dryer fires occur in residential buildings, annually, resulting in 15 deaths and 300 injuries. 80% of clothes dryer fires occur in residential buildings. Electrical failure or malfunction account for 15.3% of residential dryer fires. Mechanical failure or malfunction account for 32.6%.
Electrical Fault Circuit Interrupter (EFCI) is designed to prevent electrical failure fires caused by resistive heating ignition mechanisms that cannot be protected by branch circuit overcurrent protection including poor connections / high resistance points, appliance overloads, and open neutral conditions. EFCI could also detect mechanical failure fires such as seized motor bearings. Due to their nature, these faults cannot be detected by branch circuit overcurrent devices but can be detected by EFCI. EFCI protection must be located at the junction between the load and branch circuit wiring to detect these faults and cannot be located at the panelboard.
EFCI technology is a superior approach compared to relevant alternatives. (see "Alternatives to Electrical Fault Circuit Interrupter (EFCI) Technology: Dryer", Wayne Hartill, 2D2C Inc., 2008).
The complete protection of EFCI technology has been previously referred to as the combination of Overload Fault Circuit Interrupter (OFCI) and Power Fault Circuit Interrupter
(PFCI) technologies. For simplicity, OFCI and PFCI technologies have been renamed Electrical Fault Circuit Interrupter (EFCI). Some previous documentation refers to the old nomenclature.
Two Fact Finding Reports from independent NRTL's substantiate the performance of EFCI technology. (see "Descriptive Report and Test Results", Todd Hamden, CSA International, Feb 2006 & "Descriptive Report and Test Results", Intertek Testing Services NA Ltd., Jan 2006). A third NRTL Fact Finding Report has been requested from Underwriters Laboratories (UL). These Fact Finding Reports tested the implementation of EFCI technology in NEMA 5-15R duplex receptacles. The results of these reports also support EFCI as implemented into a NEMA 14-50R dryer receptacle since they differ only in form factor.
Products containing EFCI technology have been NRTL tested against UL standards and available for sale in the marketplace since 2006. Multiple producers of EFCI technology exist in the marketplace. With a mandate more producers will likely enter the marketplace.
A mandate of EFCI technology in a NEMA 14-50R dryer receptacle is required because the net safety benefit to society is far greater than that of voluntary sales alone.
Note that a sister proposal for Electrical Fault Circuit Interrupter (EFCI) has been submitted for a new definition in article 100.
Please review submitted documents of support from the following fire forensics experts including:
● Vytenis Babrauskas, Ph.D., President of Fire Science and Technology Inc. and author of the "Ignition Handbook".
● John S. Robison, President of Robison Forensic Consulting, previously Alabama State Fire Marshal, and previous President of International Fire Marshals Association.
● Chris W Korinek, P.E., President of Synergy Technologies and author of Chapter 10 of "Kirks Fire Investigation" book.
● Doug Crawford, Deputy Fire Marshal of the Ontario Office of the Fire Marshal.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-68.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-73 Log #4760 NEC-P19 **Final Action: Reject**
(550.13(D))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 2-274.

This action will be considered by the panel as a public comment.

Submitter: D. Jerry Flaherty, East Islip, NY
Recommendation: Add revised text to read as follows:

(D) Receptacle Outlets required. Except in the bath, closet, and ~~**hall**~~ **hallway** areas, receptacle outlets shall be installed at wall spaces 600 mm (2 ft) wide or more so that no point along the floor line is more than 1.8 m (6 ft) measured horizontally from an outlet in that space. In addition, a receptacle outlet shall be installed in the following locations:

Substantiation: No definition for "hall" in NEC.

Webster dictionary has several definitions that are not in line with this section of NEC.

1) "Entrance space into which the main door to house" — new large homes have "halls" that are quite large, fully furnished with tables (table lamps) and seating. By definition and code these "halls" need only one receptacle. I have inspected many with extension cords which are a fire hazard.

210.52(H) Hallways.

2) Webster definition - "A communally owned building where public business is transacted or where people meet etc. "which is in line with other areas of the NEC (assembles halls, dance halls, etc.) but not with this section of the code.

3) The end of habitable rooms with two or more doors at one end meets the definition of a hall and again usually only one receptacle is provided.

"Hallway" is not defined in the NEC and Webster defines as a passage connecting two or more rooms which is closer to what the NEC is referring too, but not quite.

See Proposal for a definition of a Hallway.

Hallways. A walled corridor used exclusively to connect two or more rooms.

Panel Meeting Action: Reject

Panel Statement: The term "hall" is used correctly in the noted section. Changing the term to "hallway" does nothing to improve the Code. It is noted that the proposed definition of "hallway" was rejected by CMP-1 (Proposal 1-89) prior to balloting.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-74 Log #2439 NEC-P19 **Final Action: Reject**
(550.13(E)(3))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:

550.13 Receptacle Outlets.

(E)(3) Pipe Heating Cable(s) Outlet. ~~On a circuit where all of the outlets are on the load side of the ground fault circuit interrupter~~ <u>Shall consist of a power safe protector receptacle.</u>

Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.

The Power Safe Protector (PSP) device overcomes these limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.

2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

This proposal makes changes to help make the code consistent with proposed changes to 550.13(B) for use of power safe protector receptacles.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 19-69.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-75 Log #474 NEC-P19 **Final Action: Accept**
(550.13(F)(1))

Submitter: Paul W. Abernathy, Electrical Service Specialists & The Electrical Guru
Recommendation: Revise text to read as follows:

(F) Receptacle Outlets Not Permitted. Receptacle outlets shall not be permitted in the following locations:

(1) Receptacle outlets shall not be installed within <u>or directly over</u> a bathtub or shower space.

(2) A receptacle shall not be installed in a face-up position in any countertop.

(3) Receptacle outlets shall not be installed above electric baseboard heaters, unless provided for in the listing or manufacturer's instructions.

Substantiation: This change would clear up any question as to if a receptacle is allowed directly over a bathtub or shower space in a mobile home, it is addressed in 406.8(2)(C) but is left open under the present listing 550.13(F)(1) which creates a potential hazard for the consumer.

Panel Meeting Action: Accept

Panel Statement: It is noted that the reference to 406.8(2)(C) in the submitter's substantiation should be to 406.8(C).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-76 Log #473 NEC-P19 **Final Action: Reject**
(550.13(G))

Submitter: Paul W. Abernathy, Electrical Service Specialists & The Electrical Guru
Recommendation: Delete text to read as follows:

(G) Receptacle Outlets Not Required. Receptacle outlets shall not be required in the following locations:

(1) In the wall space occupied by built-in kitchen or wardrobe cabinets

~~(2) In the wall space behind doors that can be opened fully against a wall surface~~

(3) In room dividers of the lattice type that are less than 2.5 m (8 ft) long, not solid, and within 150 mm (6 in.) of the floor

(4) In the wall space afforded by bar-type counters

Substantiation: The requirements for a Dwelling Unit are as follows:

(1) Spacing. Receptacles shall be installed so that no point measured horizontally along the floor line in any wall space is more than 1.8 m (6 ft) from a receptacle outlet.

When dealing with a Mobile Home, the space behind the door area has the same use and potential as it does in the requirements of 210.52(A)(1) and should be required to meet the same spacing requirements. Section 550.13 of the National Electrical Code makes provisions for the same spacing requirements of 6 feet from an outlet. In the spacing, requirements of 210.52(A)(1) there is no relief from the space behind a door and so it should also not be shown under 550.13(G)(2) and should be deleted.

Panel Meeting Action: Reject

Panel Statement: Chapter 5 modifies Chapters 1 through 4 as permitted by Section 90.3. No technical substantiation has been provided to support deleting the noted provision. Consideration relative to size constraints is needed for this specialized industry.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-77 Log #1448 NEC-P19 **Final Action: Reject**
(550.14(C)and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (C); delete text of (D) and substitute: Luminaires, lighting track, lampholders, pendants, and ceiling suspended (paddle) fans shall comply with 410.10(D).

Substantiation: Since pendant luminaries or cords are not prohibited there is no need to specifically permit them. Section 410.10 is more specific and restrictive, and if necessary for safety should be applicable for this article.

Panel Meeting Action: Reject

Panel Statement: Particularly for mobile homes, the acceptability of pendant luminaries or pendant cords is not intuitive. 410.10(D) only calls for damp location luminaries within the defined space. The requirement in 550.14(D) is intended to be more restrictive given the relatively lower ceilings in the bath and shower areas. Products such as track lighting, lampholders, and ceiling suspended (paddle) fans are not practical in a bathtub or shower stall.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-78 Log #1189 NEC-P19 **Final Action: Reject**
(550.14(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete, or substitute: Luminaires and other lighting equipment, pendants, and paddle fans installed in bathtub and shower areas shall comply with 410.10(D).
Substantiation: Section 410.10 is more comprehensive and some of its provisions are not modified by this section, which therefore apply; this can be confusing.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-77.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-79 Log #1188 NEC-P19 **Final Action: Reject**
(550.15)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise as follows:
Except as specifically limited in this section, the identified wiring methods and materials included in this Code shall be used in mobile homes.
Substantiation: Edit. The wiring methods and materials should be suitable for the use. All wiring methods are not suitable.
Panel Meeting Action: Reject
Panel Statement: The proposed language does not add clarity or improve usability of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-80 Log #1831 NEC-P19 **Final Action: Reject**
(550.15(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where a range, clothes dryer, dishwasher, trash compactor, or other appliance is directly connected by metal covered cable or flexible ~~metal~~ conduit, a length of not less than 900 mm (3 ft), but not longer than necessary, of unsupported cable or conduit shall be provided to ~~service~~ permit access to terminations ~~on the appliance~~. The cable or conduit shall be secured ~~to the wall~~ at the point where the unsupported length begins. Nonmetallic sheathed cables, Type SE, Type UF, Type MI, cables, flexible metallic tubing, and electrical nonmetallic tubing shall not be used for this purpose. ~~To connect a range or dryer~~.
Delete remainder.
Substantiation: Edit. Although this provision applies to metal covered cable and flexible metal conduit, it doesn't apply to flexible nonmetallic conduit or other wiring methods permitted by 550.15. Access to terminations appears to be the intent and should apply to terminations that may be made at an outlet box where the cable or conduit may be connected. A maximum length should be specified to exclude excessive lengths and comply with 110.12. Some additional wiring methods should be noted as not suitable.
Panel Meeting Action: Reject
Panel Statement: There is no justification to remove the requirement for flexible metal conduit. In this type of installation, the metallic covering affords an extra level of protection against physical damage. The panel points out to the submitter that the requirement is not directed at LFMC and LFNMC; it is directed at metal covered cable and FMC (Article 348). See the first sentence of 550.15.
"Where the unsupported length begins" is unnecessary language as the unsupported length clearly begins after the last support.
No substantiation has been provided to extend the list of cable and other products that are not to be used.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-81 Log #888 NEC-P19 **Final Action: Reject**
(550.15(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
Switches shall not be installed in a face-up position in any countertop in living area.
Substantiation: The provision of 550.13(F)(2) should apply.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation was provided to address switches. The substantiation only addresses receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-81a Log #CP1904 NEC-P19 **Final Action: Accept**
(550.15(H))

Submitter: Code-Making Panel 19,
Recommendation: Revise 550.15(H) as follows:
H) Under-Chassis Wiring (Exposed to Weather). Where outdoor or under-chassis line-voltage (120 volts, nominal, or higher) wiring is exposed to moisture or physical damage, it shall be protected by rigid metal conduit or intermediate metal conduit except as provided in 1 or 2 below. The conductors shall be suitable for wet locations.
1. Where closely routed against frames and equipment enclosures, reinforced thermosetting resin conduit (RTRC) listed for above ground use, Type MI cable, electrical metallic tubing or rigid polyvinyl chloride conduit (PVC) shall be permitted.
2. Where extending vertically from a direct burial depth of at least 457 mm (18 in.) below grade and terminated to a factory installed conduit or enclosure, Schedule 80 PVC, or reinforced thermosetting resin conduit (RTRC) listed for exposure to physical damage.
~~Exception: Type MI cable, electrical metallic tubing, or rigid nonmetallic conduit shall be permitted where closely routed against frames and equipment enclosures.~~
Substantiation: This proposal intends to meet the intent of the submitters of proposals 19-82 and 19-83. See the substantiation for those proposals. The panel also agreed that RTRC conduit is suitable for use where closely routed against the frames and equipment enclosures where listed for above ground use.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-82 Log #4170 NEC-P19 **Final Action: Accept in Principle**
(550.15(H) Exception)

Submitter: Ron B. Chilton, North Carolina Department of Insurance
Recommendation: Revise text to read as follows:
550.15(H) Under-Chassis Wiring (Exposed to Weather)
Exception: Type MI cable, electrical metallic tubing, or ~~rigid nonmetallic conduit~~, rigid polyvinyl chloride conduit shall be permitted where closely routed against frames and equipment frames and equipment enclosures, or Schedule 80 PVC conduit where extending vertically from a burial depth of at least 18 inches below grade and terminating to a factory installed conduit or enclosure.
Substantiation: Mobile homes and manufactured homes have historically been provided with a PVC conduit extending from the panelboard inside the home to below the underside of the structure for the purpose of attaching to the feeder conduit. From the time that this responsibility was under HUD's jurisdiction, this has been the practice and the typical installation was to extend a conduit from a location underground in the vertical position to attach to this conduit provided by the manufacturer. Schedule 80 PVC is identified for use where exposed to physical damage and should be acceptable for this application. At the present, many AHJs are not permitting this due to the conduit not being installed against the frame of the mobile home or manufactured home. This change should clarify, as acceptable, an installation that has been used for over 30 years.
Panel Meeting Action: Accept in Principle
See panel action on Proposal 19-81a.
Panel Statement: The panel action on Proposal 19-81a meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-83 Log #4730 NEC-P19 **Final Action: Accept in Principle**
(550.15(H) Exception)

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
550.15 Wiring Methods and Materials.
(H) Under-Chassis Wiring (Exposed to Weather). Where outdoor or under-chassis line-voltage (120 volts, nominal, or higher) wiring is exposed to moisture or physical damage, it shall be protected by rigid metal conduit or intermediate metal conduit. The conductors shall be suitable for wet locations.
Exception: Type MI cable, electrical metallic tubing, ~~or~~ rigid ~~nonmetallic~~ polyvinyl chloride conduit (PVC) or reinforced thermosetting resin conduit (RTRC), shall be permitted where closely routed against frames and equipment enclosures.
Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of "nonmetallic" and add in each of the specific raceway types. Non-metallic conduit now has four different types of raceways and not all non-metallic raceway types would be acceptable in all locations.

Panel Meeting Action: Accept in Principle
See panel action on Proposal 19-81a.
Panel Statement: The panel action on Proposal 19-81a meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-83a Log #CP1905 NEC-P19 **Final Action: Accept**
(550.16)

Submitter: Code-Making Panel 19,
Recommendation: Revise text to read as follows:
550.16 **Grounding**. Grounding of both electrical and non-electrical metal parts in a mobile home shall be through connection to a grounding bus in the mobile home distribution panelboard, ~~the grounding bus~~ <u>and</u> shall be connected through the green-colored insulated conductor in the supply cord or the feeder wiring to the ~~service ground~~ <u>grounding bus</u> in the service-entrance equipment located adjacent to the mobile home location. Neither the frame of the mobile home nor the frame of any appliance shall be connected to the grounded circuit conductor in the mobile home. Where the distribution panelboard is the service equipment as permitted by 550.32(B), the neutral conductors and the equipment grounding bus shall be connected.
Substantiation: The language change is consistent throughout the Code. "Grounding bus" is used several times in Article 230 Services and Article 250 Grounding and Bonding. This panel proposal addresses the concerns of Proposal 19-85.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-84 Log #1094 NEC-P19 **Final Action: Reject**
(550.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first paragraph and (A)(1) and substitute:
GROUNDING. Where grounding is provided in or on a mobile home it shall be by connection to a grounding bus or terminal(s) in the main disconnecting means specified in 550.11(A). The grounding bus or terminal(s) shall be connected by the feeder equipment grounding conductor to the grounding electrode conductor in the service equipment.
(A) GROUNDED CONDUCTORS.
(1) The grounded circuit conductors in or on the mobile home shall be insulated from grounding and bonding conductors, equipment enclosures, and other parts except terminations insulated from ground. The grounded circuit terminals in the distribution equipment, appliances, and other utilization equipment shall be insulated from equipment enclosures. Bonding means for grounded conductors in or on a mobile home shall be removed.
Revise text of (A)(2):...shall be made with <u>an identified</u> 4-conductor flexible cord <u>or cable containing an equipment grounding conductor</u> and <u>with</u> a 3-pole, 4-wire grounding type plug.
Revise text of (B)(1): The ~~green colored insulated~~ feeder equipment grounding conductor shall be connected to the grounding terminal(s) in the <u>main</u> disconnecting means.
Revise text of (B)(3): Cord and plug-connected appliances ~~such as washing machines, clothes dryers, refrigerators, and so forth~~ and <u>other equipment rated at over 25 volts</u> shall be grounded by means of an <u>identified flexible</u> cord ~~with~~ <u>containing an equipment grounding conductor</u> and grounding type attachment plug.
<u>*Exception: Listed appliances and equipment identified as suitable for non-grounding.*</u>
Substantiation: The feeder may terminate in a single circuit breaker of fused switch, which are not panelboards; "green-colored" and "supply cord" are superfluous. Removal of bonding means should be clear it only applies to the grounded circuit conductors. Flexible cord of (B)(1) should be identified for the use (wet locations, sunlight resistance, etc.). Proposed (B)(3) is more inclusive and the provisions should exempt low voltage equipment and listed equipment such as portable table and floor lamps, toasters, hair curlers, blow dryers, smoothing irons, etc. Requiring bonding means to be discarded is unnecessary and unenforceable.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided insufficient technical substantiation to support the proposed revisions. The reference in the proposed exception to the use of "non-grounding-type appliances" is neither a recognized nor an enforceable term.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-85 Log #1876 NEC-P19 **Final Action: Reject**
(550.16)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In the second sentence of the first paragraph change "service ground" to "grounding electrode conductor...".
Substantiation: Edit. "service ground" is not a defined term.
Panel Meeting Action: Reject
Panel Statement: The proposed revision does not add clarity or improve usability of the code. See the panel action and statement on Proposal 19-83a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-86 Log #879 NEC-P19 **Final Action: Reject**
(550.16(B)(1))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:...shall be effectively bonded to the grounding terminals ~~or enclosures~~ of the ~~distribution panelboard~~ <u>disconnecting means</u>.
Substantiation: There may not always be a panelboard if there is only one branch circuit. The supply system grounding conductor terminals are in the disconnecting means that should be the "effective" bonding point.
Panel Meeting Action: Reject
Panel Statement: The term "distribution panelboard" is used throughout Article 550. Mobile homes are not permitted to be served by a single branch circuit; therefore the submitter's substantiation is incorrect. The proposed revision to delete 'or enclosures' does not relate to 550.16(B)(1).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-87 Log #1879 NEC-P19 **Final Action: Reject**
(550.16(B)(1))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: (1) The green-colored insulated grounding wire in the supply cord or permanent feeder wiring shall be connected to the grounding bus in the ~~distribution panelboard or~~ main disconnecting means <u>enclosure</u>.
Substantiation: 550.11(A) requires a main disconnecting means which may be an individual separate circuit breaker of fused switch that is not part of a panelboard, and where the grounding conductor in the supply is terminated.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add clarity or increase usability of the code. In addition, it does not reflect current manufactured housing industry practice. See also the panel statement on Proposal 19-86.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-88 Log #1183 NEC-P19 **Final Action: Reject**
(550.16(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (1) and substitute:
All exposed noncurrent-carrying fixed metal parts that are likely to become energized shall be effectively bonded to the grounding terminal(s) in the main disconnecting means. A continuous solid copper bonding conductor shall be connected between the grounding terminal(s) in the main disconnecting means and an accessible terminal on the chassis. This bonding conductor shall be sized in accordance with Table 250.122 but shall not be smaller than 8 AWG. This bonding conductor shall be provided with approved means of protection where likely to be subject to physical damage.
Revise text of (2):
Grounding and bonding terminals shall be of the solderless type and listed as pressure connectors identified for the wire size and material used.
Substantiation: "May" is a term to be avoided per the Style Manual. "Likely" is a term used in many sections. The main disconnecting means grounding terminals provide the most direct and lowest impedence path to the service equipment. Present wording does not require a larger than 8 AWG conductor if required by table 250.122. The chassis bonding conductor should be continuous and solid due to possible corrosion from deicing salts or other conditions. Present wording of (2) appears related to the chassis bonding conductor but literal wording applies it to all bonding conductors.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-89.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-89 Log #1777 NEC-P19 **Final Action: Accept in Part**
(550.16(C)(1) and (2))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: (1) All exposed fixed noncurrent-carrying metal parts that ~~may~~ are likely to become energized shall be effectively bonded to the grounding terminal of the ~~distribution panelboard~~ disconnecting means specified in 550.11(A). A solid copper bonding conductor shall be connected between the ~~distribution panelboard~~ mobile home main disconnecting means grounding terminal and the chassis, sized in accordance with Table 250.122 but not smaller than 8 AWG. The bonding conductor shall be routed so as not likely to be subject to physical damage, or be protected by identified means.
(2) Grounding and bonding terminals shall be of the solderless type and be listed as pressure terminal connectors ~~recognized~~ identified for the wire type and size.
Delete remainder.
Substantiation: The bonding conductor should be copper and solid to minimize corrosion. Connections should be to the main disconnecting means grounding terminals for the most direct low impedance grounding path, and sized in accordance with 250.122 which may require a size larger than 8 AWG. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Accept in Part
The panel accepts deleting "may" and substituting "are likely to." The remainder of the text remains unchanged.
Panel Statement: There is neither sufficient evidence nor substantiation for the remainder of the changes proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-90 Log #386 NEC-P19 **Final Action: Reject**
(550.16(C)(4)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"The lower panel of the metallic exterior covering is secured by metallic fasteners at a cross member of the chassis by two metal straps for each ~~per~~ mobile home unit or section at opposite ends."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is incorrect. The use of the word "per" in this application is appropriate. The proposed revision does not add clarity or improve usability. The NEC Style Manual does not prohibit the use of "per."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-91 Log #1375 NEC-P19 **Final Action: Reject**
(550.17(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (1):
An electrical continuity test and where possible, a visual inspection. To ensure that all electrically conductive parts are properly, effectively bonded.
Substantiation: Visual inspection should also be required. Continuity tests unless of high amperage do not always indicate loose connections and cannot determine if connectors are listed for wire size and material.
Panel Meeting Action: Reject
Panel Statement: A visual inspection is unnecessary. Electrical continuity can be verified using the appropriate test equipment. A visual inspection is unenforceable and impractical in many cases.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-92 Log #1319 NEC-P19 **Final Action: Reject**
(550.18)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "leg" to "conductor".
Substantiation: Edit. Leg is a vernacular and nonspecific term.
Panel Meeting Action: Reject
Panel Statement: The term "leg" is clearly understood. The proposed revision does not add clarity or improve usability of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-93 Log #387 NEC-P19 **Final Action: Reject**
(550.18(A)(5))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as shown:
"First 3000 total volt-amperes at 100 percent plus remainder at 35 percent equals volt-amperes to be divided by 240 V ~~volts~~ to obtain current (amperes) for each ~~per~~ leg."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: Use of the word "volts" rather than the abbreviation "V" is appropriate because in this context it is not referring to a rating as described in the NEC Style Manual. See also the panel statement on Proposal 19-90.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-94 Log #1182 NEC-P19 **Final Action: Reject**
(550.18(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In (2) change "leg" to "ungrounded conductor or"
In (3) add: "and continuous load"
Substantiation: "Leg" is vernacular and undefined. Continuous loads such as a water heater should be provided for.
Panel Meeting Action: Reject
Panel Statement: The term "leg" is clearly understood.
The addition of 'and continuous load' adds confusion to the requirement. Insufficient technical substantiation has been provided for the proposed revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-95 Log #388 NEC-P19 **Final Action: Reject**
(550.18(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise the last sentence as shown:
"Where an air conditioner is not installed and a 40 ampere power-supply cord is provided, allow 15 amperes for each ~~per~~ leg for air conditioning."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-90.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-96 Log #1346 NEC-P19 **Final Action: Reject**
(550.20(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
"or wet" after "damp".
Substantiation: Equipment listed for wet locations is suitable for damp locations.
Panel Meeting Action: Reject
Panel Statement: The proposal is addressed by 406.8(A).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-97 Log #2398 NEC-P19 **Final Action: Accept**
(550.25)

Submitter: Douglas A. Lee, U.S. Consumer Product Safety Commission
Recommendation: Revise text to read as follows:
550.25 Arc-Fault Circuit-Interrupter Protection.
(B) ~~Bedrooms of~~ Mobile Homes and Manufactured Homes. All 120-volt branch circuits that supply 15- and 20- ampere outlets installed in family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, or similar rooms or areas of mobile homes and manufactured homes shall comply with 210.12(B)
Substantiation: CMP-2 recognized the fire prevention capabilities of arc-fault circuit-interrupters (AFCIs) by expanding areas requiring AFCI protection as set forth in 210.12 during the 2008 NEC code-making cycle. From 1999-2002, the fire death rate is roughly twice as high in manufactured homes as in other one- and two-family dwellnigs, and electrical distribution equipment continues to be one of the leading causes of manufactured home fires[1]. By making the requirements for manufactured homes consistent with the requirements for other dwelling units, additional electrical wiring system fires can be mitigated.
[1]. Hall, John R., Jr Manufactured Home Fires, National Fire Protection Association, February 2005.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-98 Log #3082 NEC-P19 **Final Action: Reject**
(550.25)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
550.25 Arc-Fault Circuit-Interrupter Protection.
~~(A) Definition. Arc-fault circuit interrupters are defined in Article 210.12(A).~~
~~(B) Bedrooms of Mobile Homes and Manufactured Homes. All 120-volt branch circuits that supply 15- and 20-ampere outlets installed in bedrooms of mobile homes and manufactured homes shall comply with 210.12(B).~~
Arc-fault circuit-interrupters shall be provided in accordance with 210.12.
Substantiation: This code section is always one code cycle behind the requirements of Article 210, because nobody ever makes proposals to this section. By simply referring the code user to the section, we can stop having the rules out of synch with each other.
Panel Meeting Action: Reject
Panel Statement: See the panel's action and statement on Proposal 19-97. The panel continues to believe that the requirements should be restated in Article 550 since this is still emerging technology and other standards, including HUD, need clear guidance from the NEC in applying the expanding requirements in applications addressed by Article 550.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-99 Log #504 NEC-P19 **Final Action: Reject**
(550.25(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "circuit" and "interrupters".
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The words are not hyphenated in the definition in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-100 Log #1345 NEC-P19 **Final Action: Accept in Principle**
(550.25(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete:
"bedrooms of".
Substantiation: Other areas included in 210.12(B) should be included. If those requirements are necessary for safety, mobile homes should be included.
Panel Meeting Action: Accept in Principle
See panel action on Proposal 19-97.
Panel Statement: The panel action on Proposal 19-97 meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-101 Log #3900 NEC-P19 **Final Action: Reject**
(550.32)

Submitter: Colin Beckham, E Light Electric Services
Recommendation: Revise text as follows:
The mobile home service equipment shall be located adjacent to the mobile home and not mounted in or on the mobile home. The service equipment shall be located in site from and not more than 9.00 m (30 ft) from the exterior wall of the mobile home it services. the service equipment shall be permitted to be located elsewhere on the premises, provided that disconnection means suitable for use as service equipment is located within sight from and not more than 9.0 m (30 ft) from the ~~exterior wall of the mobile home~~ service of the mobile home ~~it serves~~ and is rated not less than that required for service equipment per 550.32(C). Grounding at the disconnection means shall be in accordance with 250.32.
Substantiation: I believe this change will allow electricians to make safe installations and allow more flexibility in their installations reduce cost and not decrease safety.
Panel Meeting Action: Reject
Panel Statement: The submitter's intent is unclear based on the proposed revisions. Insufficient technical substantiation has been provided.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-102 Log #389 NEC-P19 **Final Action: Reject**
(550.32(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise the third sentence as shown:
"…rated not less than that required for service equipment in accordance with ~~per~~ 550.32(C)."
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-90.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-103 Log #1187 NEC-P19 **Final Action: Reject**
(550.32(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence as follows: The mobile home service equipment shall ~~be located adjacent to the mobile home and~~ not be mounted in or on the mobile home.
Substantiation: Edit. Proposed deletion is superfluous; "adjacent" is effective defined by the 30 ft requirement.
Panel Meeting Action: Reject
Panel Statement: The current text is clear. The word "adjacent" clearly implies that the service equipment should be placed as close as practical to the mobile home.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-104 Log #1823 NEC-P19 **Final Action: Reject**
(550.32(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Manufactured home service equipment shall be permitted in accordance with 550.32(B).
Substantiation: Edit. The definition of Mobile Home includes manufactured homes unless indicated otherwise. (A) indicates service equipment shall not be located on a mobile home (manufactured home). A conflict may be perceived between (A) and (B).
Panel Meeting Action: Reject
Panel Statement: The recommendation is unclear as to where to add the proposed text.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-105 Log #1186 NEC-P19 **Final Action: Reject**
(550.32(B)(6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Subsection (B)(4) already covers this and should govern, not the manufacturers instructions.
Panel Meeting Action: Reject
Panel Statement: When a mobile home is placed in a mobile home park, or a manufactured home is located, the minimum size grounding electrode conductor needs to be compatible with the service.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-106 Log #505 NEC-P19 **Final Action: Reject**
(550.32(E))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between “circuit” and “interrupter”.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The words are not hyphenated in the definition in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-107 Log #2440 NEC-P19 **Final Action: Reject**
(550.32(E))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
550.32 Additional Receptacles. Additional receptacles shall be permitted for connection of electric equipment located outside the mobile home, and all such 125-volt, single phase, 15- and 20-ampere receptacles shall be protected by a listed ~~ground fault circuit interrupter~~ power safe protector.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a “Power Off” safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-69.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-108 Log #1377 NEC-P19 **Final Action: Reject**
(550.33(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change “capacity” to “an ampacity”.
Substantiation: Edit. “Ampacity” is defined; “capacity” is not. The Style Manual, 3.2.5.1, indicates ampacity is the term to be used in the sense of current-carrying capability.
Panel Meeting Action: Reject
Panel Statement: The term “capacity” is used throughout the code and is clear to the users.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 19-109 was not used)

ARTICLE 551 — RECREATIONAL VEHICLES AND RECREATIONAL VEHICLE PARKS

19-110 Log #1354 NEC-P19 **Final Action: Reject**
(551.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change “panel” to “equipment”.
Substantiation: Edit. Where supplied by one circuit (551.42) a single fused switch or circuit breaker may not be deemed a panel.
Panel Meeting Action: Reject
Panel Statement: It is not clear which definition the submitter intends to revise based on the reference to 551.2. The substantiation does not support the proposed revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-111 Log #1376 NEC-P19 **Final Action: Accept**
(551.2.Air-Conditioning or Comfort-Cooling Equipment)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
All of that equipment intended or installed for the purpose of processing the treatment of air so as to control simultaneously <u>or individually</u> its temperature, humidity, cleanliness, and distribution to meet the requirements of the conditioned space.
Substantiation: Edit. Some equipment does not simultaneously control all the functions listed.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-112 Log #891 NEC-P19 **Final Action: Reject**
(551.2.Distribution Panelboard)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
<u>DISTRIBUTION EQUIPMENT</u> ~~PANELBOARD~~
Add to present paragraph:
...or other equipment that constitutes the disconnecting means and overcurrent protection for the branch circuit(s) supplied.
Substantiation: A panelboard may not always be required; see 551.42(A) and (B).
Panel Meeting Action: Reject
Panel Statement: The term “distribution panelboard” is used in Article 551, not the term ‘distribution equipment’ therefore the definition is not necessary. The submitter has provided inadequate substantiation to support the revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-113 Log #1822 NEC-P19 **Final Action: Accept in Principle**
(551.2.Low Voltage)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise Low Voltage definition: An electromotive force rated 24 volts, nominal, or less, supplied from a transformer, converter, ~~or~~ battery, generator, or solar voltaic system.
Substantiation: Generators and solar voltaic systems may also be power sources.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Low Voltage. An electromotive force rated 24 volts, nominal, or less~~, supplied from a transformer, converter, or battery~~.
Panel Statement: The panel action meets the submitter's intent by not limiting the power source within the definition.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-114 Log #2441 NEC-P19 **Final Action: Reject**
(551.2.Power Safe Protector (PSP) (New))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If 551.41(C) and/or 551.71 for PSP are accepted a definition may be required. Proposal also being sent to Article 100.
Panel Meeting Action: Reject
Panel Statement: The panel action on Proposal 19-134 precludes the need for a definition in this article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-115 Log #1374 NEC-P19 **Final Action: Accept in Principle**
(551.2.Transformer)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Revise:Transformer. A device that when ~~used~~ energized, inductively couples primary and secondary windings ~~raises or lowers the voltage of alternating current~~.
Alternatively, delete.
Substantiation: Some transformers have one-to-one ratios. Transformers can also operate from a "chopped" (intermittent) dc current as was done in old vacuum tube radios in automobiles to produce the higher voltages needed for the vacuum tubes. Article 100 Scope indicates commonly defined terms do not need definitions.
Panel Meeting Action: Accept in Principle
Delete the definition of "transformer" in 551.2.
Panel Statement: The panel action accepts the submitter's alternative suggestion of deleting the definition.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-116 Log #3083 NEC-P19 **Final Action: Accept**
(551.4)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
551.4 General Requirements.
(A) Not Covered. A recreational vehicle not used for the purposes as defined in 551.2 shall not be required to meet the provisions of Part IV ~~I~~ pertaining to the number or capacity of circuits required. It shall, however, meet all other applicable requirements of this article if the recreational vehicle is provided with an electrical installation intended to be energized from a 120-volt, 208Y/120-volt, or 120/240-volt, nominal, ac power-supply system.
(B) Text to remain unchanged.
FPN: Text to remain unchanged.
Substantiation: It appears that this section is in error, as Part I of the article contains only definitions and this section. It doesn't address the "the number or capacity of circuits required." If the proposal refers to the wrong part of the Article, please accept the change in principal to clarify the intent of the section.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 19-117 moved to follow 19-128 on page 738)

19-118 Log #1207 NEC-P19 **Final Action: Reject**
(551.17(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Section already applies unless modified or amended.
Panel Meeting Action: Reject
Panel Statement: Section 551.17(E) does not exist.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-119 Log #1373 NEC-P19 **Final Action: Reject**
(551.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
Circuits fed ~~from ac transformers~~ supplied from ac or dc sources shall not supply equipment that is not identified for use on such sources ~~dc appliances~~.
Substantiation: The provision should apply whether the source is an ac transformer generator or battery and include equipment other than appliances. Some equipment may be identified for use on either type of current.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add clarity or improve usability of the code. Dual voltage fixtures, including luminaires or appliances, are already referenced in 551.20(D).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-120 Log #283 NEC-P19 **Final Action: Accept**
(551.20(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "percentages".
Substantiation: The term formula normally refers to a chemical composition whereas the information that follows provides the percentages to be used to calculate the converter rating.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-121 Log #1369 NEC-P19 **Final Action: Reject**
(551.20(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Where a recreational vehicle is equipped with an ac system, a low-voltage system, or both, receptacles, cord caps, cord connector, and flanged surface devices of the low-voltage system shall have a configuration that is incompatible with such devices of the 120-volt or higher ac system.
Delete the last sentence or substitute:
Where a vehicle equipped with a battery or other low-voltage system has an electrical connection provisions for connection to an external source of low-voltage power, the means for connection shall be identified for the use and provide for disconnection of the integral power source(s). A permanent and durable label shall be provided at the connection point stating: Warning Disconnect all 24 volts or less internal power sources before connecting external power. This connection is only for a supply rated _____ volts _____ current _____ amperes. Applicable voltage type of current (ac or dc) and ampere rating shall be provided.
Substantiation: The last sentence is vague and not specific. Configuration of devices cannot prevent connection of ac power, only prevent use of devices that are not compatible.
Panel Meeting Action: Reject
Panel Statement: Insufficient technical substantiation has been provided for the first part of the submitter's recommendation. The substantiation for the second part of the recommendation is incorrect; there are 12-volt configurations that would prevent connection to ac power.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-122 Log #1962 NEC-P19 **Final Action: Reject**
(551.30(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Equipment shall be installed to ensure that the ~~current carrying~~ supply circuit conductors from the engine generator and from an outside source are not connected to a vehicle circuit ~~at the same time~~ simultaneously...
Substantiation: Edit. Current-carrying conductors are not defined and literally describes conductors with a flow of current. Neutrals are at times not considered current-carrying. Proposal clarifies that a neutral is included.
Panel Meeting Action: Reject
Panel Statement: Not all supply circuit conductors (equipment grounding conductors) are always disconnected. The recommendation is not strictly editorial. In this context, "at the same time" is more correct than "simultaneously."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 19-123 moved to follow 19-124)

19-124 Log #3833 NEC-P19 **Final Action: Accept in Principle**
(551.30(B))

Submitter: Douglas B. Tilghman, Technology Research Corp
Recommendation: Add new text to read as follows:
(B) Generator Protection. Equipment shall be installed to insure that the current-carrying conductors from the engine generators and from outside source are not connected to a vehicle circuit at the same time. Recreational Vehicle electronically controlled (automatic) transfer switch must include a mechanically device to prevent simultaneous connection.
Substantiation: Transfer equipment utilizing relays or separate non-mechanically interlocked contactors will not prevent the generator and utility power from being connected at the same time in the event of a welded contact or relay failure. In the event of welded contact(s) or relay failure, simultaneous connected power from both sources will cause damage and/or fire. The purpose of this proposal is to protect the consumer.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(B) Generator Protection. Equipment shall be installed to insure that the current-carrying conductors from the engine generators and from an outside source are not connected to a vehicle circuit at the same time. Automatic transfer switches in such applications shall be listed for use in one of the following:
(1) Emergency systems
(2) Optional standby systems.
Panel Statement: This revised language provides greater clarity and meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-123 Log #890 NEC-P19 **Final Action: Reject**
(551.30(E)(1))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "panelboard" to "distribution equipment" in (1) and the last paragraph.
Substantiation: There may not always be a panelboard; see 551.42(A) and (B).
Panel Meeting Action: Reject
Panel Statement: The submitter has not technically substantiated the proposed revision. The reference to 551.42(A) and (B) in the submitter's substantiation is not germane to the proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 19-125 moved to follow 19-126)

19-126 Log #1371 NEC-P19 **Final Action: Reject**
(551.31(B) and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "capacity" to "current rating".
Substantiation: Edit. Capacity is not a Code-defined term.
Panel Meeting Action: Reject
Panel Statement: The term "capacity" as used applies to output of a generator which is appropriate.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-125 Log #3834 NEC-P19 **Final Action: Accept in Principle**
(551.33)

Submitter: Douglas B. Tilghman, Technology Research Corp
Recommendation: Add new text to read as follows:
551.33 Alternate Source Restrictions. Transfer equipment, if not integral with the listed power source, shall be installed to ensure that the current-carrying conductors from other sources of ac power and from an outside source are not connected to the vehicle circuit at the same time. Recreational Vehicle electronically controlled (automatic) transfer switch must include mechanically interlocked device to prevent simultaneous connection.
Substantiation: Transfer equipment utilizing relays or separate non-mechanically interlocked contactors will not prevent the generator and utility power from being connected at the same time in the event of a welded contact or relay failure. In the event of welded contact(s) or relay failure, simultaneous connected power from both sources will cause damage and/or fire. The purpose of this proposal is to protect the consumer.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Add new text to read as follows:
551.33 Alternate Source Restrictions. Transfer equipment, if not integral with the listed power source, shall be installed to ensure that the current-carrying conductors from other sources of ac power and from an outside source are not connected to the vehicle circuit at the same time. Automatic transfer switches in such applications shall be listed for use in one of the following:
(1) Emergency systems
(2) Optional standby systems
Panel Statement: This revised language provides greater clarity and meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-127 Log #506 NEC-P19 **Final Action: Reject**
(551.40(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in three places.
Substantiation: The addition of the hyphen will provide consistency with the title of 551.40 and throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The words are not hyphenated in the definition in Article 100.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-128 Log #1370 NEC-P19 **Final Action: Reject**
(551.41)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(C)(1) ~~Adjacent to a bathroom lavatory~~ Within 1.8 m (6 ft) of the outside edge of a sink.
(2) Where the receptacles are installed to serve kitchen countertop surfaces ~~and are within 1.8 m (6 ft) of any lavatory or sink~~.
Exception No. 1: Receptacles installed for appliances in dedicated spaces such as dishwashers, food waste disposers, trash compactors, refrigerators, and freezers. ~~And laundry equipment.~~
(D) Face-up Postion. A receptacle or snap switch shall not be installed flush in any kitchen countertop. ~~Or similar horizontal surface in the living area.~~
Substantiation: "Adjacent" and "similar" are subjective and terms to be avoided per the Style Manual. The 6 ft dimension is used in 210.8. If 210.8(7) requires GFCI protection for laundry area receptacles within 6 ft of a sink, for safety reasons, why are those reasons not applicable for recreational vehicles? GFCI protection for countertop receptacles should not be limited to within 6 ft of a sink; if safety requires the provision of 210.8(A)(6) why not for recreational vehicles? There may be grounded surfaces farther than 6 ft from a sink such as dishwashers, trash compactors. Some horizontal surfaces may be suitable for a receptacle such as a window seat or built-in desk top.
Panel Meeting Action: Reject
Panel Statement: The term "adjacent" is currently used in other portions of 551.41. While the requirements of 551.41(C) and 210 are different, RVs are different in size and usage than dwellings and therefore the existing criteria spelled out in (C)(1) and (2) and Exception No. 1 are needed. In addition, no substantiation was provided for changes in (D).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-117 Log #4759 NEC-P19 **Final Action: Reject**
(551.41(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 2-274.
This action will be considered by the panel as a public comment.
Submitter: D. Jerry Flaherty, East Islip, NY
Recommendation: Add revised text to read as follows:
551.41 Receptacle Outlets Required.
(A) Spacing. Receptacle outlets shall be installed at wall spaces 600 mm (2 ft) wide or more so that no point along the floor line is more than 1.8 m (6 ft), measured horizontally, from an outlet in that space.
Exception No. 1: Bath and ~~hall~~ hallway areas.
Substantiation: No definition for "hall" in NEC.
Webster dictionary has several definitions that are not in line with this section of NEC.
1) "Entrance space into which the main door to house" — new large homes have "halls" that are quite large, fully furnished with tables (table lamps) and seating. By definition and code these "halls" need only one receptacle. I have inspected many with extension cords which are a fire hazard.
210.52(H) Hallways.
2) Webster definition - "A communally owned building where public business is transacted or where people meet etc. "which is in line with other areas of the NEC (assembles halls, dance halls, etc.) but not with this section of the code.
3) The end of habitable rooms with two or more doors at one end meets the definition of a hall and again usually only one receptacle is provided.
"Hallway" is not defined in the NEC and Webster defines as a passage connecting two or more rooms which is closer to what the NEC is referring too, but not quite.
See Proposal for a definition of a Hallway.
Hallways. A walled corridor used exclusively to connect two or more rooms.
Panel Meeting Action: Reject
Panel Statement: The term "hall" is used correctly in the noted section. Changing the term to "hallway" does nothing to improve the code. It is noted that the proposed definition of "hallway" was rejected by CMP-1 (Proposal 1-89) prior to balloting.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-129 Log #1883 NEC-P19 **Final Action: Reject**
(551.41(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (A) and (B) and Exception No. 1 and substitute: Receptacle outlets shall be provided in accordance with 210.52(A), (C), and (D).
Revise: Exception: Wall space occupied by ~~kitchen~~ cabinets, ~~wardrobe~~ cabinets, built in furniture <u>or appurtenances that occupy the wall space from floor level to a height of 1.5 m 5 ft. In such cases a floor receptacle(s) in accordance with 210.52(A)(3) shall be provided.</u>
Substantiation: A reference to 210.52 provides more comprehensive provisions which are not fully covered in this section, and those provisions apply unless specifically modified. Wall spaces behind doors are not excluded in Article 210 and many times provides the easiest access to a receptacle due to furniture layout, likewise tdo hall receptacles. Cabinets should not be limited to wardrobe or kitchen cabinets. Excluded wall space should only apply where cabinets, built-in furniture etc., do not leave an available wall space. In those cases, floor receptacles should be required so as not to leave possible entire walls without a receptacle.
Panel Meeting Action: Reject
Panel Statement: While the requirements of 551.41(A) and (B) and 210.52(A)(3) are different, RVs are different in size and space usage than dwellings and the differences are needed. This section has not been an issue for the RV industry in the past and usability of the NEC by the industry by having the RV requirements maintained within Article 551 is far more important than using references where information could be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-130 Log #1372 NEC-P19 **Final Action: Reject**
(551.41(A) Exception No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete:
"behind doors that open fully against a wall surface."
Substantiation: In many instances, this location is the one most easily accessible and not likely obstructed by furniture or other appurtenances. This space is not exempted in Article 210; why should it be in this article?
Panel Meeting Action: Reject
Panel Statement: Chapter 5 modifies Chapters 1 through 4 as permitted by Section 90.3. No technical substantiation has been provided to support deleting the noted provision. Consideration relative to size constraints is needed for this specialized industry.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-131 Log #1960 NEC-P19 **Final Action: Reject**
(551.41(B)(4) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: (4) In bathrooms, within 900 mm (3 ft) of the outside edge of each bathroom lavatory at this location.
Substantiation: A receptacle outlet should be required to avoid the use of extension cords, and be GFCI protected as required in (C), but does not require the receptacle.
Panel Meeting Action: Reject
Panel Statement: While most people would agree a receptacle is desired in a bathroom, many RV baths are a combination use-space where there is a lavatory, shower, and toilet in a single compartment. Manufacturers typically provide a GFCI receptacle outside the bath area when there is no receptacle provided within the bathroom itself.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-132 Log #1327 NEC-P19 **Final Action: Reject**
(551.41(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete present (1), (2), and (3) and Exception No. 1 for (2) and substitute:
(1) Within 1.8 m (6 ft) of a sink, tub, or shower.
(2) Where the receptacles are installed to serve kitchen countertop surfaces.
Exception: Receptacles installed in dedicated spaces solely for specific appliances such as dishwashers, disposals, refrigerators, freezers, and trash compactors.
Substantiation: "Adjacent" is subjective and a term to be avoided per the Style Manual. In (3), "area" is not defined, a compartment with only a toilet is not likely to have a receptacle installed. If the requirements of 210.8(A)(6) and (7) (countertops and laundry areas) are necessary for safety, which do not exempt countertops regardless of sinks, and laundry receptacles, they should also apply to this article. Present Exception No. 1 only requires the appliances to be in dedicated spaces, not the receptacles which could be a countertop receptacle.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-128.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-133 Log #1961 NEC-P19 **Final Action: Reject**
(551.41(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "where provided"...
Substantiation: Edit. Superfluous; if receptacles are not provided, the requirement is of no effect.
Panel Meeting Action: Reject
Panel Statement: Deletion of "where provided" could mandate the use of receptacles where they are currently optional. An example would be an exterior receptacle as stated in 551.41(C)(4).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-134 Log #2442 NEC-P19 **Final Action: Reject**
(551.41(C))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
(C) ~~Ground-Fault Circuit-Interrupter~~ <u>Power Safe Protector</u> Protection. Where provided, each 125-volt, single-phase, 15- or 20-ampere receptacle outlet shall have ~~ground-fault circuit-interrupter~~ <u>power safe protector</u> protection for personnel in the following locations:
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There are currently no testing standards for this product. Any testing standards noted in the substantiation are for receptacles in general. The testing reports provided are based on performance results for a specific product.

This proposal is brand-specific. The NEC cannot require a specific brand in any article in the code.

Installation of this device is not currently prohibited by the code.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-135 Log #826 NEC-P19 **Final Action: Reject**
(551.43(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete and substitute RECEPTACLE RATINGS

Receptacle ratings shall comply with 210.21(B)(1) or (B)(3) as applicable.

Substantiation: Edit. Section 210.21 is more comprehensive and covers other ratings.

Panel Meeting Action: Reject

Panel Statement: The current language is clear and is specific to the RV industry. Usability of the NEC by the industry by having the RV requirements maintained within Article 551 is far more important than using references where information could be overlooked.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-136 Log #825 NEC-P19 **Final Action: Reject**
(551.45)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.

This action will be considered by the panel as a public comment.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise DISTRIBUTION EQUIPMENT ~~PANELBOARD~~

(A) A listed ~~and appropriately rated~~ distribution panelboard or other listed equipment ~~listed for the purpose~~ identified for the use and rated not less than the power supply assembly shall be used.

In (B), the exception to (B) and (C) change “panelboard” to “distribution equipment”.

Substantiation: The text relates to equipment which may not be a “panelboard”. There may only be one circuit as covered in 551.42.

Panel Meeting Action: Reject

Panel Statement: 551.45(A) already includes ‘listed’ and ‘or other equipment’ so there is no need to add the proposed language. No substantiation for the deletion of the phrase ‘listed for the purpose’ has been provided. Power supply assemblies are addressed by 551.46. See also the panel statement on Proposal 19.112.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-137 Log #572 NEC-P19 **Final Action: Reject**
(551.45(C) Exception (New))

Submitter: Kent Perkins, Recreation Vehicle Industry Association

Recommendation: Add a new Exception to read as follows:

Exception: Recreational vehicle distribution panelboards shall be exempted from the hold down requirements for back fed circuit breakers in 408.36(D).

Substantiation: 408.36(D) addresses the use of a hold down bracket in a distribution panelboard for circuit breakers that are “back fed.” This means the 120 VAC power is provided to the “bottom” of the breaker itself, and electricity flows through to the top of the breaker to energize the busbar where all the other circuit breakers receive their power. The NEC is requiring this hold down bracket to prevent accidental electrocution or shock, because with a back-fed breaker, the breaker remains “hot” even when it is removed from the panelboard. If the pressure connection of the breaker to its bus was not held in place, it could inadvertently become loose and fall away from the bus. Should it touch the unsuspecting service technician or assembler, while the 120 VAC is energized, someone could be hurt or killed.

RVs, unlike dwellings, are cord connected, and, therefore, the power to the distribution panelboard can be easily disconnected. This is not true in most dwelling electrical systems. Since there is no reason for a service technician to ever work on a live distribution panelboard, this hold down requirement is unnecessary in RV distribution panelboards.

Panel Meeting Action: Reject

Panel Statement: Insufficient technical substantiation has been provided to counter the requirements in 408.36(D).

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-138 Log #822 NEC-P19 **Final Action: Reject**
(551.46(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

(1) Where a separable power supply assembly ~~consisting of a cord with a female connector and molded attachment plug cap~~ is provided, the vehicle shall... (remainder unchanged).

Delete (2) and substitute:

PERMANENTLY CONNECTED. Where a recreational vehicle is supplied by a fixed-in-place (permanent type) wiring method the supply conductors shall terminate directly on the supply terminals of the distribution equipment or to conductors in a junction box that are directly connected to supply terminals of the distribution equipment. The circuit from the recreational vehicle site supply equipment to the recreational vehicle distribution equipment shall contain insulated conductors, including an equipment grounding conductor, and have an ampacity not less than the ampere rating of the distribution equipment.

Substantiation: The present provisions are somewhat confusing; “permanently connected” implies a fixed “hard wired” type supply system and not a flexible cord power supply assembly, and since flexible cord power supply assemblies are to connect to a flanged surface inlet per 551.46(A)(1) the present provisions don’t correlate with that section. The proposed deletion in (1) is superfluous; the definition of power supply assembly includes cord connector and plug cap (not necessarily molded type).

Panel Meeting Action: Reject

Panel Statement: The current language is not confusing to the users. In an effort for the submitter to “clarify” the requirements, many needed criteria are being deleted. Examples include the strain relief, the molded attachment plug cap, and permanent provision for protection cord in transit.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-139 Log #573 NEC-P19 **Final Action: Accept in Principle**
(551.46(A)(2))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.

This action will be considered by the panel as a public comment.

Submitter: Kent Perkins, Recreation Vehicle Industry Association

Recommendation: Add new last sentence to the end of the paragraph as follows:

The cord shall be protected from physical damage.

Substantiation: The current language only requires protection where the cord passes through walls or floors. This language makes it clear that the power cord must be protected from any type of physical damage that could occur during cord removal, storage, etc.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(2) Permanently Connected. Each power-supply assembly shall be connected directly to the terminals of the distribution panelboard or conductors within a junction box and provided with means to prevent strain from being transmitted to the terminals. The ampacity of the conductors between each junction box and the terminals of each distribution panelboard shall be at least equal to the ampacity of the power-supply cord. The supply end of the assembly shall be equipped with an attachment plug of the type described in 551.46(C). Where the cord passes through the walls or floors, it shall be protected by means of conduit and bushings or equivalent. The cord assembly shall have permanent provisions for protection against corrosion and mechanical damage while the vehicle is in transit, or while the cord assembly is being stored or removed for use.

Panel Statement: The panel action meets the submitter’s intent.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

19-140 Log #823 NEC-P19 **Final Action: Reject**
(551.46(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete texts (except fine print notes) and substitute:
(C) SEPARABLE POWER SUPPLY ASSEMBLIES
(1) UNITS WITH ONE 15-AMPERE BRANCH CIRCUIT
A separate power supply assembly supplying a recreational unit having only a 15-ampere branch circuit shall consist of the following:
(1) An extra-hard usage flexible cord with an ampacity not less than 15 amperes containing an equipment grounding conductor identified for use in wet locations and sunlight resistance
(2) Equipped with a firmly attached cord cap (plug) and cord connector body rated 15 amperes 125 volts that shall be 2-pole 3-wire grounding type conforming to the configuration shown in Figure 551.46(C)(2) UNITS WITH ONE 20-AMPERE BRANCH CIRCUIT
A separable power supply assembly supplying a recreational vehicle having only a 20-ampere branch circuit shall consist of the following:
(1) An extra-hard usage type of flexible cord with an ampacity not less than 20 amperes containing an equipment grounding conductor, identified for use in wet locations and sunlight resistance
(2) Equipped with a firmly attached cord cap (plug) and cord connector body rated 20 amperes 125 volts conforming to the configuration shown in Figure 551.46 (C)(3) UNITS WITH TWO TO FIVE 15 OR 20 AMPERE BRANCH CIRCUITS
A separable power supply assembly supplying a recreational vehicle with two to five 15-or 20 ampere branch circuits shall consist of the following:
(1) An extra-hard usage flexible cord with an ampacity not less than 30 amperes containing an equipment grounding conductor.
(2) Equipped with a firmly attached cord cap (plug) and cord connector rated 30 amperes 125 volts, conforming to the configuration shown in Figure 551.46(C)(4) UNITS WITH 50 AMPERE POWER SUPPLY ASSEMBLY
A separable power supply assembly rated 50 amperes as required by 551.42(D) shall consist of the following:
(1) An extra-hard usage type flexible cord or cable with an ampacity not less than 50 amperes, containing an equipment grounding conductor and identified for use in wet locations and sunlight resistance
(2) Equipped with a firmly attached cord cap (plug) and cord connector body rated 50 amperes 125/250 volts, conforming to the configuration shown in Figure 551.46(C).
Substantiation: Proposal is largely editorial. Provisions should clearly apply to separable power supply assemblies since fixed (permanent) wiring methods are not prohibited. Proposal provides specifics for cords and includes cord connector bodies that appear to be necessary by 551.46 (A)(1).
Panel Meeting Action: Reject
Panel Statement: The panel is unable to decipher what the submitter intends to revise. The proposal is more than editorial. Additionally, the submitter is confused regarding the meaning of a cord that is permanently connected or separable. The industry clearly understands the requirements, and further clarification is unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-141 Log #2710 NEC-P19 **Final Action: Reject**
(551.46(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (C) ~~ATTACHMENT PLUGS~~ POWER SUPPLY ASSEMBLY in (1), (2) and (3) Change "an attachment plug" to "power supply assembly".
Substantiation: Edit. The definition of power supply assembly is inclusive of more than attachment plugs; (C)(4) uses the phrase "power supply assembly".
Panel Meeting Action: Reject
Panel Statement: The requirement addresses the attachment plug, not the power supply assembly. The power supply assembly is addressed in Article 551.44.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-142 Log #824 NEC-P19 **Final Action: Reject**
(Figure 551.46(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "cord connectors" after "receptacles" and "flanged surface inlets" after "caps".
Substantiation: Edit. These devices should be included.
Panel Meeting Action: Reject
Panel Statement: The submitter provides no technical justification for the addition of "cord connector" or "flanged surface inlets."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-142a Log #CP1900 NEC-P19 **Final Action: Accept**
(551.47)

Submitter: Code-Making Panel 19,
Recommendation: Revise as follows:
(L) ~~Metal~~ Receptacle Faceplates. Metal faceplates shall comply with Section 406.5 (A). ~~be of ferrous metal not less than 0.76 mm (0.030 in.) in thickness or of nonferrous metal not less than 1.0 mm (0.040 in.) in thickness.~~ Nonmetallic faceplates shall ~~be listed~~ comply with Section 406.5(C).
Substantiation: The title in 551.47(L) only addresses metal faceplates and contains the same requirements as for metal receptacle faceplates in 406.5(A). The panel concluded that it is simpler to refer to the appropriate requirement in 406.5 and also include the reference to requirements for nonmetallic receptacle faceplates. See panel action on Proposal 19-150.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-142b Log #CP1903 NEC-P19 **Final Action: Accept**
(551.47)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 19,
Recommendation: Revise as follows:
(I) Cable Supports. Where connected with cable connectors or clamps, cables shall be supported within 300 mm (12 in.) of outlet boxes, distribution panelboards, and splice boxes on appliances. Supports shall be provided at least every 1.4 m (4½ ft) at other places.
Substantiation: The present language does not technically permit closer support intervals.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-143 Log #821 NEC-P19 **Final Action: Reject**
(551.47(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already more adequately covered by 314.20 which also covers noncombustible material.
Panel Meeting Action: Reject
Panel Statement: Section 551.47(D) modifies Section 314.20.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-144 Log #1833 NEC-P19 **Final Action: Reject**
(551.47(F) and (G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (F): Raceways and coverings of cables ~~sheaths~~ shall be continuous between termination points. ~~boxes and other enclosures.~~
Delete text of (G) and substitute: Cables and raceways installed through framing members shall comply with 300.4(A) through (E).
Substantiation: Edit. All cables do not have "sheaths". Present (G) is more adequately covered in 300.4 which includes raceways and metal framing members.
Panel Meeting Action: Reject
Panel Statement: The current language in (F) is clear and the requirements within (G) are specific to the RV industry. Usability of the NEC by the industry by having the RV requirements maintained within Article 551 is far more important than using references where information could be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-145 Log #820 NEC-P19 **Final Action: Reject**
(551.47(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 300.4 which applies unless amended.
Panel Meeting Action: Reject
Panel Statement: The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this article is far more important than not using references where information could be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-146 Log #819 NEC-P19 **Final Action: Reject**
(551.47(I))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or substitute:
Cables and raceways shall be securely supported and fastened in place in accordance with the applicable raceway or cable article.
Substantiation: Edit. Some cables such as Type MI may have different support requirements which should be acceptable. Support requirements for cables are covered in the respective cable articles, as are raceways which are not noted.
Panel Meeting Action: Reject
Panel Statement: While there are various cable support criteria depending on the type of cable being used, the existing requirement within Article 551.47(I) is set at 4 1/2 ft. There is no known cable that requires support less that 4 1/2 ft. The NMS cable is the most common cable used within the RV industry, and 4 1/2 feet is identified as the acceptable support dimension in Article 334.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-147 Log #2720 NEC-P19 **Final Action: Accept in Principle**
(551.47(I))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Where connected with cable connectors or clamps, cables shall be securely fastened to supports within 300 mm (12 in.) of such terminations. Intermediate fastening to supports shall be provided at intervals not greater than 1.4 m (4 $^1/_2$ ft).
Exception: Fastening and support shall be permitted in accordance with 320.30(D), 330.20(B) and (C), 334.30(B).
Substantiation: None given.
Panel Meeting Action: Accept in Principle
See panel action on Proposal 19-142b.
Panel Statement: The panel action on Proposal 19-142b meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-148 Log #818 NEC-P19 **Final Action: Reject**
(551.47(K))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first part...
Where likely to be exposed...
Substantiation: Likely is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter's intent is not understood. The location for proposed text addition is unclear. For further information, see panel action and statement on Proposal 19-212.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-149 Log #827 NEC-P19 **Final Action: Reject**
(551.47(K))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first part: Where likely to be exposed...
Substantiation: Edit. Likely is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-148.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-150 Log #1043 NEC-P19 **Final Action: Accept in Part**
(551.47(L))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Sections 404.9(C) and 406.5(C) cover faceplates and do not require listing.
Panel Meeting Action: Accept in Part
Accept the deletion of the last sentence in Section 551.47(L) as this is covered by Section 551.40(B). Reject the remainder of the proposal.
Panel Statement: See panel statement on Proposal 19-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-151 Log #878 NEC-P19 **Final Action: Reject**
(551.47(P)(1)(a))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
That portion of a branch circuit that is installed in an expandable unit shall be connected to the portion of the branch circuit in the main body of the vehicle by means of a grounding type attachment plug and flexible cord ~~listed~~ identified for hard usage or extra-hard usage and the installation. The cord ~~and its connections shall comply with all provisions of article 400 and~~ shall be considered as a permitted use under 400.7 (remainder unchanged).
Substantiation: The attachment plug should be a grounding type. Extra-hard usage cords should be permitted; all cords should be identified as suitable for the use. Cords and connectors are already required to comply with applicable provisions of Article 400 and other articles.
Panel Meeting Action: Reject
Panel Statement: The proposal is editorial and provides no additional clarity to the requirements. The requirement for a grounding type attachment plug is covered by reference to Article 400. Acceptance of extra hard usage cord is implied by the requirement for hard usage cord. No substantiation is given to reduce the requirement for "listed" cord.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-152 Log #894 NEC-P19 **Final Action: Reject**
(551.47(P)(1)(a))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of first sentence:
...by means of ~~an~~ a grounding type attachment plug and a flexible cord ~~listed~~ identified for extra-hard usage or hard usage and the application. The cord and its connections ~~shall comply with all provisions of Article 400 and~~ shall be considered a permitted use under 400.7.
Substantiation: Cords are not required to be listed by Article 400. Extra hard usage types should be permitted and cords should be identified for the application. Provisions of Article 400 already apply unless modified.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-151.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-153 Log #3927d NEC-P19 **Final Action: Accept in Principle in Part**
(551.47(P)(2) and 551.80(B))

Submitter: Goran Haag, Champion Fiberglass, Inc.
Recommendation: Add new text to read as follows:
Everywhere Schedule 80 PVC is mentioned, "Type RTRC marked with the suffix -XW" should also be included.
Substantiation: For the NEC 2008, Type RTRC marked with the suffix –XW and Schedule 80 PVC were added as sufficient for Class I Division 2 installations. The Type RTRC marked with the suffix –XW were "forgotten" at some places in the NEC, needs to be corrected.
Panel Meeting Action: Accept in Principle in Part
1. Accept the reference to RTRC by revising the second paragraph of 551.47(P)(2)(e) as follows:
Where subject to physical damage, the flexible cord shall be protected with RMC, IMC, Schedule 80 PVC, reinforced thermosetting resin conduit (RTRC) listed for exposure to physical damage, or other approved means and shall extend at least 150 mm (6 in.) above the floor. A means shall be provided to secure the flexible cord where it enters the recreational vehicle.
2. Accept the reference to RTRC by revising 551.80(B) as follows:
(B) Protection Against Physical Damage. Direct-buried conductors and cables entering or leaving a trench shall be protected by rigid metal conduit, intermediate metal conduit, electrical metallic tubing with supplementary corrosion protection, rigid nonmetallic conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, or other approved raceways or enclosures. Where subject to physical damage, the conductors or cables shall be protected by rigid metal conduit, intermediate metal conduit, ~~or~~ Schedule 80 PVC conduit, or reinforced thermosetting resin conduit (RTRC) listed for exposure to physical damage. All such protection shall extend at least 450 mm (18 in.) into the trench from finished grade.
3. Reject the proposed text "marked with the suffix -XW."
Panel Statement: The addition of the references to RTRC as shown in the panel action meets the submitter's intent.
The addition of "marked with the suffix -XW" is rejected because it is not included in Article 355, but the submitter's intent is addressed by the requirement "listed for exposure to physical damage."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-154 Log #574 NEC-P19 **Final Action: Accept in Part**
(551.47(R)(1))

Submitter: Kent Perkins, Recreation Vehicle Industry Association
Recommendation: Revise text as follows:
(1) Circuit conductors shall be appropriately sized in relation to the anticipated load as stated on the label required in (4) below. ~~and shall be protected by an overcurrent device in accordance with their ampacities. Where the generator provides overcurrent protection for the conductors, additional overcurrent protection is not required.~~
Substantiation: The words at the end of the first sentence are unnecessary. If a generator prep is provided in accordance with (2), the conductor will terminate in junction boxes at either end of the conductor run. With no connection to the electrical system provided, no current can run through the conductor and overcurrent protection would not be needed. Adding the requirement that only RV listed gensets be used ensures overcurrent protection when the genset is installed as protection for the output of the genset is a listing requirement for any RV generator set. The last sentence makes no sense since this paragraph is addressing a generator prep not a generator installation and no generator is present.
Panel Meeting Action: Accept in Part
Revise text to read as follows:
(1) Circuit conductors shall be appropriately sized in relation to the anticipated load as stated on the label required in (4) below and shall be protected by an overcurrent device in accordance with their ampacities. ~~Where the generator provides overcurrent protection for the conductors, additional overcurrent protection is not required.~~
Panel Statement: The text at the end of the first sentence is being retained to maintain the requirement for overcurrent protection of the circuit conductors. If the proposal were accepted as submitted, circuit conductors from the generator could be installed with no overcurrent protection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-155 Log #889 NEC-P19 **Final Action: Reject**
(551.51(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
<u>A switch shall not be installed in a face up position in any countertop within the living area.</u>
Substantiation: The provisions of 551.41(D) should also apply to switches.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation was provided to address switches. The substantiation only addresses receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MICHAELIS, R.: Any switch installed face up on a counter top is an accident just waiting to happen. While it is less likely to have liquids or other contaminants enter the switch it is very likely that the switch is accidentally turned on, in the case of a disposal or other equipment this could be hazardous.

19-156 Log #893 NEC-P19 **Final Action: Reject**
(551.53(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (A) and (B).
Revise (C): OUTDOOR <u>EQUIPMENT.</u> ~~OUTLETS, LUMINAIRES, AIR COOLING EQUIPMENT AND SO ON~~ ~~Outdoor~~ <u>L</u>uminaires and other <u>utilization</u> equipment <u>installed outdoors</u> shall be ~~listed~~ <u>identified for the location</u>.
Substantiation: All equipment installed outdoors may not be specifically listed for "outdoor" use such as straps, hangers, connectors listed for wet locations, weatherproof boxes and covers, etc.
Panel Meeting Action: Reject
Panel Statement: No substantiation is provided to delete (A) or (B). Section 551.53(C) is consistent with Section 314.15 and extends that same degree of protection for "other equipment" as it pertains to this Section. Straps and hangers are not included in the requirements of this section or in Section 314.15.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-157 Log #1835 NEC-P19 **Final Action: Reject**
(551.53(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Outdoor luminaires, lampholders and other electrical equipment shall be ~~listed~~ <u>identified</u> for outdoor use.
Substantiation: Edit. Some equipment such as straps, supports, conductors, etc., may not be specifically listed for "outdoor" use. Luminaires and lampholders and other equipment required to be listed are evaluated for outdoor use in the listing.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add clarity or improve usability of the code. Insufficient technical substantiation has been provided to support the proposed revisions.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-158 Log #1834 NEC-P19 **Final Action: Accept in Part**
(551.54(B))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The distribution panelboard <u>or other identified distribution equipment</u> shall have a grounding bus with ~~sufficient~~ terminals for all grounding <u>and bonding</u> terminals. ~~or other approved means.~~
Substantiation: "Sufficient" is subjective and a term to be avoided per the Style Manual. A grounding bus provides the most direct low impedence connection to the service and should also be the terminal connection for bonding conductors. A single circuit breaker or fused switch for a one circuit installation may not be considered a "panelboard".
Panel Meeting Action: Accept in Part
Accept the deletion of "sufficient"; reject the remaining proposed revisions.
Panel Statement: 551.45(A) already includes "or other equipment" so there is no need to add the proposed language. The terminals within the panelboard are for grounding; therefore the addition of "bonding" may create confusion.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-159 Log #575 NEC-P19 **Final Action: Reject**
(551.54(C))

Submitter: Kent Perkins, Recreation Vehicle Industry Association
Recommendation: Revise the title and first and second sentences as follows:
(C) Insulated Grounded Conductor <u>(Neutral)</u>. The grounded circuit conductor <u>(neutral)</u> shall be insulated from the equipment grounding conductors and from equipment enclosures and other grounded parts. The grounded circuit conductor <u>(neutral)</u> terminals in the distribution...
Substantiation: This provides clarity. Even though the term "grounded circuit conductor" is now commonly used for the neutral or white wire, this is confusing since in RVs this conductor is not "grounded" as it is in residential applications.
Panel Meeting Action: Reject
Panel Statement: The term "grounded conductor" replaced "neutral" in many locations in the 2008 NEC. The panel does not agree with the last sentence of the submitter's substantiation. The grounded conductor is bonded to ground as in residential applications.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HOPKINS, B.: Please change your vote to "accept"
I am requesting that you change your vote to "accept," placing the term "(neutral)" into the text following "Insulated grounded conductor" or "grounded conductor" in 3 places.
Since the neutral is isolated or insulated from ground throughout the RV, calling the white or neutral conductor "a grounded conductor" is correct. However, in the terminology used within the RV industry, which has been based on previous language in the NEC, this wire has commonly been referred to as the "neutral" inside the RV circuits. The reason is that this conductor does not get grounded until the vehicle is stationary and connected in the park (pedestal or at the park's service entry).
RVIA is directly involved in developing training and conducting training clinics for RV service technicians. As many new technicians have prior trade experience, and have a tendency to move from employer to employer, many have worked in the building trades and are familiar with grounded conductors. Teaching that this grounded conductor is a "neutral" and, in RVs, cannot be commingled with circuit ground wires always leads to extended discussions. Current training materials on this subject are attached.

Placing the term "(neutral)" in this paragraph where requested helps drive home the point that the white wire is to be insulated from the equipment enclosures and other grounded parts. It also validates that the "neutral training" that has been provided over the years, is still anchored in the NEC.

It should also be understood that there exists unlisted aftermarket products. On rare occasion, we see an adaptor plug or cord that has manufactured-in reverse polarity. In fact, even cutting the third pin off the permanently required power supply cord, or using an improper extension cord could lead to reverse polarity. In the event there is a short while reverse polarity exists, a "hot skin" on a metal-sided RV could lead to a hazardous electrical condition causing injury or death. One recent example of this was a death in PA where reversed polarity was created by the use of an orange extension cord with no third pin, to energize the RV. In addition, it was later learned the neutral wire on the exterior recept wire had worked loose and was touching the RV's exterior covering. Unknowingly, the owner bent over to pick up some trash, and backed against a fence while his hand was on the hood of the RV.

To continue to support the existing RV industry training and continue to support the need for an isolated neutral in an RV, please change your vote to "accept."

See the information I have provided with this negative vote.

Note: Supporting Material is available at NFPA Headquarters.

19-160 Log #1898 NEC-P19 **Final Action: Reject**
(551.55)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: These provisions are already covered by Article 250 and Part V of Article 410. The last sentence of (C)(3) is unclear; it appears to permit luminaire attachment screws as a grounding conductor attachment while 250.148(C) requires a screw used for grounding not be used for other purposes. (C)(3) indicates OTHER than a mounting or cover screw be used. 314.40(D) applies unless modified.
Panel Meeting Action: Reject
Panel Statement: RVs are different than dwellings, and the differences in the requirements are needed. This section has not been an issue for the RV industry in the past. Maximizing usability of the NEC by the RV industry by having the RV requirements maintained within Article 551 is far more important than using references in a manner where important information is likely to be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-161 Log #1742 NEC-P19 **Final Action: Reject**
(551.55(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "...or other identified distribution equipment" after "panelboard".
Substantiation: A single circuit breaker or switch/fuse (other approved distribution equipment) for a one-circuit installation may not be deemed a "panelboard".
Panel Meeting Action: Reject
Panel Statement: 551.45(A) already includes "or other equipment" so there is no need to add the proposed language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-162 Log #2725 NEC-P19 **Final Action: Reject**
(551.55(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:

Grounding of electrical equipment shall be in accordance with part VII of Article 250.
Substantiation: Edit. Since Article 250 applies unless amended a simple reference to more comprehensive provisions is sufficient.
Panel Meeting Action: Reject
Panel Statement: Refer to panel statement on Proposal 19-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-163 Log #1201 NEC-P19 **Final Action: Reject**
(551.55(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

The equipment grounding conductor ~~in nonmetallic sheathed cable~~ shall be permitted to be secured under a <u>machine</u> screw threaded into the luminaire canopy <u>with at least two threads engaged</u>, <u>or secured with a machine screw and nut</u>, other than a mounting screw or cover screw, or attached to a listed grounding means (plate) in a nonmetallic ~~outlet~~ box. ~~for grounding~~. ~~Grounding means shall also be permitted for luminaire attachment screws.~~

Alternatively delete this section.
Substantiation: An EGC in nonmetallic raceways should be included. Machine screws with at least two threads engaged or secured with a nut should be specified. Other sections require a grounding screw to be used for no other purpose. This section could be deleted since fixtures are required to be listed by 410.6 and 551.53(B) which will provide a grounding means. Field alterations such as drilling and screw attachments may void listing since these may not have been evaluated in the listing process.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-160.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-164 Log #1190 NEC-P19 **Final Action: Accept in Part**
(551.55(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

A connection between the one or more <u>equipment</u> grounding conductors brought into a nonmetallic ~~outlet~~ box <u>or enclosure</u> shall be so arranged that a connection <u>of the equipment grounding conductor</u> can be made to any fitting or devise in <u>or supplied from</u> the box <u>or enclosure</u> that ~~requires grounding~~ <u>is to be grounded</u>.
Substantiation: Edit. The provision should include enclosures that are not "boxes" or "outlets", and fittings or devices that are supplied from the box or enclosure and grounded by choice (not required).
Panel Meeting Action: Accept in Part

Accept the references to equipment grounding conductors, and reject the remaining proposed revisions as follows:

(D) Grounding Connection in Nonmetallic Box. A connection between the one or more <u>equipment</u> grounding conductors brought into a nonmetallic outlet box shall be so arranged that a connection <u>of the equipment grounding conductor</u> can be made to any fitting or device in that box that requires grounding.
Panel Statement: No technical substantiation has been provided for the rejected proposed revisions. The heading of the subsection addresses only nonmetallic boxes. The other editorial proposals add no additional clarity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-165 Log #1959 NEC-P19 **Final Action: Reject**
(551.55(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: ~~A connection between the~~ <u>O</u>ne or more grounding conductors brought into a nonmetallic box <u>or enclosure</u> shall be so arranged that a connection can be made to any fitting or device in that box <u>or enclosure or supplied from that box or enclosure</u> that ~~requires grounding~~ <u>is to be grounded</u>.
Substantiation: Edit. There cannot be a connection between grounding conductors if there is only one. Where grounding is done by choice and not required, present literal wording exempts the rule.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-164.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-166 Log #2724 NEC-P19 **Final Action: Reject**
(551.55(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 250.148(B) and (D) which apply unless amended.
Panel Meeting Action: Reject
Panel Statement: Refer to panel statement on Proposal 19-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-167 Log #1211 NEC-P19 **Final Action: Accept in Part**
(551.56)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
(A): All exposed noncurrent-carrying metal parts that ~~may~~ are likely to become energized shall be effectively bonded to the grounding terminal(s) in the main disconnecting means ~~or enclosure of the distribution panelboard~~.
Delete (B) and substitute: A bonding conductor shall be connected between the grounding terminal(s) in the main disconnecting means and an accessible terminal on the chassis. The bonding conductor shall be solid copper, insulated or bare, and sized in accordance with Table 250.122 based on the rating of the main overcurrent device but not smaller than 8 AWG.
Exception: Any recreational vehicle that employs a unitized metal chassis frame construction to which the distribution panelboard main disconnecting means is securely fastened with a threaded bolt connection or bolt and nut with lock washer or by welding shall be considered to be bonded.
Revise (C): BONDING CONDUCT~~OR REQUIREMENTS~~ TERMINALS. ~~Grounding~~ Bonding terminals shall be of the solderless type listed as pressure terminals ~~recognized~~ identified for the wire size and type material used. ~~The bonding conductor shall be solid or stranded, insulated or bare and shall be minimum 8 AWG copper or equal~~.
Substantiation: "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections. There may not be a "panelboard" where an individual switch or circuit breaker is used. The bonding conductor should be solid and copper to minimize corrosion. "Equal" is not defined as to what size or material is equal. Bonding terminals should be identified for the wire size and material.
Panel Meeting Action: Accept in Part
The panel accepts deleting "may" and substituting "are likely to." The remainder of the text remains unchanged.
Panel Statement: There is neither sufficient evidence nor substantiation for the remainder of the changes proposed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-168 Log #2723 NEC-P19 **Final Action: Reject**
(551.56(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
HEATING and AIR CONDITIONING METAL AIR DUCT BONDING
Heating and air conditioning (including evaporative coolers) metal circulating air ducts shall be effectively bonded to the grounded metal enclosures of the equipment.
Substantiation: Heating may be done with a heat pump. Evaporative coolers should be noted as they may not be considered as air conditioners.
Panel Meeting Action: Reject
Panel Statement: The present wording is inclusive of any metal ducting system that may be installed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-169 Log #576 NEC-P19 **Final Action: Accept**
(551.60)

Submitter: Kent Perkins, Recreation Vehicle Industry Association
Recommendation: Add new sentence to end of the first paragraph to read as follows:
The dielectric test must be performed in accordance with the test equipment manufacturer's written instructions.
Substantiation: This ensures the test procedure is performed properly relative to each specific type or model of dielectric test equipment.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-170 Log #2721 NEC-P19 **Final Action: Reject**
(551.60)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
(1) An electrical continuity test and visual inspection to ~~ensure~~ verify that all metal parts are bonded and grounded as required.
Substantiation: Continuity tests can be visual and/or electrical, but don't necessarily "ensure" that parts are properly bonded unless fault currents are employed in testing tests should also check for grounding; ungrounded bonded parts do not protect against shock.
Panel Meeting Action: Reject
Panel Statement: A visual inspection is unnecessary. Electrical continuity can be verified using the appropriate test equipment. A visual inspection is unenforceable and impractical in many cases.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-171 Log #2443 NEC-P19 **Final Action: Reject**
(551.71)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
551.71 Type Receptacles Provided.
All 125-volt, single-phase, 15- and 20-ampere receptacles shall have listed ~~ground fault circuit-interrupter~~ power safe protector protection for personnel.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-134.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-172 Log #1321 NEC-P19 **Final Action: Reject**
(Table 551.73)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise heading:
DEMAND FACTORS for SITE FEEDERS and SERVICE ~~ENTRANCE~~ CONDUCTORS:
Substantiation: Edit. The FPN for the definition of service-entrance conductors, underground system indicates there may be no service-entrance conductors (service lateral). Based on definitions in Article 100 all service-entrance conductors are service conductors but all service conductors are not service-entrance conductors. The demand factors should also apply to service laterals.
Panel Meeting Action: Reject
Panel Statement: The proposal adds no clarity and does not improve usability of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-173 Log #273 NEC-P19 **Final Action: Accept**
(551.73(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “computed” to “calculated” in the second paragraph.
Substantiation: The term “calculated” more accurately describes the operation. It is not necessary to have a computer to do the calculations, they can also be done manually.
This is one of a series of proposals to provide consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-174 Log #390 NEC-P19 **Final Action: Reject**
(551.73(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “for each” in four places.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The submitter’s substantiation is incorrect. The use of the word “per” in this application is appropriate. The proposed revision does not add clarity or improve usability. The NEC Style Manual does not prohibit the use of “per.”
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-175 Log #1210 NEC-P19 **Final Action: Reject**
(551.73(B))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “panelboards” to “equipment”.
Substantiation: Secondary distribution may be provided by other than panelboards; e.g., individual switches or circuit breakers.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-112.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-176 Log #391 NEC-P19 **Final Action: Reject**
(551.73(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “for each”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-174.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-177 Log #2719 NEC-P19 **Final Action: Reject**
(551.73(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Revise last sentence:
The ~~neutral~~ grounded conductor shall have an ampacity not less than the ungrounded conductors.
Substantiation: Edit. A grounded conductor center tapped from a winding of a 4-wire delta transformer connection is not a neutral.
Panel Meeting Action: Reject
Panel Statement: The submitter’s substantiation is incorrect. The use of the term “neutral conductor” is appropriate in this section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-178 Log #1209 NEC-P19 **Final Action: Reject**
(551.74)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Superfluous; Article 240 applies unless amended.
Panel Meeting Action: Reject
Panel Statement: Refer to panel statement on Proposal 19-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-179 Log #2722 NEC-P19 **Final Action: Reject**
(551.74)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Article 240 already applies unless amended.
Panel Meeting Action: Reject
Panel Statement: Refer to panel statement on Proposal 19-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-180 Log #1208 NEC-P19 **Final Action: Reject**
(551.77(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~A~~ An identified ~~disconnecting~~ switch(es) or circuit breaker(s) shall be provided in the site supply equipment for simultaneously disconnecting the ungrounded conductors ~~power supply~~ supplying each class of receptacles that are part of the ~~equipment~~ vehicle site supply equipment ~~for disconnecting the power supply to the recreational vehicle~~.
Substantiation: The disconnecting means should be identified for the use (rating, number of poles, weather proof, etc.) Power supply (park service, transformers, switchboards, etc. is not disconnected but conductors are.
Panel Meeting Action: Reject
Panel Statement: The switch or circuit breaker used is already required to be listed and used within the terms of its listing. No substantiation is given for adding the requirement for simultaneous disconnection of the ungrounded conductors.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-181 Log #1900 NEC-P19 **Final Action: Reject**
(551.77(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows: A disconnecting switch or circuit breaker shall be provided in the site equipment for disconnecting the receptacle(s) supplying the power supply assembly ~~to the recreational vehicle~~.
Substantiation: Edit. Proposal is more specific. “Power supply” literally includes the site feeder and service while intent appears intended to apply to the receptacle(s).
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-180.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-182 Log #1206 NEC-P19 **Final Action: Reject**
(551.79)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered in Article 225 unless amended.
Panel Meeting Action: Reject
Panel Statement: Refer to panel statement on Proposal 19-145.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-183 Log #1899 NEC-P19 **Final Action: Reject**
(551.79)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. This is already essentially covered by 225.18 and 225.19. The requirement for a 3 ft. horizontal clearance is vague; it appears to apply to areas subject to vehicle movement as it literally requires horizontal clearance from roads and parking areas but appears intended to apply to clearances from buildings or structures.
The FPN is unnecessary as 225.60 and 225.61 apply unless amended.
Panel Meeting Action: Reject
Panel Statement: Refer to panel action and statement on Proposal 19-145. Section 551.79 provides additional requirements not located in Sections 225.18 and 225.19 for all areas subject to recreational vehicle movement.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-184 Log #1045 NEC-P19 **Final Action: Reject**
(551.80(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute:
Exposed direct-buried conductors and cables emerging from a trench or concrete or asphalt slab shall be protected by identified raceways or enclosures where likely to be exposed to physical damage. All such protection shall extend below finished grade not less than the required burial depth of the conductors or cables.
Substantiation: This provision should be limited to where conductors or cables are exposed and likely to be subject to physical damage, and cover such wiring embedded in concrete or asphalt slabs. Conductors and cables may emerge into a wall, a pad or floor mounted equipment. Or a lighting pole, and not require protection. Protection should extend to the minimum required depth since for example Table 300.5 indicates direct buried conductors under highways, roads, alleys, and parking lots require a minimum cover of 24 inches for protection.
Panel Meeting Action: Reject
Panel Statement: The submitter provides no technical substantiation for the proposed revisions. Current language is specific to methods used in RV campground construction and provides better usability than the proposed language.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-185 Log #4731 NEC-P19 **Final Action: Accept**
(551.80(B))

Submitter: James M. Imlah, City of Hillsboro
Recommendation: Revise text to read as follows:
551.80 Underground Service, Feeder, Branch-Circuit, and Recreational Vehicle Site Feeder-Circuit Conductors.
(A) General. All direct-burial conductors, including the equipment grounding conductor if of aluminum, shall be insulated and identified for the use. All conductors shall be continuous from equipment to equipment. All splices and taps shall be made in approved junction boxes or by use of material listed and identified for the purpose.
(B) Protection Against Physical Damage. Direct-buried conductors and cables entering or leaving a trench shall be protected by rigid metal conduit, intermediate metal conduit, electrical metallic tubing with supplementary corrosion protection, rigid ~~nonmetallic~~ polyvinyl chloride conduit(PVC), nonmetallic underground conduit with conductors (NUCC), high density polyethylene conduit (HDPE), reinforced thermosetting resin conduit (RTRC), liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, or other approved raceways or enclosures. Where subject to physical damage, the conductors or cables shall be protected by rigid metal conduit, intermediate metal conduit, or Schedule 80 PVC conduit. All such protection shall extend at least 450 mm (18 in.) into the trench from finished grade.
FPN: See 300.5 and Article 340 for conductors or Type UF cable used underground or in direct burial in earth.
Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of “nonmetallic” and add in each of the specific raceway types. Non-metallic conduit now has four different types of raceways and not all non-metallic raceway types would be acceptable in all locations.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 552 — PARK TRAILERS

19-186 Log #1380 NEC-P19 **Final Action: Reject**
(552.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The provisions of this article cover the ~~conductors~~ wiring and equipment installed within or on park trailers and accessory wiring and equipment associated with the park trailer.
Substantiation: Edit. This article covers wiring and equipment that is not within or on the park trailer; e.g., 552.43 and power supply receptacles.
Panel Meeting Action: Reject
Panel Statement: CMP-19 is not authorized to modify the scope of Article 552. The existing language is sufficiently inclusive.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-187 Log #3238 NEC-P19 **Final Action: Reject**
(552.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
The provisions of this article cover the electrical conductors and equipment installed in or on park trailers and its power supply assembly.
Substantiation: Parts of power supply assemblies are not in or on the trailer. It is not clear which parts of Articles 550 and 551 also apply. If they were referenced by section many provisions in this article could be deleted.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-186.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-188 Log #2801 NEC-P19 **Final Action: Accept**
(552.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~552.3 Other Articles.~~
~~Wherever the provisions of other articles and Article 552 differ, the provisions of Article 552 shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 552.3 repeats the requirements previously expressed in 90.3 and serves no additional purpose. It should also be noted that other “Special” articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-189 Log #1348 NEC-P19 **Final Action: Reject**
(552.10(C)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete or substitute:
CONNECTIONS. Conductors shall be connected in accordance with applicable provisions of 110.14.
Substantiation: Already covered by 110.14 which covers splices and other connections which this provision does not address; is this omission considered to revise 110.14?
Panel Meeting Action: Reject
Panel Statement: The reference to Article 110.14 in the substantiation is for general wiring methods. Article 552.10(C)(2) is for industry specific low voltage wiring methods.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 19-190 moved to follow 19-195 on page 747)

19-191 Log #1353 NEC-P19 **Final Action: Reject**
(552.20(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
Circuits ~~fed~~ supplied from ac transformers shall not supply dc appliances or equipment unless the current is rectified or the appliance or other equipment is identified for such use.
Substantiation: Either condition in the proposal should be acceptable. (See 552.20(B)).
Panel Meeting Action: Reject
Panel Statement: The proposal does not add clarity or improve usability of the code. Dual voltage fixtures, including luminaires or appliances, are already referenced in 552.20(D).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-192 Log #282 NEC-P19 **Final Action: Accept**
(552.20(B))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "percentages" in the second paragraph, second sentence.
Substantiation: There is no formula or equation, the information provides the percentages to be applied when calculating the load.
This is one of a series of proposals to provide consistent terminology through the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-193 Log #1347 NEC-P19 **Final Action: Reject**
(552.40(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Electrical materials, devices, appliances, fittings, and other electrical material intended for use in, or attached to, or associated with the park trailer shall be listed where listing standards have been established. All products and equipment shall be identified for the use. ~~Shall be used only in the manner for which they have been listed and found suitable for the use.~~
Substantiation: Listing should only be required for electrical material and only where standards have been established. Supports for cables and raceways are not generally listed. The manner in which something has been listed is generally unknown to installers.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided for changing this requirement. Nowhere in the NEC is it implied that cable and raceway supports are required to be listed although standards do exist, UL2239 and UL1565.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-194 Log #1243 NEC-P19 **Final Action: Reject**
(552.41)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A), Exception No. 2, delete: "Behind doors that may fully open against a wall surface."
In (B), add: (4) Within 900 mm (3 ft.) of a lavatory.
Revise text of (F)(2): A receptacle or switch shall not be installed in a face-up position in any countertop unless specifically approved.
Substantiation: The space behind an opened door is not omitted in 210.52(A) and may be the only place where a receptacle is conveniently accessible. if this space is considered in 210.52 as necessary, for safety, per 90.1(B), why not for occupants of a park trailer? A receptacle should be required at a lavatory location (GFCI protected) to permit use of personal grooming devices without the use of extension cords from receptacles without GFCI protection. Snap switches should not be permitted in countertops due to potential liquids and accidental turn-on.
Panel Meeting Action: Reject
Panel Statement: Regarding the proposed changes to (A) and (B): Chapter 5 modifies Chapters 1 through 4 as permitted by Section 90.3.
Regarding the proposed changes to (F): Switches are outside the scope of (F), which is limited to receptacles.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-195 Log #1350 NEC-P19 **Final Action: Reject**
(552.41(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (A) and (B) and substitute:
(A) SPACING. 125-volt 15-and 20-ampere receptacle outlets shall be installed in accordance with applicable provisions of 210.52(A) and (C). Receptacles required by this section shall be in addition to any receptacle that is part of a luminaire or appliance, located within cabinets, cupboards, or other enclosures, or more than 1.7 m (5 1/2 ft) above the floor.
Exception No. 1: Bath and hall areas not exceeding 3 m (10 ft) in length.
Exception No. 2: Wall spaces occupied by cabinets, built-in furniture or other appurtenances.
Substantiation: 210.52 provides comprehensive provisions (which apply unless amended) but may not be considered when applying this article. "Adjacent" is subjective and a term to be avoided. If a receptacle in a wall space behind a door is required by 210.52 based on 90.1(A) and (B,) how is safety not impinged by exempting space behind a door? 210.52 has pertinent provisions re: receptacles part of a luminaire, in cabinets, and over 5 1/2 ft above the floor, which are not specifically amended, but since specific provisions are noted in this article may be assumed to be amended or overlooked.
Panel Meeting Action: Reject
Panel Statement: The word "adjacent" provides flexibility for placement within the constraints for spacing in 552.41(A). See also the panel statement on Proposal 19-194.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
HOPKINS, B.:

19-190 Log #4761 NEC-P19 **Final Action: Reject**
(552.41(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 2-274.
This action will be considered by the panel as a public comment.
Submitter: D. Jerry Flaherty, East Islip, NY
Recommendation: Add revised text to read as follows:
552.41 Receptacle outlets shall be installed at wall spaces 600 mm (2 ft) wide or more so that no point along the floor line is more than 1.8 m (6 ft), measured horizontally, from an outlet in that space.
Exception No. 1: Bath and ~~hall~~ hallway areas.
Substantiation: No definition for "hall" in NEC.
Webster dictionary has several definitions that are not in line with this section of NEC.
1) "Entrance space into which the main door to house" — new large homes have "halls" that are quite large, fully furnished with tables (table lamps) and seating. By definition and code these "halls" need only one receptacle. I have inspected many with extension cords which are a fire hazard.
210.52(H) Hallways.
2) Webster definition - "A communally owned building where public business is transacted or where people meet etc. "which is in line with other areas of the NEC (assembles halls, dance halls, etc.) but not with this section of the code.
3) The end of habitable rooms with two or more doors at one end meets the definition of a hall and again usually only one receptacle is provided.
"Hallway" is not defined in the NEC and Webster defines as a passage connecting two or more rooms which is closer to what the NEC is referring too, but not quite.
See Proposal for a definition of a Hallway.
Hallways. A walled corridor used exclusively to connect two or more rooms.
Panel Meeting Action: Reject
Panel Statement: The term 'hall' is used correctly in the noted section. Changing the term to 'hallway' does nothing to improve the Code. It is noted that the proposed definition of 'hallway' was rejected by CMP-1 (Proposal 1-89) prior to balloting.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-196 Log #2444 NEC-P19 **Final Action: Reject**
(552.41(C))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
552.41 Receptacle Outlets Required.
(C) ~~Ground-Fault Circuit-Interrupter~~ Power Safe Protector Protection. Each 125-volt, single-phase, 15- or 20-ampere receptacle outlet shall have ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel in the following locations:
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There are currently no testing standards for this product. Any testing standards noted in the substantiation are for receptacles in general. The testing reports provided are based on performance results for a specific product.
This proposal is brand-specific. The NEC cannot require a specific brand in any article in the code.
Installation of this device is not currently prohibited by the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-197 Log #2622 NEC-P19 **Final Action: Reject**
(552.41(D)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~On a circuit where all of the outlets are on the load side of the~~ Provided with ground-fault circuit interruption protection for personnel.
Substantiation: Where supplied by a circuit with other interior outlets, there doesn't seem to be a safety reason to require all the interior outlets to be GFCI protected.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to support the proposed revision.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-198 Log #2621 NEC-P19 **Final Action: Reject**
(552.41(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: At least one readily accessible receptacle outlet shall be installed outdoors on the exterior of the park trailer.
Substantiation: Edit. Present text doesn't specify the location to be on the trailer or readily accessible. Location should be on the trailer to assure it is available when the trailer is moved.
Panel Meeting Action: Reject
Panel Statement: Insufficient technical substantiation has been provided to support the proposed revision. The receptacle outlet should not be required to be "readily accessible" for security purposes. Special flexibility is provided in the requirements for purposes of security and physical protection during relocation when necessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-199 Log #1242 NEC-P19 **Final Action: Accept in Principle in Part**
(552.43)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (A) and substitute: The power supply to the park trailer shall be a feeder assembly in accordance with 552.44 or a permanently installed feeder.
In (B) change "panelboard" to "equipment".
In (C)(1) delete "color coded".
Substantiation: Power supply assemblies per 552.44 are assumed to be acceptable. Additionally, why should a single 15-ampere branch circuit require a 30-or 50-ampere supply cord? Distribution equipment other than a "panelboard" such as a fused switch or circuit breaker may be used where only one branch circuit is supplied. "Color-coded" is not defined; does it mean different colors? Any insulated conductor has color. The Code does not generally specify colors other than white or green for general use.
Panel Meeting Action: Accept in Principle in Part
1. Accept in principle the revision to 552.43(A) by making the following revisions:
(A) Feeder. The power supply to the park trailer shall be a feeder assembly consisting of not more than one listed 30-ampere or 50-ampere park trailer power-supply cord and in accordance with 552.44 ~~with an integrally molded or securely attached cap,~~ or a permanently installed feeder.
2. Reject the proposed revisions to 552.43(B) and (C).
Panel Statement: 1. Regarding the proposed changes to 552.43(A): The construction of the supply end of the supply cord is clearly stated in 552.44(C). The term "securely attached" is vague and the word "cap" is inconsistent with the term "attachment plug" used in 552.44. Listing as required for power supply cords provides for performance-based criteria that qualifies "securely attached."
2. The proposed revisions to 552.43(B) and (C) are not technically substantiated and do not add clarity or improve usability of the Code. Color coding is pervasive throughout the NEC and is clearly understood.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
CHILTON, R.: The Panel's action is inconsistent with Section 550.10(A) for "mobile homes" where similar requirements for feeders are addressed. Also, attachment plugs typically are manufactured with a molded plug "cap" or may be provided with the same type removable "cap" as the cover for the attachment plug and is a commonly understood term.

19-200 Log #2709 NEC-P19 **Final Action: Reject**
(552.44(C)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise heading ~~ATTACHMENT PLUGS~~ POWER SUPPLY ASSEMBLY Change "attachment plugs in (1) to: "power supply assembly".
Substantiation: Edit. 552.43 includes the power supply cord; (C)(2) uses the phrase "power supply assembly".
Panel Meeting Action: Reject
Panel Statement: Insufficient technical substantiation has been provided to support the proposed revision. The title of the section accurately reflects what is covered therein.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-201 Log #1212 NEC-P19 **Final Action: Reject**
(552.45(A), (B) and (C))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A,) (B), and (C) change "panelboard" to "equipment".
In (B), add: and _____ mm (_____in._) high.
Substantiation: A single fused switch or circuit breaker may be distribution equipment, especially where only one branch circuit is provided. Since no height requirement is specified 110.33 applies. Proposal is intended to allow the panel to specify a height if different than 110.33.
Panel Meeting Action: Reject
Panel Statement: 552.45 identifies only the use of a distribution panelboard. The substantiation for the proposed revision to (B) refers to 110.33, which is only for systems over 600 volts.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-202 Log #707 NEC-P19 **Final Action: Accept**
(552.46(B)(1))

Submitter: Joe Tedesco, Boston, MA
Recommendation: The lighting circuits shall be permitted to serve built-in gas ovens with electric service only for lights, clocks or timers, or listed cord-connected kitchen waste disposers.
Substantiation: The term "kitchen waste disposers" is the correct term, and is used in 422.16(B)(1).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-203 Log #1241 NEC-P19 **Final Action: Reject**
(552.46(B)(3)(b))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Where the power supply and branch circuits supplies continuous load(s) or any combination of continuous loads and noncontinuous loads, the ~~branch circuit~~ conductors ~~shall be in accordance with 210.19(A)~~ have an ampacity not less than 125 percent of the continuous load plus 100 percent of the noncontinuous load.
Substantiation: The same reason for this equipment (heating at terminals and overcurrent devices) should apply to all supply conductors. Example D3, D3(a) calculate continuous loads for feeders and service conductors at 125 percent.
Panel Meeting Action: Reject
Panel Statement: The submitter's recommendation is unclear and does not follow the proper style for legislative format. The code reference is inaccurate and confusing.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-204 Log #392 NEC-P19 **Final Action: Reject**
(552.47(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the last paragraph change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is incorrect. The use of the word "per" in this application is appropriate. The proposed revision does not add clarity or improve usability. The NEC Style Manual does not prohibit the use of "per."
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-205 Log #393 NEC-P19 **Final Action: Reject**
(552.47(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "per" to "for each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-204.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-206 Log #1099 NEC-P19 **Final Action: Reject**
(552.48)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (B):
~~CONDUIT and TUBING~~ RACEWAYS and CABLES. Where ~~rigid metal conduit or intermediate metal conduit is~~ raceways or cables are terminated at an enclosure with a locknut or locknut and bushing connections, at least two locknuts shall be provided, one inside and one outside of the enclosure... (remainder unchanged).
Delete (C), (D), (G), (H), (I), (K), (L).
Substantiation: The double locknut provision should also apply to cables where connectors may loosen and impair grounding continuity or subject conductors to abrasion by the knockout opening. The proposed deletions are already covered elsewhere in the Code and apply unless amended. Additionally (D) doesn't cover installations in noncombustible material; (G) is covered by 300.4(A) and (B) which includes all raceways and cables; (H) is covered by the respective cable articles, which may have different support requirements, e.g., 310.30 m, 332.30; (K) is covered by 406.5(A) and (C) which doesn't require listing; (L) is covered by 406.5(B); (I) is covered by 334.30(C).
Panel Meeting Action: Reject
Panel Statement: Section 552.48(B) addresses threaded conduits installed without fittings using locknuts. Cables are always installed with fittings and all materials and equipment are required to be listed per Section 552.40(B). The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this article is far more important than not using references where information could be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-207 Log #1379 NEC-P19 **Final Action: Reject**
(552.48)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (A) and substitute:
Identified cables and raceways covered by Articles 320, 322, 330 through 340, 342 through 362, 368, and 388 shall be the wiring method(s) employed and shall be permitted in accordance with their respective articles, except as otherwise specified in this article.
Delete first sentence of (B) and substitute:
Where conduit, tubing, raceways or cables are terminated at an enclosure with a locknut or locknut and bushing at least two locknuts shall be provided, one of which shall be outside of the enclosure.
Substantiation: "Shall be permitted" is not a requirement; 90.5(B) states: "shall be permitted" describes actions allowed but not required. The locknut provisions all raceways and cables which utilize locknut connections for termination fittings (connectors) to maintain grounding continuity and prevent abrasion of conductors if the connectors become loose or detached from the enclosure.
Panel Meeting Action: Reject
Panel Statement: The submitter's recommendation is unclear and does not follow the proper style for legislative format. See the panel action on Proposal 19-206.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-208 Log #2645 NEC-P19 **Final Action: Reject**
(552.48)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete: (H),(I),(J),(K) and (L).
Revise latter part of (M): "...or by other raceway or cable identified for the application.
Substantiation: Edit. (H) is already covered by referenced articles in (A); the last sentence literally does not permit support at intervals less than 4-1/2 ft. (I) is covered in 314.17(C) exception and 334.30(C) which apply unless amended.
(J) is already covered by 110.27(B) and 334.15(B).
(K) is already covered by 406.5(A)(C).
(L) is covered by 406.5(B).
Literal wording in (M) indicates the specified raceway/cable may be routed against other raceway or cable identified for the use.
Panel Meeting Action: Reject
Panel Statement: The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this Article is far more important than not using references where information could be overlooked. The addition of the word "by" before "other raceway or cable identified for the application" is not needed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-209 Log #1240 NEC-P19 **Final Action: Reject**
(552.48(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Boxes and cabinets shall comply with 312.2 and 314.20. Alternatively, delete this section.
Substantiation: This is already covered by 312.2 and 314.20 which also covers cabinets and noncombustible finishes.
Panel Meeting Action: Reject
Panel Statement: The submitter has not offered any technical substantiation for adding cabinets. The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this Article is far more important than not using references or requirements where information could be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-210 Log #1239 NEC-P19 **Final Action: Accept in Principle**
(552.48(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~SHEATH ARMOR~~ Cable Covering. The ~~sheath~~ outer covering of ~~nonmetallic sheathed~~ cables and flexible cords, metal-clad cable, and Type AC metal-covered cables shall be continuous between ~~outlet~~ boxes and other enclosures or terminations.
Substantiation: Edit. All metal-clad cable (Type MC) may not have a "sheath". This provision does not presently apply to such Type MC cable with an interlocking armor, Type MI, UF, and SE cable.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Cable Sheath ~~Armor~~. The sheath of nonmetallic-sheathed cable, and the armor of metal-clad cable, and Type AC cable shall be continuous between outlet boxes and enclosures.
Panel Statement: The sheath of nonmetallic-sheathed cable is not armor. CMP-19 does not agree with the submitter's substantiation; however, the panel action meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-211 Log #1059 NEC-P19 **Final Action: Reject**
(552.48(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Already substantially covered by 300.4 which applies unless amended.
Panel Meeting Action: Reject
Panel Statement: The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this Article is far more important than not using references or requirements where information could be overlooked.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-211a Log #CP1902 NEC-P19 **Final Action: Accept**
(552.48(H))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 19,
Recommendation: Revise as follows:
(H) Cable Supports. Where connected with cable connectors or clamps, cables shall be supported within 300 mm (12 in.) of outlet boxes, distribution panelboards, and splice boxes on appliances. Supports shall be provided at least every 1.4 m (4½ ft) at other places.
Substantiation: The present language does not technically permit closer support intervals.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-212 Log #1235 NEC-P19 **Final Action: Reject**
(552.48(J), (K) and (L))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (J): Where likely to be exposed to physical damage, ~~exposed~~ nonmetallic cable shall be protected by covering boards, guard strips, raceways, or other identified means.
Delete (K) and (L).
Substantiation: Edit. "Likely" is defined as such a nature or circumstance to make something probable and is used in many sections. (K) and (L) are superfluous, already covered in 404.9 and 406.5.
Panel Meeting Action: Reject
Panel Statement: The use of the phrase "likely to be" is not appropriate in this instance as the condition is either evident, or not, at the point of inspection. No substantiation is provided for the addition of the word "identified". See panel action and statement on proposal 19-208 for not deleting (K) and (L).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-212a Log #CP1901 NEC-P19 **Final Action: Accept**
(552.48(K))

Submitter: Code-Making Panel 19,
Recommendation: Revise as follows:
(K) ~~Metal~~ Receptacle Faceplates. Metal faceplates shall comply with Section 406.5 (A). ~~be of ferrous metal not less than 0.76 mm (0.030 in.) in thickness or of nonferrous metal not less than 1.0 mm (0.040 in.) in thickness.~~ Nonmetallic faceplates shall ~~be listed~~ comply with Section 406.5(C).
Substantiation: The title in 552.48(K) only addresses metal faceplates and contains the same requirements as for metal receptacle faceplates in 406.5(A). The panel concluded that it is simpler to refer to the appropriate requirement in 406.5 and also include the reference to requirements for nonmetallic receptacle faceplates. The requirement that faceplates be listed is already covered by 552.40(B).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-213 Log #1098 NEC-P19 **Final Action: Reject**
(552.48(O)(1) and (2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence in (1):
That portion of a branch circuit that is installed in an expandable unit shall be permitted to be connected to the branch circuit by means of an extra-hard usage type flexible cord or cable identified for the application, with or without an attachment plug, and containing an equipment grounding conductor.
Revise last sentence of (2):
A flexible cord or cable located on the outside of a unit shall be identified for ~~outdoor~~ use in wet locations and sunlight resistance.
Substantiation: Article 400 does not require listing. Flexible cables should also be permitted. Cords and cables should be identified for the application and contain an EGC. All hard usage and extra-hard usage cords are not suitable, e.g., electric vehicle cables Article 400 covers wet and damp locations and sunlight resistance, but not "outdoor" use.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to open the application to any flexible cable type. Use of "extra-hard usage cord" is implied by specification of "hard usage cord." Listed cord is intended for this application as is the reference to section 400.7 permitted use.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-214 Log #1238 NEC-P19 **Final Action: Reject**
(552.49)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 404.9 and 406.5 which apply unless amended.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation references code sections that do not apply to Section 552.49.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-215 Log #1939 NEC-P19 **Final Action: Reject**
(552.49)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 314.16 which applies unless amended.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-216 Log #1237 NEC-P19 **Final Action: Reject**
(552.50)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 404.9 and 406.5 which apply unless amended.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation references code sections that do not apply to Section 552.50.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-217 Log #1938 NEC-P19 **Final Action: Reject**
(552.50)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 200.6 which applies unless amended.
Panel Meeting Action: Reject
Panel Statement: See panel statement on proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-218 Log #1236 NEC-P19 **Final Action: Reject**
(552.51)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 404.9 and 406.5 which apply unless amended.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation references code sections that do not apply to Section 552.51.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-219 Log #1937 NEC-P19 **Final Action: Reject**
(552.51)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 110.14 which applies unless amended.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-220 Log #1915 NEC-P19 **Final Action: Reject**
(552.52(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 404.14(A) and (B). This section does not limit the ac general use snap switch for use with ac motors as does 404.14(A) and may be deemed to modify that section.
Panel Meeting Action: Reject
Panel Statement: Section 552.52(B) clarifies Section 404.14 for this industry specific application.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-221 Log #1914 NEC-P19 **Final Action: Reject**
(552.53)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already coverered by 210.21 and 406.3(A).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-222 Log #1913 NEC-P19 **Final Action: Reject**
(552.54(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 410.13
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-223 Log #1912 NEC-P19 **Final Action: Reject**
(552.54(B)and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 404.4 and 410.4.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-224 Log #1911 NEC-P19 **Final Action: Reject**
(552.56(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 250.119.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-225 Log #1100 NEC-P19 **Final Action: Reject**
(552.56(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence and substitute:

Grounding and bonding of electrical equipment shall be in accordance with applicable provisions of Part IV, V, and VI of Article 250.

Delete (1) and (2).

Revise (3):

The equipment grounding conductor in nonmetallic sheathed cable or nonmetallic raceway shall be permitted to be secured under a machine screw threaded into the metal luminaire canopy with at least two threads engaged, or secured with a machine screw and nut, other than a mounting or cover screw, or attached to ~~a listed~~ an integral grounding means (plate) in a nonmetallic box ~~for luminaire mounting~~. ~~(Grounding means shall also be permitted for luminaire attachment screws.)~~ A metal luminaire securely attached to a grounded metal box or fitting with machine screws shall be considered grounded.

Substantiation: (C)(1) and (2) are already covered by 250.118 and 250.148(C) which apply unless amended. A machine screw with a minimum number of threads engaged should be required. Listed boxes will include the integral grounding plate. "Permitted" grounding does not entail a requirement per 90.5(B). Luminaire attachment (mounting) screws are not identified for connection of a wire-type equipment grounding conductor and should not be permitted; other sections require a grounding screw to be used for no other purpose.
Panel Meeting Action: Reject
Panel Statement: The panel rejects deleting 552.56(C)(1) and (2). The current language is clear and specific to a specialized industry. Usability of the NEC by including the specific reference or requirement within this article is far more important than not using references or requirements where information could be overlooked. The proposed revisions to 552.56(C)(3) present substantial modifications to Section 250.8 that are not allowable grounding methods or add requirements that are already covered in Section 250.118. The submitter has provided no substantiation to add nonmetallic raceway to this section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-226 Log #1940 NEC-P19 **Final Action: Reject**
(552.56(C) and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. These provisions are already covered elsewhere in the Code.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-227 Log #1368 NEC-P19 **Final Action: Reject**
(552.56(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (D):

A connection between the one or more grounding conductors brought into a nonmetallic box or enclosure shall be arranged so that a connection can be made to any ~~fitting or device~~ equipment in ~~that~~ or fed from the box or enclosure that ~~requires~~ is to be, grounded.

Revise text of (E):

Where ~~more than~~ one or more wire-type equipment grounding or bonding conductors ~~of a branch circuit~~ enters a box or other enclosure all such conductors ~~shall be in good electrical contact with each other~~ shall be connected together and to the box or enclosure (if metal) and the arrangement shall be such that disconnection or removal of any device, luminaire, or other equipment contained in or fed from the box or enclosure ~~will~~ does not interfere with or interrupt the grounding continuity.

Substantiation: The provisions of (D) should apply to enclosures which are not "boxes" and include equipment in the box or enclosure or fed from it to be grounded whether or not grounding is required. The provisions of (E) should also apply where only one grounding or bonding conductor is installed and require connection to a metal box or enclosure.

Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided for the proposed revisions. The heading of the subsection addresses only nonmetallic boxes. The proposed revisions do not add clarity or improve usability of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-228 Log #1989 NEC-P19 **Final Action: Reject**
(552.56(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 250.148(B).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-229 Log #1988 NEC-P19 **Final Action: Reject**
(552.56(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 250.114.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-230 Log #1993 NEC-P19 **Final Action: Reject**
(552.57)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

(A) Where the wiring system is 120-volts or 120/240 volts all exposed noncurrent-carrying metal parts that ~~may~~ are likely to become energized, and the trailer components specified in 552.57(D), (E), and (F) shall be effectively bonded to the grounding terminal(s) ~~or enclosure~~ of the ~~distribution panelboard~~ main disconnecting means specified in 525.45(C).

Revise last sentence of (C): The bonding conductor specified in 552.57(B) shall be of... (remainder unchanged). Revise (F): ~~FURNACE and~~ METAL AIR DUCT BONDING ~~Furnace and~~ Metal circulating air ducts associated with electrically operated heating and cooling systems shall be bonded and grounded by approved means.

Substantiation: It doesn't seem necessary to apply (A) to low voltage systems. Metal parts should also be grounded; bonded, by definition does not necessarily provide grounding. The main disconnecting means grounding. The main disconnecting means grounding terminals provide the most direct ground path to the service. Air ducts not associated with electric equipment should not require bonding or grounding; "likely" is defined as probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The substantiation suggests that this requirement applies to low voltage systems, which is not the case since this requirement falls under Part IV, Nominal 120-Volt or 120/240-Volt Systems. It is unnecessary to add the suggested code references within (A) and (C) since the current language requires "All" exposed non-current carrying metal parts to be bonded. The proposed changes in (F) only add confusion to the current requirement. Typical AC ducting is not metal and nowhere else in the section is the phrase "and grounded by approved means" currently stated.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-231 Log #1367 NEC-P19 **Final Action: Reject**
(552.57(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

~~Grounding~~ Bonding conductor terminals shall be of the solderless type and listed as pressure terminal connectors ~~recognized~~ identified for the wire size and material used. The bonding conductor shall be solid copper ~~or stranded~~ insulated covered or bare and be minimum 8 AWG. ~~copper minimum or equivalent.~~

Substantiation: Grounding is not the same as bonding. Terminals should also be identified for the conductor material (copper). Solid copper is less likely to have corrosion problems. "8 AWG copper minimum or equivalent" is not specific. What or who is to determine if a smaller than 8 AWG noncopper conductor is equivalent? "Equivalent" is subjective and a term to be avoided.
Panel Meeting Action: Reject
Panel Statement: There is neither sufficient evidence nor technical substantiation for the proposed changes. For example, there is no evidence that the area beneath a park trailer is a corrosive environment warranting a solid copper covered conductor.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-231a Log #1987 NEC-P19 **Final Action: Accept**
(552.59(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete, or alternatively revise last sentence: Outdoor receptacle ~~or convenience~~ outlets shall be in accordance with 406.8(A) and (B). ~~of a gasketed cover type suitable for use in wet locations~~. Switches and circuit breakers installed outdoors shall comply with 404.4.
Substantiation: "Convenience" outlet is not defined. This section does not encompass the requirements of 406.8(B), without apparent justification.
Panel Meeting Action: Accept
Panel Statement: Accept the submitter's amendment to Section 552.59(A). See panel action and statement on Proposal 19-211.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-232 Log #1366 NEC-P19 **Final Action: Reject**
(552.59(A))

TCC Action: It is the understanding of the Technical Correlating Committee that the proposals referenced in the panel statement should be Proposals 19-211 and 19-231a.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Already covered by 110.11, 406.8, 410.10. Is this section intended to modify 406.8(B)(2)(a) for "bubble" type covers? "Convenience" type outlets are not defined. Switches are not covered, therefore, 404.4 applies, likewise other appropriate sections should govern.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposals 19-211 and 19-232a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

19-233 Log #1365 NEC-P19 **Final Action: Reject**
(552.60(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (1):

A visual and continuity test to ensure that required bonding is accomplished ~~all metal parts are properly bonded~~.

Revise (4):

Receptacles with ~~requiring~~ GFCI protection shall be tested for correct function by the use of a GFCI testing device.

Substantiation: A visual "test" may permit verification of proper connectors, wire size and type and secure connections. Unless of high amperage a continuity test will not necessarily indicate loose connections. "All" metal parts are not required to be bonded. All receptacles with GFCI protection whether or not required should be tested.
Panel Meeting Action: Reject
Panel Statement: A visual inspection is unnecessary. Electrical continuity can be verified using the appropriate test equipment. A visual inspection is unenforceable and impractical in many cases.

Existing language in (4) is clear as written. The proposed revision does not add clarity or improve usability of the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 553 — FLOATING BUILDINGS

19-234 Log #1050 NEC-P19 **Final Action: Reject**
(553.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
All metal parts in contact with the water, all metal piping, and all noncurrent-carrying metal parts that ~~may~~ are likely to become energized shall be connected by approved means to the equipment grounding terminal(s) ~~bus~~ in the ~~panelboard~~ floating building distribution equipment where the supply conductors terminate.
Substantiation: "May" is subjective and a term to be avoided per the Style Manual. "Likely" is defined as such by a nature or circumstance as to make something probable and is used in many sections. Since the means of connection bonding is not specific it should be acceptable to the AHJ re: manner and material.
Panel Meeting Action: Reject
Panel Statement: The submitter is incorrect in his reference to Section 553.1.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-235 Log #1249 NEC-P19 **Final Action: Reject**
(553.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "is likely to".
Substantiation: Edit. "May" is a term to be avoided per the Style Manual. "Likely" is used in many sections.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 19-234.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-236 Log #1363 NEC-P19 **Final Action: Reject**
(553.2.Floating Building)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete:
"not located on the premises".
Substantiation: "Premises" is defined as a tract of land which includes the shore or land area adjacent to floating buildings or docks.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is incorrect. The term "premises wiring system" is defined in Article 100.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-237 Log #2802 NEC-P19 **Final Action: Accept**
(553.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~553.3 Application of Other Articles.~~
~~Wiring for floating buildings shall comply with the applicable provisions of other articles of this Code, except as modified by this article.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 553.3 repeats the requirements previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-238 Log #4288 NEC-P19 **Final Action: Accept**
(553.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~553.3 Application of Other Articles.~~
~~Wiring for floating buildings shall comply with the applicable provisions of other articles of this Code, except as modified by this article.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 553.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-239 Log #1364 NEC-P19 **Final Action: Reject**
(553.4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The service equipment for a floating building shall be located ~~adjacent~~ in close proximity to where the floating building is moored, but not in or on the floating building or on any floating structure.
Substantiation: Edit. "Adjacent" is subjective and a term to be avoided.
Panel Meeting Action: Reject
Panel Statement: The term "in close proximity to where" provides no clearer definition than "adjacent." The proposal does not add clarity or improve usability of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-240 Log #3656 NEC-P19 **Final Action: Reject**
(553.4)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
553.4 Location of Service Equipment.
The service equipment or means of disconnect for a floating building shall be located adjacent to, but not on or in, the floating structure.
Where the area within 15 m (50 ft) of the floating building is in the 100 year flood plane, the service equipment or means of disconnect shall be located outside of the 100 year flood plane and shall be capable of being opened by the use of a remote control device located at the shore access point to the floating building.
Substantiation: Not all floating buildings are served by service equipment. The intent of the rule is to provide a local disconnect for the floating building, not to require that the floating building be supplied by service equipment. In many cases locating the service equipment or means of disconnect adjacent to the floating structure will result in the equipment being damaged by flood waters. A provision to locate a remotely operated disconnect outside of the flood plane will provide the means for a local emergency disconnect as well as protect the disconnect from flood damage.
Panel Meeting Action: Reject
Panel Statement: Many floating buildings are located well within a flood plane. This proposal can result in locating the disconnecting means miles from the floating building, which is not practical.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 7 Negative: 1
Explanation of Negative:
MICHAELIS, R.: There needs to be a means to disconnect power to floating buildings during flooding so that damage can be evaluated safely before power is restored. As CMP 19 pointed out this disconnect could be at a great distance from the floating building in order to get outside of the 100 year flood level. This is exactly where this disconnect needs to be, at a location well above the flood level.

19-241 Log #4765 NEC-P19 **Final Action: Reject**
(553.4)

Submitter: Joseph P. Fello, Eaton Corp.
Recommendation: Add new text to read as follows:
Location of Service Equipment. The service equipment for a floating building shall be located adjacent to, but not on or in, the building or any floating structure. The Main over current protective device which feeds the building or floating structure distribution system shall have GFCI protection for personnel. Individual branch GFCI protection for personnel fed by that feeder is a suitable alternate to main GFCI protection.
Substantiation: Shore power leakage currents on board vessel or due to aging infrastructure, lack of maintenance, conduit and or wire corrosion, etc. pose a hazard for potential leakage to ground that may cause electric shock drowning, fire, wasted energy, and property damage. GFCI protection will add protection from such occasions. I have provided additional information from the Milke Holt Newsletter dated October 17, 2007. In summary, the intent of this proposal is to protect personnel from hazardous leakage from wiring associated with a floating building.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Although the recommendation has merit, additional technical substantiation and product development is needed. The use of GFCI for personnel protection is not prohibited by the current Code. The proposed requirement for GFCI personnel protection (6 mA leakage) is not practical for all floating building environments.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-242 Log #3408 NEC-P19 **Final Action: Reject**
(553.5)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
553.5 Service-Entrance Conductors. One set of service-entrance conductors shall be permitted to serve more than one set of service equipment.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: Although the proposal has merit, CMP-19 defers to the action taken by CMP-4 on the definitions of the terms.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-243 Log #1362 NEC-P19 **Final Action: Reject**
(553.6)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change “panelboard” to “distribution equipment”.
Substantiation: Edit. All floating buildings may not have distribution equipment that is a “panelboard”.
Panel Meeting Action: Reject
Panel Statement: There is currently a definition of the term “panelboard” in Article 100; “distribution equipment” is not defined in Article 100 and its use may lead to confusion. The submitter has provided inadequate substantiation to support the revision.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-244 Log #1361 NEC-P19 **Final Action: Reject**
(553.7(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:
All wiring shall be installed so that motion of the water surface or floating building and changes in the water level is not likely to ~~will not~~ result in undue strain on the feeder wiring method or connections ~~unsafe conditions~~.
Substantiation: Edit. Motion of the building not caused by the water should be considered. “Undue” strain is subjective and not defined as is “unsafe conditions” and which is difficult to predict.
Panel Meeting Action: Reject
Panel Statement: The proposal does not add clarity or improve usability of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-245 Log #1251 NEC-P19 **Final Action: Reject**
(553.8(A))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A) change “panelboard” to “distribution equipment”.
Substantiation: Edit. All floating buildings may not have a panelboard as distribution equipment.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-243.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-246 Log #1205 NEC-P19 **Final Action: Reject**
(553.8(A) and (B))

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A) change “panelboard” to “distribution equipment”
Revise text of (B) as follows: The equipment grounding conductor shall be installed in the same raceway or portable power cable containing the feeder conductors and connected to a grounding terminal in the service equipment and main disconnecting means in the floating building.
Substantiation: A floating building may have a single switch or circuit breaker as a main disconnecting means, which are not “panelboard”. “Installed with the feeder conductors” is not explicit and may be deemed to modify the requirement to be run in the same raceway or cable with circuit conductors.
Panel Meeting Action: Reject
Panel Statement: There is currently a definition of the term “panelboard” in Article 100; “distribution equipment” is not defined in Article 100 and its use may lead to confusion. The submitter has provided inadequate technical substantiation to support the revisions.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-247 Log #1250 NEC-P19 **Final Action: Reject**
(553.9)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase “distribution board” in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “panelboard” to “distribution equipment”.
Substantiation: Edit. All floating buildings may not have a “panelboard”.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-243.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-248 Log #1058 NEC-P19 **Final Action: Accept in Part**
(553.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
All metal parts in contact with the water, all metal piping,and all non-current-carrying metal parts that ~~may~~ are likely to become energized shall be connected to an equipment grounding ~~bus~~ terminal(s) in the ~~panelboard~~ floating building distribution equipment by approved means where the supply conductors terminate.
Substantiation: "May" is subjective and a term to be avoided per the Style Manual. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used many times in the Code. Since the means of connection (bonding) are not specific, it should be acceptable to the AHJ re: manner and material.
Panel Meeting Action: Accept in Part
The panel accepts deleting "may" and substituting "are likely to." The remainder of the text remains unchanged.
Panel Statement: There is neither sufficient evidence nor substantiation for the remainder of the changes proposed.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

ARTICLE 555 — MARINAS AND BOATYARDS

19-249 Log #4764 NEC-P19 **Final Action: Accept in Principle**
(555.2)

TCC Action: The Technical Correlating Committee directs that this proposal be reconsidered and correlated with the action taken on Proposal 9-130a where Code-Making Panel 9 deleted the phrase "distribution board" in Article 408.
This action will be considered by the panel as a public comment.
Submitter: Joseph P. Fello, Eaton Corp.
Recommendation: An enclosed assembly that can include receptacles, circuit breaker, fused switches, fuses, Watt Hour Meters, distribution panel, transformer and monitoring means approved for marine use.
Substantiation: The current paragraph Marine Power Outlets does not fully describe all equipment which can contain a distribution panel and or transformer and still be designated as a Power Outlet. The need for this clarification has arisen due to the comparisons of a stand alone transformer enclosure to a power outlet which contains a transformer. This equipment with the addition of a distribution panel or transformer will allow for terminations no less than 12 in. above a floating pier as Per 555.9
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
An enclosed assembly that can include equipment such as receptacles, circuit breakers, fused switches, fuses, Watt Hour Meters, distribution panels, and monitoring means approved for marine use.
Panel Statement: The revised language allows additional equipment without having to cite all possibilities and meets the intent of the submitter. By adding the language "equipment such as," a transformer would be permitted to be located in the marine power outlet assembly.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-250 Log #1360 NEC-P19 **Final Action: Reject**
(555.2.Marine Power Outlet)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
An enclosed assembly listed for marine use that can include receptacles, circuit breakers, fused switches, fuses, watt-hour meter(s) and monitoring means, ~~approved~~ identified for marine use."
Substantiation: Edit. "Approved" is not the same as listed and identified, but merely acceptable to the AHJ.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to require listing of marine power outlets beyond that required in 555.19(A)(1). The term "approved" as defined in Article 100 is what is intended.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-251 Log #2445 NEC-P19 **Final Action: Reject**
(555.2.Power Safe Protector (PSP))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If 555.19(B)(1) is accepted to include PSP requirements, there may be a need to put this in definitions. A proposal is also being sent to panel 1, Article 100.
Panel Meeting Action: Reject
Panel Statement: The panel action on Proposal 19-276 precludes the need for a definition in this article.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-252 Log #4766 NEC-P19 **Final Action: Reject**
(555.3)

Submitter: Joseph P. Fello, Eaton Corp.
Recommendation: Add new text to read as follows:
555.3 Personnel Protection. GFCI protection for personnel shall be provided for the marina distribution system. The GFCI protection for personnel shall be provided in either the main over current protective device, or in the over current protective devices of each individual branch or feeder circuit.
Substantiation: Shore power leakage currents on board vessel or due to aging infrastructure, lack of maintenance, conduit and or wire corrosion, etc. pose a hazard for potential leakage to ground that may cause electric shock drowning, fire, wasted energy, and property damage. GFCI protection for personnel will add protection from such occasions. I have provided additional information from the Mike Holt Newsletter dated October 17, 2007.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Although the recommendation has merit, additional technical substantiation and product development is needed. The use of GFCI for personnel protection is not prohibited by the current code. The proposed requirement for GFCI personnel protection (6 mA leakage) is not practical for all marina environments.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 8 Negative: 1
Explanation of Negative:
MICHAELIS, R.: Ground fault monitoring is now recommended in the Marina Electrical Safety Standard NFPA-303-2006.
Marinas have both a legal and moral obligation to provide guests, customers, and marina personnel with the safest environment possible. This standard describes "best practices" that were authored by knowledgeable people in the industry and addresses issues that are known causes of injury and property damage. Ignoring these sections is really not an option. The proposal should be accepted with the addition of ground fault monitoring and alarms being available for marinas with qualified supervision.

19-253 Log #1359 NEC-P19 **Final Action: Reject**
(555.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "specifically approved" to "identified".
Substantiation: Edit. "Approved" is acceptable to the AHJ which is not necessarily the same as identified.
Panel Meeting Action: Reject
Panel Statement: The proposed revisions are not strictly editorial. Insufficient technical substantiation has been provided to support the proposal.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-254 Log #3657 NEC-P19 **Final Action: Reject**
(555.7)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
555.7 Location of Service Equipment.
The service equipment or means of disconnect for floating docks or marinas shall be located adjacent to, but not on or in, the floating structure.
Where the area within 15 m (50 ft) of the dock is in the 100 year flood plane, the service equipment or means of disconnect shall be located outside of the 100 year flood plane and shall be capable of being opened by the use of a remote control device located on the shore end of the dock or immediately adjacent thereto.
Substantiation: Not all floating docks are served by service equipment. The intent of the rule is to provide a local disconnect for the floating dock, not to require that the dock be supplied by service equipment. In many cases locating the service equipment or means of disconnect adjacent to the floating structure will result in the equipment being damaged by flood waters. A provision to locate a remotely operated disconnect outside of the flood plane will provide the means for a local emergency disconnect as well as protect the disconnect from flood damage.
Panel Meeting Action: Reject
Panel Statement: Many marinas are often located well within a flood plane. This proposal can result in locating the disconnecting means miles from the marina, which is not practical.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-255 Log #1706 NEC-P19 **Final Action: Accept**
(555.9)

Submitter: Mike Theisen, St. Cloud, MN
Recommendation: Revise text as follows:
555.9 Electrical Connections.
Electrical connections shall be located at least 305 mm (12 in.) above the deck of a floating pier. Conductor splices, within approved junction boxes, utilizing sealed wire connector systems listed and identified for submersion shall be permitted where located above the waterline but below the electrical datum ~~field~~ plane for floating piers.
All electrical connections shall be located at least 305 mm (12 in.) above the deck of a fixed pier but not below the electrical datum plane.
Substantiation: The term “electrical datum field” is not defined, but “electrical datum plane” is defined in 555.2.
Panel Meeting Action: Accept
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-256 Log #1322 NEC-P19 **Final Action: Reject**
(555.10 and Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Permanently installed electrical equipment enclosures installed on piers and docks ~~above deck~~ level shall be securely and substantially supported by structural members independent of any ~~conduit~~ raceway connected to them. ~~If enclosures are not attached to mounting surfaces by means of external ears or lugs, the internal screw heads.~~ Internal openings for support fasteners shall be sealed to ~~prevent~~ minimize ~~seepage of water~~ entrance of moisture through mounting holes.
Exception: Threaded rigid steel conduit or steel intermediate metal conduit shall be permitted to support a conduit body not larger than the trade size of the conduit and electrical metallic tubing and rigid nonmetallic conduit shall be permitted to support a conduit body no larger than the trade size of the tubing where the conduit body does not support equipment or contain devices other than splicing devices.
FPN: One method of support for conduit bodies is a strap or clamp on at least two hubs secured to structural support.
Substantiation: The provision should apply to permanently installed equipment and include locations below deck level. Support fasteners may be bolts or nail in addition to screws. Sealing of openings may minimize moisture entrance but not prevent it due to cracking and drying of the sealant. Conduit bodies not larger than the trade size of the raceway and not supporting equipment should be substantially equal to the raceway in strength.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no substantiation for the technical changes that have been proposed. The intent of the requirement for sealing of internal screw heads is to prevent the seepage of water through these screw openings. The Code does not define the distinction between a “dock” and a “pier.” No proposal or substantiation has been provided to suggest the need for such distinction.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

(Note: Sequence 119-256a was moved to follow 19-62 on page 727)

19-257 Log #1248 NEC-P19 **Final Action: Reject**
(555.10(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Permanently installed electrical equipment installed on piers or docks ~~above deck level~~ shall be securely ~~and substantially~~ fastened in place and supported by structural members. ~~Independent of any conduit connected to them. if enclosures are not attached to mounting surfaces by means of external cars or lugs the~~ Internal mounting holes ~~screw heads~~ shall be sealed to prevent ~~seepage~~ entrance of water.
Substantiation: Edit. Docks should be included. “Substantially” is subjective and a term to be avoided per the Style Manual. Proposed deletion beginning with “independent” is superfluous. “Conduit” does not include all raceways, such as EMT. The provision should apply to permanently installed equipment and that installed below dock level.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 19-256.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-258 Log #1057 NEC-P19 **Final Action: Reject**
(555.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Circuit breakers, ~~and~~ switches, panelboards, power outlets, and cabinets ~~installed~~ in ~~gasketed~~ wet locations shall be listed and identified for the application and externally manually operable arranged ~~to permit manual operation without exposing the interior of the enclosure. All such enclosures shall be arranged with a weep hole to discharge condensation.~~
Substantiation: The provision should include panelboards and power outlets listed and identified for wet locations should be sufficient; all such equipment does not have gaskets. Watertight equipment will not have weepholes.
Panel Meeting Action: Reject
Panel Statement: Insufficient technical substantiation has been provided to support the proposal. Power outlets and other equipment are only intended to be required to be approved for marine use except as specified in 555.19(A).
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-259 Log #4646 NEC-P19 **Final Action: Accept**
(Table 555.12)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: In the header over the left column, revise the wording to “Number of Shore Power Receptacles”.
Substantiation: The submitter has become aware of attempts to include convenience receptacles in the total receptacle numbers, thereby artificially manipulating the applicable demand factors. Although it is possible to reach the desired result through extended code analysis and discussion, this proposal makes it simple.
Panel Meeting Action: Accept
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-260 Log #1233 NEC-P19 **Final Action: Reject**
(555.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (A) and substitute:
(A) Wiring Methods.
(1) General. Wiring methods employed shall be identified for the use.
(2) Portable Power Cables. Type G, GC, and W portable power cables shall be permitted as follows:
(1) As fixed wiring on the underside of piers and docks (floating or fixed) where not continuously immersed in water.
(2) Where flexibility is necessary on floating piers or docks. Cables shall be sunlight resistant where exposed to direct rays of the sun.
(A)(3) No change.
Revise (B): Installation.
(B)(1) Overhead Wiring. Overhead wiring shall be installed so as ~~avoid~~ prevent contact with masts and other parts of boats, boat hoists, and movable equipment, ~~being moved~~ in the yard. Overhead conductors and cables shall be routed ~~to avoid wiring closer than~~ not less than 6.0 m (20 ft) from the outer edge of any portion of the yard that ~~can~~ is likely to be used for moving vessels or stepping or unstepping masts.
Delete text of (B)(5) and substitute: Protection. Except as permitted in (A)(2). Rigid metal conduit, intermediate metal conduit, or rigid nonmetallic conduit identified for the use shall be installed to protect wiring on piers and docks that is not enclosed in buildings or structures. Rigid metal conduit, intermediate metal conduit and fittings shall be threaded or unthreaded with watertight threadless fittings. The conduit of fittings shall be threaded into hubs or threaded openings in enclosures.

Exception No. 1: Threadless watertight connectors shall be permitted for connection to threaded hubs or openings in enclosures.

Exception No. 2: Where connected to sheet metal enclosures, a locknut/bushing connection shall be permitted, provided a sealing type locknut is installed on the outside of the enclosure.

Substantiation: There are only three portable power cables indicated in Table 400 which should be suitable for the use. Article 400 does not specify listing. “Suitable” and “avoid” are terms to be avoided per the Style Manual. “Temperature extreme” is not defined. No portable power cables are indicated as resistant to ozone, acids, or chemicals. IMC is permitted in 553.13(A). Wiring inside of enclosed structures should be excluded. “Connected to enclosures by full standard threads does not prohibit locknut/bushing connections. The present latter part re: special fittings is vague and unclear. Threadless watertight fittings should be acceptable. Proposed Exception No. 2 seems reasonable and safe for connections to enclosures without threaded hubs or openings.

Panel Meeting Action: Reject

Panel Statement: The existing text in 555.13(A)(1), in addition to particular requirements in this section, is sufficient to permit the effective enforcement of the requirements. Other editorial proposals provide no additional clarity. “Threadless watertight fittings” are not readily available.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-261 Log #4732 NEC-P19 **Final Action: Accept in Principle**
(555.13)

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

555.13 Wiring Methods and Installation.

(B) Installation.

(5) Protection. Rigid metal or ~~nonmetallic~~ <u>rigid polyvinyl chloride</u> conduit <u>(PVC) or reinforced thermosetting resin conduit (RTRC)</u>suitable for the location shall be installed to protect wiring above decks of piers and landing stages and below the enclosure that it serves. The conduit shall be connected to the enclosure by full standard threads. The use of special fittings of nonmetallic material to provide a threaded connection into enclosures on rigid ~~nonmetallic~~ <u>polyvinyl chloride</u> conduit <u>(PVC) or reinforced thermosetting resin conduit (RTRC)</u> employing joint design as recommended by the conduit manufacturer, for attachment of the fitting to the conduit shall be acceptable, provided the equipment and method of attachment are approved and the assembly meets the requirements of installation in damp or wet locations as applicable.

Substantiation: This is an addition from the result of the 2008 NEC adding of new code articles for each of the specific nonmetallic raceways and the conditions for their intended use. Remove the reference of “nonmetallic” and add in each of the specific raceway types. Non-metallic conduit now has four different types of raceways and not all non-metallic raceway types would be acceptable in all locations such as a dock.

Panel Meeting Action: Accept in Principle

See panel action on Proposal 19-268a.

Panel Statement: The panel action on Proposal 19-268a meets the submitter’s intent.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-262 Log #1247 NEC-P19 **Final Action: Reject**
(555.13(A)(1) and (2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise as follows:

(1) <u>Identified</u> wiring methods of Chapter 3 shall be <u>the wiring method(s) employed</u> permitted ~~where identified for use in wet locations~~.

(2) Change “listed” to “identified”.

Substantiation: All wiring methods identified for wet locations may not be suitable for the use. “Permitted” per 90.5(B) is not a requirement. Article 400 does not require listing.

Panel Meeting Action: Reject

Panel Statement: Except as specifically amended in Article 555, the existing text in (1) is correct. Article 555 specifically calls for “listed” extra-hard usage portable cable when used in these applications.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-263 Log #3658 NEC-P19 **Final Action: Reject**
(555.13(A)(2)(3))

Submitter: Donald A. Ganiere, Ottawa, IL

Recommendation: Add new (3) to read as follows:

555.13(A)(2)<u>(3) As feeders from the service equipment or means of disconnect to the floating piers or docks.</u>

Substantiation: The current rule does not permit the use of portable power cables as the feeder to the dock. The feeder, in the case of a floating dock requires more flexibility that the wiring on the dock itself and portable power cables are very flexible and well suited for the purpose of supplying power to the dock.

Panel Meeting Action: Reject

Panel Statement: The submitter’s substantiation is incorrect; the use of portable power cables as the feeder to the dock is permitted in 555.13(A)(2) and (B)(4). Portable power cables are prohibited as a means of disconnect.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-264 Log #1062 NEC-P19 **Final Action: Reject**
(555.13(B)(1))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Where used, overhead wiring shall be installed to avoid <u>accidental</u> contact with masts ~~and~~ other parts of boats, <u>boat hoists, dry docks</u>, other structures <u>and movable equipment</u> ~~being moved in the yard~~.

Substantiation: Edit. Accidental contact with hoists, dry docks, and other structures should be included, including boats in the water.

Panel Meeting Action: Reject

Panel Statement: The proposed revisions are not strictly editorial. Insufficient technical substantiation has been provided to support the proposal. The use of “accidental” is not warranted; any contact with masts etc. is to be avoided.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-265 Log #1061 NEC-P19 **Final Action: Reject**
(555.13(B)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

Outside branch circuits and feeders shall comply with Parts I, II and III of Article 225. (remainder unchanged).

Substantiation: Edit. Proposal is more specific. Reference should not be made to an entire article per the Style Manual.

Panel Meeting Action: Reject

Panel Statement: The proposed revision does not add to the existing text as Parts I, II, and III comprise Article 225.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-266 Log #969 NEC-P19 **Final Action: Reject**
(555.13(B)(4))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

(1) Cables shall be ~~properly~~ <u>securely</u> supported <u>by approved means</u>

(4) Cables shall not be installed where <u>likely to be</u> subject to physical damage.

Substantiation: “Properly” is subjective and a term to be avoided per the Style Manual. “Likely” is defined as such a nature or circumstance as to make something probable and is used many times throughout the Code.

Panel Meeting Action: Reject

Panel Statement: The term “properly” is correct for this application.

The use of the phrase “likely to be” is not appropriate in this instance as the condition is either evident, or not, at the point of inspection.

Number Eligible to Vote: 9

Ballot Results: Affirmative: 9

19-267 Log #4776 NEC-P19 **Final Action: Accept in Principle**
(555.13(B)(4)(b))

Submitter: Julian R. Burns, Quality Power Solutions, Inc.

Recommendation: Add: <u>Exception No. 1 Where listed portable power cables are installed in accordance to the requirements as permitted by 551.13(4)(a) and terminate in a listed marina pedestal/power center employing terminal blocks/bars, the installation of a junction shall not be required.</u>

Substantiation: New listed and advanced marina power pedestals and power centers are available and in today’s applications, boats are the size of mobile homes requiring, in some cases, two 100 Amp feeders. By installing an additional junction box, when the flexible cables can in many cases run continuous from the supply to the power pedestal just provides an additional point for corrosion and burnt up connections. The power pedestals already have the terminal blocks.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(b) Where portable power cables are used as permitted in 555.13(A)(2)(2), there shall be an approved junction box of corrosion-resistant construction with permanently installed terminal blocks on each pier section to which the feeder and feeder extensions are to be connected. <u>A listed marine power outlet employing terminal blocks/bars shall be permitted in lieu of a junction box.</u> Metal junction boxes and their covers, and metal screws and parts that are exposed externally to the boxes, shall be of corrosion-resistant materials or protected by material resistant to corrosion.

Panel Statement: The panel action reformats the proposal to eliminate the addition of a new exception. The panel action meets the intent of the submitter.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-268 Log #4786 NEC-P19 **Final Action: Reject**
(555.13(B)(4)(b))

Submitter: Louis Marcelli, PEICO, Inc.
Recommendation: Delete section 555.13(B)(4)(b) completely.
Substantiation: Section was brought into the NEC from NFPA 303 without comment in the 2002 NEC edition. The apparent original intent of NFPA 303 (1960 was when this verbiage 1st showed up) is now satisfied by modern power pedestals. Loose interpretation of this section is requiring unnecessary connection points, which add additional corrosion points and unnecessary expense to the marina owner. Precedent has been set by the State of Washington passing legislation that this section of the code does not apply in their State (WAC 296-46B-555).
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 19-267, which precludes the need to delete the section.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-268a Log #CP1907 NEC-P19 **Final Action: Accept**
(555.13(B)(5))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal with regard to the deleted word "full" that was left out of the revised text without explanation.
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 19,
Recommendation: Revise 555.13(B)(5) as follows:
(5) Protection. Rigid metal, ~~or~~ ~~nonmetallic~~ reinforced thermosetting resin conduit (RTRC) conduit listed for aboveground use, or rigid polyvinyl chloride (PVC) conduit suitable for the location shall be installed to protect wiring above decks or piers and landing stages and below the enclosure that it serves. The conduit shall be connected to the enclosure by standard threads or fittings listed for use in damp or wet locations as applicable. ~~The use of special fittings of nonmetallic material to provide a threaded connection into the enclosures on nonmetallic conduit, employing joint design as recommended by the conduit manufacturer, for attachment of the fitting to the conduit shall be acceptable, provided the equipment and method of attachment are approved and the assembly meets the requirements of installation in damp or wet locations as applicable.~~
Substantiation: The general requirement in 555.13(A) is modified by 555.13(B)(5) to require rigid type conduits. Nonmetallic conduits "suitable for the location…" implies the potential need for resistance to ultra-violet light or perhaps resistance to other effects in the installed environment. Section 300.15 requires all fittings to be listed for use with the specific wiring methods for which they are intended, and Section 314.15 addresses fittings installed in damp and wet locations.
Panel Meeting Action: Accept
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-269 Log #1254 NEC-P19 **Final Action: Reject**
(555.15)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Wiring and equipment within the scope of this article shall be grounded ~~as specified in Article 250~~ and as required by 555.15(A) through (E).
Revise second sentence of (B): The equipment grounding conductor contained within Type MI cable shall ~~be permitted to be~~ identified after it emerges from the cable. ~~at terminations~~
Substantiation: Article 250 has alternatives and exceptions to grounding which do not appear intended to apply. Many sections simply specify "shall be grounded" which leaves no doubt as to intent. Similar requirements worded differently may cause confusion per the Style Manual. "Permitted" per 90.5(B) does entail a requirement.
Panel Meeting Action: Reject
Panel Statement: All of the requirements in Article 250 apply to Article 555 except as modified in 555.15. The panel's proposed text meets the intent of the submitter and clarifies that color coding of the equipment grounding conductor is not required for Type MI cable.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-270 Log #1352 NEC-P19 **Final Action: Reject**
(555.15)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Wiring methods and equipment within the scope of this Article shall be grounded ~~as specified in Article 250~~ and also comply with 555.15(A) through (E).
In (A) add:
(4) Metal yokes and straps of snap switches, dimmers, and other devices.
Revise second sentence of (B):
The equipment grounding conductor contained within Type MI cable shall be ~~permitted to be~~ identified in accordance with 250.119 ~~at terminations~~.
Substantiation: Grounding provisions of Article 250 have exceptions and alternatives which do not appear intended to apply. Many sections simply state: "shall be grounded". Similar provisions stated differently may cause confusion per the Style Manual. Since (A) requires the EGC to be within a cable, that EGC and not the cable sheath, that should be the one to be identified. "Permitted" per 90.5(B) is not a requirement. Metal yokes and straps are required to be grounded by 404.9, but it does not require the EGC to be an insulated copper conductor as required by (B).
Panel Meeting Action: Reject
Panel Statement: See the panel action on proposal 19-269.
The addition of (4): The requirement in 404.9 applies to Article 555 according to 90.3 and has not been modified.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-271 Log #1253 NEC-P19 **Final Action: Reject**
(555.15(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "panelboard" to "distribution equipment".
Substantiation: Edit. A circuit may be supplied by a single individual switch or circuit breaker which is not a "panelboard".
Panel Meeting Action: Reject
Panel Statement: There is currently a definition of the term "panelboard" in Article 100; "distribution equipment" is not defined in Article 100, and its use may lead to confusion. The submitter has provided inadequate substantiation to support the revision.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-272 Log #1060 NEC-P19 **Final Action: Reject**
(555.17(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The disconnecting means shall ~~be permitted to~~ consist of a circuit breaker, switch, or both...(remainder unchanged).
Substantiation: Edit. "Permitted" is not a requirement per 90.5(B).
Panel Meeting Action: Reject
Panel Statement: The text in 555.17(A) does not presently contain the text the submitter proposes to remove.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-273 Log #1252 NEC-P19 **Final Action: Reject**
(555.17(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
The disconnecting means shall consist of a circuit breaker, switch, or both that simultaneously disconnects all ungrounded conductors of the circuit it controls and shall be ~~properly~~ durably identified as to which receptacle(s) it controls.
Substantiation: Edit. Simultaneous disconnection should be specified as is done in similar sections. (See 3.3.5 of the Style Manual. "Properly" is a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The proposed revisions are not strictly editorial. Insufficient technical substantiation has been provided to support the proposal.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-274 Log #1232 NEC-P19 **Final Action: Reject**
(555.19)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (A)(1) and substitute: Receptacles used to supply shore power to boats or other watercraft in the water shall be supplied from a listed marine power outlet assembly or a receptacle outlet that is weatherproof with the attachment plug inserted or removed. The weatherproof qualities of the power outlet assembly or receptacle outlet shall not be affected when the receptacles are in use with any type of booted or unbooted attachment plug/cap. (See 406.8(2)(a)).

Revise text of (A)(3): Each ~~single~~ receptacle that supplies shore power to boats or other watercraft on the water shall be supplied from a listed marine power outlet assembly ~~or panelboard~~ by an individual branch circuit with voltage and current ratings ~~of the voltage class and rating~~ corresponding to the ratings of the receptacle it supplies. The receptacle shall be provided with ground-fault circuit interruptor protection, overcurrent protection and disconnecting means.

Substantiation: The shore power outlet assembly should be listed. The provision should also apply to watercraft that are not boats, such as floating structures. "Integrity" is not specific as to intent. The provisions should be limited to watercraft on the water. GFCI protection should be specified as it is in 555.19(B). Marine power outlet assemblies are designed for marine use while panelboards generally are not. The definition of Marine Power Outlet does not specify single receptacles. Disconnecting means and overcurrent protection should be specified; the definition of marine power outlet what can be included but there are no specific requirements for GFCI protection, overcurrent protection, or disconnecting means. Disconnecting a 100 ampere pin and sleeve plug under load could be hazardous.
Panel Meeting Action: Reject
Panel Statement: The submitter's substantiation is incorrect. Floating structures are regulated by Article 553. The revised text "other watercraft on the water" is ambiguous and unenforceable. Insufficient technical substantiation has been provided to support the proposal. Power outlets and other equipment are only intended to be required to be approved for marine use except as specified in 555.19(A). For 15 A and 20 A receptacles, the requirements are covered by 555.19(B)(1). See the panel statement on Proposal 19-252.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-275 Log #1358 NEC-P19 **Final Action: Accept in Principle in Part**
(555.19(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
In (1), change "buildings" to "structures".
In (2), insert "durably" ahead of "marked".
Substantiation: Edit. All buildings are structures, but all structures are not buildings. Marking should be durable due to atmospheric conditions.
Panel Meeting Action: Accept in Principle in Part
In (1), change "buildings" to "buildings or structures."
Reject the proposed revision to (2).
Panel Statement: The panel action changing "buildings" to "buildings or structures" is consistent with the rest of the Code and meets the submitter's intent.
"Durability" is not an enforceable term.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-276 Log #2446 NEC-P19 **Final Action: Reject**
(555.19(B)(1))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
555.19
(B) Other Than Shore Power.
(1) ~~Ground-Fault Circuit-Interrupter (GFCI)~~ Power Safe Protector Protection for Personnel. 15- and 20-ampere, single-phase, 125-volt receptacles installed outdoors, in boathouses, in buildings used for storage, maintenance, or repair where portable electrical hand tools, electrical diagnostic equipment, or portable lighting equipment are to be used shall be provided with ~~GFCI~~ power safe protector protection for personnel. Receptacles in other locations shall be protected in accordance with 210.8(B).
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There are currently no testing standards for this product. Any testing standards noted in the substantiation are for receptacles in general. The testing reports provided are based on performance results for a specific product.
This proposal is brand-specific. The NEC cannot require a specific brand in any article in the code.
Installation of this device is not currently prohibited by the code.
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

19-277 Log #3015 NEC-P19 **Final Action: Accept**
(555.21, FPN)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Delete the following text:
~~FPN: See 500.4(A) for documentation requirements.~~
Substantiation: This FPN is not necessary, since compliance with 500.4(A) is required in order to utilize the exception. I obviously must "see 500.4(A)" if I am using the exception.
Panel Meeting Action: Accept
Number Eligible to Vote: 9
Ballot Results: Affirmative: 9

ARTICLE 590 — TEMPORARY INSTALLATIONS

3-107 Log #1335 NEC-P03 **Final Action: Reject**
(590.1)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
The provisions of this article apply to temporary electrical power and lighting installations except as covered by 525.1.
Substantiation: Article 525 covers installations that are or may be temporary with different provisions.
Panel Meeting Action: Reject
Panel Statement: 525.3 already provides the suggested text in accordance with the following:
"525.3 Other Articles.
(A) Portable Wiring and Equipment. Wherever the requirements of other articles of this Code and Article 525 differ, the requirements of Article 525 shall apply to the portable wiring and equipment."
Additional text in Article 590 is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-108 Log #2447 NEC-P03 **Final Action: Reject**
(590.1(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If 590.6(A) for PSP is accepted, a definition may be required. A proposal is also being sent to Article 100.
Panel Meeting Action: Reject
Panel Statement: This proposed definition is related to both the GFCI definition and the AFCI definition already assigned to Code-Making Panel 2 by the NEC Technical Correlating Committee; therefore, this definition should be assigned to Code-Making Panel 2.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-109 Log #1355 NEC-P03 **Final Action: Reject**
(590.1(A), FPN (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:
FPN: See Article 520 for theatre and Motion Picture Studios and Article 525 for Carnivals, Circuses, Fairs, and similar events.
Substantiation: Edit. Temporary wiring for Articles 520 and 525 is specifically covered in those articles with no reference to this article.
Panel Meeting Action: Reject
Panel Statement: 590.2 states that all other requirements of the code for permanent wiring shall apply to temporary wiring installations, except as specifically modified by Article 590.
In addition, 525.3(A) further states that wherever the requirements of other articles in the NEC and Article 525 differ, the requirements of Article 525 apply to portable wiring and equipment. Article 520 has specific requirements in Parts IV and V for portable applications that may or may not be temporary installations, where Article 590 might apply. Article 590 would apply unless specifically deemed otherwise by the other article.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-110 Log #1357 NEC-P03 **Final Action: Reject**
(590.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "requirements" to "applicable provisions".
Substantiation: Edit. In addition to requirements, optional exceptions, other provisions, and permitted alternatives should apply.
Panel Meeting Action: Reject
Panel Statement: The text is specific to requirements since all other exceptions, provisions, or permitted alternatives would be permissive based on 90.5(B); therefore, changing the text here is not necessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-111 Log #1066 NEC-P03 **Final Action: Reject**
(590.4)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the actions on Proposals 1-234 and 9-130a.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete(A).
Revise second sentence of (B):
~~Overcurrent protection shall be provided in accordance with 240.4, 240.5, 240.100, and 240.101.~~
Feeders shall originate in an identified ~~approved distribution center~~ switchboard, panelboard, fused switch, or circuit breaker
Substantiation: Edit. Article 240 already applies unless modified. Distribution center is not defined.
Panel Meeting Action: Reject
Panel Statement: The NEC Style Manual permits reference to specific important sections as the referenced sections relate to the application in 590.4(B) for feeders, and this is done throughout the NEC.
"Distribution center" does not need to be defined for commonly used technical terms. The term "distribution board" is used in the scope of Article 408 for switchboards and panelboards.
90.1(C) states the NEC is not intended as an instruction manual for untrained persons and feeder "distribution board or center" is certainly a commonly used technical phrase in the electrical industry.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-112 Log #1234 NEC-P03 **Final Action: Reject**
(590.4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (H): Protection from Accidental Damage. ~~Flexible cords and cables~~ Temporary wiring methods shall be protected from accidental damage by approved methods where likely to be subject to physical damage. (remained unchanged)
(I) Terminations. ~~at devices Flexible cords and cables entering enclosures containing devices requirinig termination~~ Temporary wiring methods shall be secured to ~~the~~ boxes and other enclosures with fittings ~~designed~~ identified for the purpose, except that single individual conductors shall enter the box or enclosure through bushed fittings.
(J) Support. ~~Cable assemblies and flexible cords and cables~~ Temporary wiring methods shall be supported and fastened in place at approved intervals. ~~That ensure they will be protected from physical damage. Support~~ Fastening shall be in the form of staples, cable ties, straps, or ~~similar type fittings~~ other approved means installed so as not to cause damage. (remainder unchanged)
In the Exception, change "proper" to "identified".
Substantiation: Single conductors permitted by the Exception for 590.4(B) should be included. Fastening should be included at supports. Support does not ensure protection from damage: (H) requires protection. "Proper" in the exception is subjective and a term to be avoided per the Style manual. Whether or not enclosures contain devices is irrelevant.
(I) should apply where conductors are spliced and soldered in enclosures.
Panel Meeting Action: Reject
Panel Statement: 590.4(H) specifically covers flexible cords and cable that may be subject to damage. Changing the text to apply to all temporary wiring is unnecessary since most other wiring methods have specific coverage for physical protection. 110.2 already requires approval of wiring methods as well as whether protection is necessary therefore, the suggested change "approved methods where likely to be subject to physical damage" is a judgment call by the AHJ and the change is unnecessary.
The suggested changes in (I) are unnecessary since single individual conductor entrance into an enclosure is already covered in 300.3(A), 300.3(B), and 300.20, as well as other areas of the NEC.
The suggested changes in (J) are unnecessary since cable assemblies can be adequately supported with securing or fastening, as methods of supporting the cable assemblies and flexible cords and cables.
For example, heavy-duty tie wraps can be used for temporary support where connected to overhead trusses or joists. Approved means is not required since 110.2 already provides for approval.
Relative to the word "proper" in the exception, see the panel action and substantiation on 3-133a.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-113 Log #1308 NEC-P03 **Final Action: Reject**
(590.4(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Delete "permitted" in third sentence.
Substantiation: Edit. The provision should be a requirement; 90.5(B) indicates the provision is allowed, but not required by the use of "permitted".
Panel Meeting Action: Reject
Panel Statement: Removing the word "permitted" would indicate the only wiring method that could be used would be "within cable assemblies or within multiconductor cords or cables of a type identified in Table 400.4 for hard usage or extra-hard usage".
Feeder conductors could certainly be used in other methods also.
The exception to 590.4(B) would also permit single insulated conductors to be used where installed for the purposes of 590.3(C).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-114 Log #1227 NEC-P03 **Final Action: Reject**
(590.4(B) Exception and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Single insulated circuit conductors and insulated or bare equipment grounding conductors shall be permitted for the purpose specified in 590.3
(C)Where accessible only to qualified persons. A box, conduit body, or terminal fitting having a separately bushed hole for each conductor shall be used wherever a transition is made to a different wiring method.
Substantiation: The provision should clearly include grounding conductors. Proposed last sentence is similar to (G) which doesn't cover single conductors.
Panel Meeting Action: Reject
Panel Statement: Inserting "circuit" into the text in the exception is unnecessary since the exception applies to feeder conductors directly in the section above.
Permission to install single insulated or bare equipment grounding conductors is in 250.120(C), 250.130, and other places within Article 250, and since the equipment grounding conductor would be part of the feeder, inserting grounding conductors into the text is unnecessary.
The proposed text in (C) is already covered in 300.15, 300.16, and in 590.4(G).
There was no technical substantiation provided for the changes, and the panel is unsure about the intent of the proposal.
The submitter is very vague about both intent and substantiation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-115 Log #1334 NEC-P03 **Final Action: Accept in Part**
(590.4(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
All branch circuits shall originate in an approved power outlet, switchboard, panelboard, motor control center, fused switch, or circuit breaker.
Substantiation: Edit. Branch circuits may also originate from the proposed additional equipment.
Panel Meeting Action: Accept in Part
The panel accepts all of the recommended changes to the proposed first sentence, except the words "or circuit breaker" to read as follows:
"(C) **Branch Circuits.** All branch circuits shall originate in an approved power outlet switchboard or panelboard, motor control center, or fused switch enclosure."
Panel Statement: The panel accepted all of the changes with the exception of the words "or circuit breaker" since the branch circuit cannot originate within a circuit breaker.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
PACE, D.: The proposal should have been rejected. The current text in 590.4(C) is appropriate. The revised text is redundant. Switchboards, Motor Control Centers and Fused Switches are power outlets as defined in Article 100. Addition of these items will create confusion. Many will interpret that these are the only things that a temporary branch circuit can originate in. Additionally, a single circuit breaker can be installed in an enclosure and used as a power outlet. The panel statement will lead people to think that circuit breakers can not be used for temporary branch circuits. If the panel wants to revise the text then it should be revised to read follows:
"Branch Circuits. All Branch Circuits shall originate in an approved power outlet, switchboard, panelboard, motor control center, or fused switch or circuit breaker enclosure."

3-116 Log #648 NEC-P03 **Final Action: Reject**
(590.4(C)(1) (New))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Add a new subsection (1) to 590.4(C).
(1) Construction Site Lighting. On construction sites, temporary lighting shall be installed on a dedicated branch circuits without receptacles.
Substantiation: The intent of the change is to clarify the no receptacles requirement on construction site temporary lighting as stated in 590.4(D), and which eliminates the possibility of connecting temporary lighting stringers to GFCI protected receptacle circuit. The dedicated branch circuit without receptacles as required by 590.4(D) or contact points (cord cap and cord plugs) would ensure that construction workers would not be able to connect any power tools or equipment that could cause the activation of a fuse, circuit breaker, or GFCI, due to a fault or equipment overload, that would de-energize the lighting circuit.
Panel Meeting Action: Reject
Panel Statement: The third sentence in 590.4(D) already states that receptacles must not be installed on branch circuits that supply temporary lighting; therefore, the proposed text for (C) is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-117 Log #649 NEC-P03 **Final Action: Reject**
(590.4(C)(1) (New))

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Add a new subsection (1) to 590.4(C).
(1) Construction Site Lighting. On construction sites, temporary lighting shall be installed on a dedicated branch circuits.
Substantiation: The intent of the change is to clarify the no receptacles requirement on construction site temporary lighting as stated in 590.4(D), and which eliminates the possibility of connecting temporary lighting stringers to GFCI protected receptacle circuit. The dedicated branch circuit without receptacles as required by 590.4(D) or contact points (cord cap and cord plugs) would ensure that construction workers would not be able to connect any power tools or equipment that could cause the activation of a fuse, circuit breaker, or GFCI, due to a fault or equipment overload, that would de-energize the lighting circuit.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-116.
While this proposal does not include the phrase "without receptacles," the substantiation and intent is the same as in Proposal 3-116.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-118 Log #974 NEC-P03 **Final Action: Reject**
(590.4(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Unless installed in a continuous metal raceway or metal covered cable that qualifies as an equipment grounding conductor in accordance with 250.118 ~~or a continuous metal covered cable that qualifies as an equipment grounding conductor in accordance with 250.118~~ all ~~branch~~ lighting and power circuits shall contain a separate wire-type equipment grounding conductor or be provided with an equipment bonding conductor. ~~And all receptacles shall be electrically connected to the equipment grounding conductor.~~
Substantiation: Edit. Proposal eliminates unnecessary wording. "Lighting and power" circuits will include feeders. Since metal raceways and metal covering of cables are literally separate conductors, a wire type should be specified. Bonding conductors should be permitted where, for example, a raceway or cable that does not qualify as an EGC is interposed between raceways cables or equipment that does qualify as an EGC. Section 406.3(B) already applies and covers grounding of receptacles, as does 404.9(B) for switches, which is not specified in this article.
Panel Meeting Action: Reject
Panel Statement: The existing text in this section does not have unnecessary wording.
The first sentence that the submitter has recommended to delete ensures that all receptacles must be of the grounding type and must remain.
The phrase "that qualifies as an equipment grounding conductor in accordance with 250.118" has been repeated to ensure that it applies to both continuous metal raceways and to continuous metal cables.
The requirement applies to "all branch circuits," and there was no technical substantiation to replace it with "lighting and power" branch circuits.
Compliance with Articles 250 and 406 are already a requirement, and this section does not deal with switches in Article 404, therefore; the other suggested changes are unnecessary. The existing text ensures compliance with the appropriate requirements for connecting receptacles to an equipment grounding conductor.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-119 Log #1306 NEC-P03 **Final Action: Reject**
(590.4(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
All receptacles shall be of the grounding type. Unless installed in a continuous metal raceway or a continuous metal covered cable that qualifies as an equipment grounding conductor in accordance with 250.118, all branch circuits shall include a separate wire-type equipment grounding conductor and all receptacles shall be connected to the equipment grounding conductor. Receptacles on construction sites shall not ~~be installed on branch circuits~~ connected to an ungrounded circuit conductor that supplies temporary lighting. ~~Receptacles shall not be connected to the same ungrounded conductor of multiwire circuits that supply lighting.~~
Substantiation: Edit. Metal covered cables should be included. Receptacles should not be connected to ungrounded conductors of circuits supplying lighting whether or not multiwire.
Panel Meeting Action: Reject
Panel Statement: The suggested change for a continuous metal cable is already in the existing text and the existing last two sentences are very clear and concise as to their application with the suggested text introducing a possibility of misapplication.
Receptacles must not be installed on individual or multiwire branch circuits with lighting, and the existing text provides that requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-120 Log #3016 NEC-P03 **Final Action: Reject**
(590.4(D))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(D) Receptacles. All receptacles shall be of the grounding type. ~~Unless installed in a continuous metal raceway that qualifies as an equipment grounding conductor in accordance with 250.118 or a continuous metal-covered cable that qualifies as an equipment grounding conductor in accordance with 250.118, all branch circuits shall include a separate equipment grounding conductor, and all receptacles shall be electrically connected to the equipment grounding conductor(s).~~ Receptacles on construction sites shall not be installed on branch circuits that supply temporary lighting. Receptacles shall not be connected to the same ungrounded conductor of multiwire circuits that supply temporary lighting.
Substantiation: The proposed deleted text is simply repetitive text. These provisions are already found in Article 250, and nothing in Article 590 supplements or modifies the requirements (90.3).
Panel Meeting Action: Reject

Panel Statement: The existing text makes it clear to the user of the NEC that the continuous metal raceway or metal cable assembly requirement qualifies as an equipment grounding conductor.

It emphasizes the importance of the grounding path since an installer of a temporary branch circuit to a receptacle may try to install a splice in the conductors without proper connection to the grounding system (mid-span tap from an MC cable without the proper connection to both the metal cable sheathing and the equipment grounding conductor as the complete path for possible fault current).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-121 Log #3345 NEC-P03 **Final Action: Reject**
(590.4(D))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete last two sentences and substitute:

Branch circuits (including multiwire circuits) that supply temporary lighting shall not supply receptacles or any other type of equipment. Ground-fault circuit interrupter protection shall not be installed for branch circuits or feeders supplying temporary lighting.

Substantiation: These provisions are apparently intended to minimize outages of lighting circuits and should apply to other than construction sites (demolition, emergencies, tests, experiments, etc.) Equipment other than receptacles, such as motors, electric welders, etc., may cause outages. A 2-pole common trip circuit breaker in compliance with the last sentence will not prevent outage of the lighting circuit if one ungrounded conductor supplying receptacles is overloaded and trips the circuit breaker. GFCI protection can also cause outages.

Panel Meeting Action: Reject

Panel Statement: This section only covers receptacles and the branch circuits supplying the receptacles in accordance with the title of the subsection, therefore; coverage of temporary lighting with other electrical equipment on the branch circuit is not appropriate here.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-122 Log #3702 NEC-P03 **Final Action: Reject**
(590.4(D))

TCC Action: The Technical Correlating Committee directs this proposal be reconsidered and correlated with the action taken on Proposal 18-54.

This action will be considered by the panel as a public comment.

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise 590.4(D) as follows:

(D) Receptacles.

<u>(1) All Receptacles.</u> All receptacles shall be of the grounding type. Unless installed in a continuous metal raceway that qualifies as an equipment grounding conductor in accordance with 250.118 or a continuous metal-covered cable that qualifies as an equipment grounding conductor in accordance with 250.118, all branch circuits shall include a separate equipment grounding conductor, and all receptacles shall be electrically connected to the equipment grounding conductor(s). Receptacles on construction sites shall not be installed on branch circuits that supply temporary lighting. Receptacles shall not be connected to the same ungrounded conductor of multi-wire circuits that supply temporary lighting.

<u>(2) Receptacles in Wet Locations.</u> <u>15- and 20-ampere, 125- and 250-volt receptacles installed in a wet location shall comply with Section 406.8(B)(1).</u>

Substantiation: This proposal, and the companion proposal in Section 406.8(B)(1) recognize that more durable products already exist that will help ensure that the degree of protection for receptacles envisioned by the requirement in 406.8(B) will be retained in these harsher use environments. Requirements for listed “extra-duty” outlet box hoods are under development in UL 514D.

The durability of presently listed outlet box hoods provided for compliance with the requirements in Section 406.8(B)(1) has been called into question by an increasing number of inspection authorities. NEMA manufacturers of these outlet box hoods have proposed more rigorous performance requirements in UL 514D to improve the general durability of all listed hoods. However, the inspection authorities that have been consulted during NEMA’s investigation have indicated that outlet box hoods in particular installations are more susceptible to damage. Among these are temporary installations in wet locations such as construction jobsites, with enclosures with enclosed receptacles supported from grade as described in Section 314.23 (B) and enclosures with enclosed receptacles supported as described in Section 314.23 (F).

This proposal reinforces that the present requirement in Section 406.8(B)(1) applies to temporary installations and complements the companion proposal in that Section by accentuating that certain applications require outlet box hoods of the “extra-duty” type.

Panel Meeting Action: Reject

Panel Statement: The panel rejects the proposed change in 590.4(D).

The panel notes that the proposal to add extra duty outlet box hoods in a wet location in a proposed revision to 406.8(B)(1) must first be accepted by Code-Making Panel 18.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

EASTER, L.: Based on the action taken by CMP 18 on proposal 18-54, a NEMA vote to against the panel action is appropriate. CMP18 Accepted in Principle, the companion proposal (18-54) that adds requirements for listed “extra duty outlet box hoods”. The substantiation provided for the proposal in 590.4(D) is consistent with the proposal and action taken in 406.8(B)(1). Field reports indicate that presently listed While in Use (WIU) covers are not sufficiently robust for jobsite applications.

3-123 Log #4569 NEC-P03 **Final Action: Accept in Principle**
(590.4(D))

Submitter: Phil Simmons, Simmons Electrical Services

Recommendation: Revise the existing text of the 2008 NEC as follows:

(D) Receptacles. All receptacles shall be of the grounding type. Unless installed in a continuous metal raceway that qualifies as an equipment grounding conductor in accordance with 250.118 or a continuous metal-covered cable that qualifies as an equipment grounding conductor in accordance with 250.118, all branch circuits shall include a separate equipment grounding conductor, and all receptacles shall be electrically connected to the equipment grounding conductor(s). Receptacles on construction sites shall not be ~~installed on~~ <u>connected to the same individual, general purpose, or multiwire</u> branch circuits that supply temporary lighting. ~~Receptacles shall not be connected to the same ungrounded conductor of multiwire circuits that supply temporary lighting.~~

Substantiation: Lighting on construction sites should not be connected to the same branch circuit(s) that supply receptacles to help ensure that areas are not put into darkness due to the operation of portable power tool. This is important for all types of branch circuits, not just to the same conductor of multiwire branch circuits. Since 210.4(B) requires simultaneous disconnection of multiwire branch circuits, it is important that the lighting equipment not be on any of the multiwire branch circuit conductors.

Panel Meeting Action: Accept in Principle

The panel accepts the deletion of the last sentence.

In the recommended text, delete the last sentence, add “any” to the second to last sentence, make “circuits” a singular “circuit”, and change “supply” to “supplies” to read as follows:

“Receptacles on construction sites shall not be installed on any branch circuit that supplies temporary lighting.”

Panel Statement: Adding the word “any” to the sentence and making “circuits” singular will ensure that all branch circuits will be covered, such as individual, other than individual, multiwire, or general purpose branch circuits.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

CASPARRO, P.: I support the action taken by the Panel on this proposal.

3-124 Log #549 NEC-P03 **Final Action: Reject**
(590.4(E))

Submitter: Margarito Aragon, Jr., Aragon’s Electrical Consulting

Recommendation: Delete the second sentence.

590.4(E) Disconnecting Means. Suitable disconnecting switches or plug connectors shall be installed to permit the disconnection of all ungrounded conductors of each temporary circuit. ~~Multiwire branch circuits shall be provided with a means to disconnect simultaneously all ungrounded conductors at the power outlet or panelboard where the branch circuit originated.~~ Identified handle ties shall be permitted.

Substantiation: To conform to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors on multiwire branch circuit and applies per 90.3

Panel Meeting Action: Reject

Panel Statement: Repeating this very important requirement in 590.4(E) helps remind the user of the NEC that simultaneous disconnection of multiwire branch circuits for a temporary installation is a safety issue.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-125 Log #1356 NEC-P03 **Final Action: Reject**
(590.4(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
~~Suitable~~ Identified disconnecting switches, circuit breakers, or plug connectors shall be installed to ~~permit the disconnection of~~ simultaneously disconnect all ungrounded conductors of each temporary circuit.
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. Simultaneous disconnection should apply to all circuits not just multiwire, such as 2-wire and 3-phase.
Panel Meeting Action: Reject
Panel Statement: The definition of "identified" uses the term "suitable." The substantiation has not identified a problem with the use or misuse of the term "suitable" in this particular application. The suggested change for "simultaneous disconnection" of a single circuit breaker in an individual branch circuit is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-126 Log #1449 NEC-P03 **Final Action: Reject**
(590.4(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: A switch or circuit breaker, or plug connector that simultaneously disconnects all ungrounded conductors of the circuit it controls shall be installed at the point where the circuit originates. Identified handle ties shall be permitted.
Substantiation: Edit. "Suitable" is a term to be avoided per the Style Manual. Circuit breakers should be included, and the provision should also apply to feeders. Circuits may originate from single fused switches or circuit breakers which are not power outlets (not defined) or panelboards.
Panel Meeting Action: Reject
Panel Statement: A circuit breaker can be considered to be a switch as covered in 404.8(A), therefore, the existing text adequately covers the requirements for disconnecting ungrounded conductors without starting a laundry list of "switches."
See the panel statement for Proposal 3-125 for the term "suitable."
The additional proposed text does not add any further clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-127 Log #3017 NEC-P03 **Final Action: Reject**
(590.4(E))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(E) Disconnecting Means. Suitable disconnecting switches or plug connectors shall be installed to permit the disconnection of all ungrounded conductors of each temporary circuit. ~~Multiwire branch circuits shall be provided with a means to disconnect simultaneously all ungrounded conductors at the power outlet or panelboard where the branch circuit originated. Identified handle ties shall be permitted.~~
Substantiation: The proposed deleted text is no longer needed, now that all multiwire branch circuits require simultaneous disconnect [210.4(B)].
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-124.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-128 Log #4179 NEC-P03 **Final Action: Accept in Principle**
(590.4(E))

Submitter: Timothy D. Curry, Curry Electric, Inc.
Recommendation: Delete text as follows:
Receptacles shall not be connected to the same ~~ungrounded conductor of~~ multiwire branch circuits that supply temporary lighting.
Substantiation: Art. 590.4(E) requires, that IF a multiwire branch circuit is installed onto a breaker, that it must be installed onto a multi-pole (common trip or tie handles) breaker. If a short circuit or over current were to occur in the outlet portion of this circuit, it would cause the breaker to trip, leaving a work area without power to outlets AND lights. Workers attempting to locate the problem, reset the breaker, or to leave the area, are at increased risk of injury due to the lack of lighting. If all multiwire branch circuits were restricted to ONLY lighting or outlets, I believe that a much safer work site will occur, while still allowing multiwire branch circuit(s) to be utilized.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-123, which addresses the submitter's concern.
This proposal is not dealing with text in 590.4(E) but rather text in 590.4(D).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-129 Log #4467 NEC-P03 **Final Action: Reject**
(590.4(E))

Submitter: Timothy D. Curry, Curry Electric, Inc.
Recommendation: Revise text to read as follows:
~~Identified t~~Tie handles shall not be permitted.
Substantiation: All other locations [see 210.4 (B)] in the code that involve multiwire branch circuits now require a common trip breaker. Typically, temporary panels used for job site power are beat up, banged around, and generally abused. It would be very easy for a tie handle to come loose, fall off, or otherwise become non-functional, thus turning this "multiwire" branch circuit into 2 or even 3 single pole circuits, thus increasing the chance of neutral backfeed and the resulting shock hazard.
Panel Meeting Action: Reject
Panel Statement: The substantiation is incorrect. 210.4(B) states each multiwire branch circuit shall be provided with a means to simultaneously disconnect all ungrounded conductors. The simultaneous disconnection could be with a handle tie. 240.15(B) also permits handle ties in three different applications.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-130 Log #4570 NEC-P03 **Final Action: Reject**
(590.4(E))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise the existing text of the 2008 NEC as follows:
(E) Disconnecting Means. Suitable disconnecting switches or plug connectors shall be installed to permit the disconnection of all ungrounded conductors of each temporary circuit. ~~Multiwire branch circuits shall be provided with a means to disconnect simultaneously all ungrounded conductors at the power outlet or panelboard where the branch circuit originated. Identified handle ties shall be permitted.~~
Substantiation: Section 210.4(B) requires that multiwire branch circuits be provided with simultaneous disconnecting means at the point the branch circuit originates. This identical requirement is not required in Article 590 due to the provisions of 90.3.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-124.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-131 Log #1228 NEC-P03 **Final Action: Reject**
(590.4(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~On construction sites a~~ A box or other enclosure shall not be required for splices ~~or junction connections~~ where the circuit conductors are multiconductor flexible cord or flexible cable assemblies or Type NM or NMC cables, provided that the equipment grounding conductor continuity in maintained ~~with or without the box~~ and there is no strain on the splices. See 110.14(B) and 400.9. ~~A box, conduit body, or terminal fitting having a separately bushed hole for each conductor shall be used wherever a change is made to a conduit or tubing system or a metal sheathed cable system.~~
Substantiation: If this provision is suitable for construction sites, it should be suitable for all temporary wiring. Flexible cables of Article 400 should be included. This provision primarily addresses splices for certain wiring methods that are not conduit, tubing, or metal cables. The last sentence is superfluous and already covered by other provisions in the Code. It doesn't cover metallic cables that are not sheathed (Type AC). It requires a box, conduit body or terminal fitting where a change from conduit to tubing is made even though this transition is commonly with a coupling which is not a "terminal fitting". Open splices should be protected against strain. "With or without the box" is irrelevant since a box is not required.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to limit the multiconductor cord or cable assemblies to flexible cord or NM cable. There also was no technical substantiation provided to expand this permitted use from construction sites to other types of temporary installations.
The last sentence should not be deleted and is not superfluous since it reinforces the requirement for transitioning between cords and cable assemblies to raceways or cords to metal sheathed cable assemblies.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-132 Log #1495 NEC-P03 **Final Action: Reject**
(590.4(G))

Submitter: Robert G. Fahey, City of Janesville
Recommendation: Add new text as follows:
(G) Splices on construction sites, a box shall not be required for splices or junction connections where the circuit conductors are multiconductor cord or cable assemblies, provided (1) the splices are not readily accessible, and (2) that the equipment grounding continuity is maintained with or without the box. See 110.14(B) and 400.9. A box, conduit body, or terminal fitting having a separately bushed hole for each conductor shall be used wherever a change is made to a conduit or tubing system or a metal-sheathed cable system.
Substantiation: The problem I have encountered on a construction site, is the electrical contractor has installed service entrance cable (SER) to a job trailer, the contractor has sleeved the SER cable to protect it from physical damage, but has spliced 2 different SER cables together on top of the earth where it is accessible to the public and others who may not be familiar with the risks of an open splice. The other concern I have with this installation, is the individual conductors are accessible and risk the possibility of damage, by inserting the wording "not readily accessible", it will require open splices to be located where they are not readily accessible, in other words they will be located where these open splices cannot be touched or accessed by anyone without the use of a ladder.
Panel Meeting Action: Reject
Panel Statement: Adding the wording that splices shall not be readily accessible does not prevent the possibility of physical damage or that another trade will not have access to the splice.
Temporary splices on a construction site can be adequately installed where the splice is not a danger to anyone on the site.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-133 Log #1337 NEC-P03 **Final Action: Reject**
(590.4(J))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Cable assemblies and flexible cords and cables utilized as branch circuits or feeders shall be securely supported in place at intervals that minimize the likelihood of physical damage ~~ensure that they will be protected from physical damage~~. (remainder unchanged).
Substantiation: This provision should be limited to flexible cords and cables used as branch circuits and feeders; it is not practical for cords used for or attached to portable equipment. Support in itself does not "ensure" protection from physical damage.
Panel Meeting Action: Reject
Panel Statement: Since services and service conductors based on 590.4(A) must comply with the requirements in Article 230, the supporting section in (J) will only apply to feeders and branch circuits based on 590.4(B) and (C).
Appropriately, supporting cable assemblies, as well as flexible cords and cables, can help ensure that undue stress and strain does not occur to cause damage to the cables.
The substantiation does not provide any information on what is considered "securely" supported.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-133a Log #CP300 NEC-P03 **Final Action: Accept**
(590.4(J), Exception)

Submitter: Code-Making Panel 3,
Recommendation: In 590.4(J) Exception, remove the word "proper".
Substantiation: The word "proper" is vague and unenforceable.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-134 Log #1595 NEC-P03 **Final Action: Reject**
(590.4(J) Exception)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Revise text to read as follows:
Exception: (~~For holiday lighting~~) In accordance with 590.3(B), where the conductors or cables are arranged with proper strain relief devices, tension take up devices, or other approved means to avoid damage from the movement of the live vegetation, trees shall be permitted to be used for the support of overhead spans of (feeder or) branch-circuit conductors or cables.
Substantiation: The intent of my original proposal for the 2005 NEC (May 2004 ROP Proposal 3-119, Log 2512, Section 527.4(J) exception) was not to limit this application to "holiday lighting" only, but to allow this use for other installations such as quickly arranging a temporary power source for parking lot lighting where the pavement may need to be excavated in order to make repairs to a damaged underground cable or pipe. Stringing up temporary power through trees is a quick way to restore power temporarily. Finding the faulty underground wiring using faultfinders and cable locators, and then hiring an excavator to dig up a parking lot so permanent repairs can be made and the power restored can be time consuming. This can be of great concern for people's safety and security if the lights were to remain dark for an extended period of time. Using trees to support some overhead wires can be a quick temporary solution that would still be subject to 90 days' usage.
Panel Meeting Action: Reject
Panel Statement: The ninety-day limit has applied only to Christmas lighting and holiday lighting since its insertion into the NEC in the 1980s.
The exception permitting overhead spans to support holiday lighting was inserted in 590.4(J), Exception in the 2005 NEC to permit very limited applications for holiday lighting and was never intended to apply to parking lighting and much heavier load applications. The chafing and possible insulation damage to overhead conductors that can occur while supported by live vegetation has been a major issue.
To again allow trees and other vegetation to support temporary installations, besides holiday lighting, brings up an enforcement issue: How does the AHJ evaluate the load bearing characteristics of a tree limb?
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-135 Log #1336 NEC-P03 **Final Action: Reject**
(590.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and 590.6(B). ~~This section shall only apply to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, repair, or demolition of buildings structures, equipment, nor similar activities.~~
Substantiation: Temporary wiring as covered in 590.3(A) and (B) can describe installations covered by Article 525. Section 525.23(A) has different requirements for GFCI protection.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide any substantiation, technical or otherwise, to delete the sentence for GFCI protection requirements in 590.6 covering "temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities."
The submitter is correct in his statement that Article 525, covering fairs and circuses, has different requirements for GFCI protection than Article 590; however, that is not a reason for deleting the sentence in 590.6.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

3-136 Log #3601 NEC-P03 **Final Action: Reject**
(590.6)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
590.6 Ground-Fault Protection for Personnel.
Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.
Where ground-fault circuit interrupter protection for personnel is supplied by plug-and-cord-connection to the branch circuit or to the feeder, the GFCI protection shall be listed as portable GFCI protection or provide a level of protection equivalent to a portable GFCI, whether assembled in the field or at the factory.
(A) Receptacle Outlets. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel. If a receptacle(s) is installed or exists as part of the permanent wiring of the building or structure and is used for temporary electric power, ground-fault circuit-interrupter protection for personnel shall be provided. ~~For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.~~
[remainder of 590.6 unchanged by this Proposal]
Substantiation: "Portable GFCIs" are required by the trinational *Standard for Ground-Fault Circuit-Interrupters, NMX-J-520-ANCE-2006* 1, *CSA C22.2 No. 144.1-06* 2, *ANSI/UL943-2005* 3, Clause 6.7.2.1, and construction-site portable power-distribution equipment is similarly required by standard *Portable Power-Distribution Equipment, UL1640* 3, Clauses 53.3 - 53.5 and 63.3 - 63.4, additionally to de-energize the "load" output contacts and terminals when one or more of the following defects occurs:

the grounded conductor to the power supply is opened

the grounded conductor is transposed with an ungrounded conductor to the power supply

one of the ungrounded conductors to the power supply on a polyphase system or on a single-phase, 3-wire system is opened

When Underwriters Laboratories (in UL product category KCXS) and CSA International (in CSA product class 1451-81) list such GFCI products, both certifiers specifically identify these as "portable GFCIs" to differentiate them from other GFCIs. Listed portable GFCIs can be embodied not only as GFCI plugs and in-line GFCI cord sets but even some GFCIs for permanent wiring such as SOME faceless GFCI receptacles can be additionally Listed and identified as portable GFCIs.

[1] Asociación de Normalización y Certificación (Association of Standardization and Certification),

[2] Canadian Standards Association

[3] Underwriters Laboratories Inc.

When conventional GFCIs intended for permanent, inspected hard-wiring are used in what should be portable GFCI applications, where the any of the indicated defect conditions occur, the ground-fault-detection circuitry is NOT powered and the GFCI protection cannot operate but power is nonetheless delivered UNinterrrupted EVEN IN THE PRESENCE OF A GROUND-FAULT. Any GFCI protection the user assumes is present is in fact UNAVAILABLE.

Amongst those NOT directly involved in GFCI manufacture who are nonetheless involved with this *Code*, there is a significant misperception that GFCI protection of personnel will provide a panacea against ALL causes of lethal electric shock. Due to their misunderstanding of the differences between GFCIs for permanent installation and portable GFCIs, a significant number of cord reel manufacturers unwittingly extrapolated their Listings for portable (cord-and-plug-connected) cord reels [having ordinary receptacles as outlet components] and their Listings for HARD-WIRED cord reels acceptably having GFCI receptacles as outlet components, without the overt knowledge of at least two major certifiers, to incorrectly encompass portable (cord-and-plug-connected) cord reels having GFCI receptacles (no open neutral protection) as outlet components where portable GFCI protection (with open neutral protection) was warranted.

It is also common to find cord-and-plug-connected field assemblies employing GFCI receptacles (no open neutral protection) as outlet components rather than portable GFCI protection (with open neutral protection) of the outlets. Some times, these are field repairs misperceived as safety upgrades where conventional receptacles in plug-and-cord-connected equipment are replaced with conventional GFCI receptacles. Furthermore, field repairs of plug-and-cord-connected equipment are occasionally encountered where portable GFCIs (faceless-receptacle-type) have been field-replaced with more-readily available, conventional GFCI receptacles under the mistaken belief that they are equivalent. In either situation, where the indicated defects occur, the user has a false sense of security because power is still delivered.

Companion proposals have been made to 100 "Ground-Fault Circuit Interrupter (GFCI), *Portable (as applied to ground-fault circuit interrupters)*" [NEW], to 210.8, to 215.9, and to 518.3(B)*.

* NOTE: That 518.3(B) proposal regarding portable GFCI protection is separate from another proposal I submitted for 518.3(B) involving GFCI protection required elsewhere in the *Code*.

Panel Meeting Action: Reject

Panel Statement: The last sentence in 590.6(A) provides the requirement for cord sets and/or devices incorporating listed ground-fault circuit-interrupter protection for personnel to be identified for portable use, thereby covering the open neutral requirement for portable GFCI devices. Cord and plug connected GFCIs can be supplied by a branch circuit (the final overcurrent protective device to the outlet), but the proposed text has also inserted feeders.

No technical substantiation has been provided for including the use of feeders and the requirement for open neutral GFCI protection.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-137 Log #3661 NEC-P03 **Final Action: Reject**
(590.6)

Submitter: Melvin K. Sanders, TECo., Inc.

Recommendation: Revise text as follows:

590.6 Ground-Fault Protection for Personnel. Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) ~~and~~ or 590.6(B).

Substantiation: The literal wording of the present text requires both (A) and (B) to be employed. By changing the term "and" to "or", the original intent of this statement would be clarified.

The result will be to continue to allow instances where receptacle outlets not meeting the conditions of 590.6(A) to utilize both parts of 590.6(B).

Panel Meeting Action: Reject

Panel Statement: The intent of 590.6(A) is to require all 125-volt 15-, 20-, and 30-ampere single phase receptacles, not part of permanent wiring, to be GFCI protected where used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities.

The intent of 590.6(B) is to require all other receptacles other than those in 590.6(A) to be GFCI protected or use the "assured equipment grounding conductor program".

By replacing "and" with "or", the user of this section could pick either (A) or (B), but would not be required to do both.

This could leave 15-, 20-, and 30-ampere 125-volt receptacles without GFCI protection or all others without GFCI protection.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-138 Log #3871 NEC-P03 **Final Action: Reject**
(590.6)

Submitter: Mike Weitzel, Bechtel

Recommendation: Revise text to read as follows:

590.6 Ground-Fault Protection for Personnel. Ground-fault circuit interrupter protection for personnel... utility generated power source.

Substantiation: It seems appropriate to clarify that the fault protection supplied this section is the circuit-interrupter type with the objective of protecting personnel, and not to protect equipment, in this case. Clarification from the Code panel will be appreciated.

Panel Meeting Action: Reject

Panel Statement: If only GFCI protection were being applied in this section, then it would be appropriate to make the change suggested by the submitter; however, the assured equipment grounding conductor program is a form of ground-fault protection for personnel by ensuring that all cord sets and equipment connected by cord and plug have a verified grounding path by testing before first use on the site, when there is evidence of damage, before equipment is returned to service following any repairs and at intervals not exceeding 3 months.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-139 Log #4416 NEC-P03 **Final Action: Accept in Principle**
(590.6)

Submitter: Mark C. Ode, Underwriters Laboratories Inc.

Recommendation: 590.6 Ground-Fault Protection for Personnel. Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). ~~This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities.~~ This section shall apply to power derived from an electric utility company or from an on-site-generated power source. For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.

(A) Receptacle Outlets. Temporary receptacle installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities shall comply with the requirements in 590.6(A)(1) through 590.6(A)(4), as applicable.

(1) Receptacle Outlets Not Part of Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.

(2) Receptacle Outlets Existing or Installed as Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets ~~If a receptacle(s) is~~ installed or existing as part of the permanent wiring of the building or structure and ~~is~~ used for temporary electric power, shall be provided with ground-fault circuit-interrupter protection for personnel.

(3) Receptacles on 15 kW or less Portable Generators. All 120 and 120/240 volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit interrupter protection for personnel.

(4) Receptacle Outlets in Industrial Establishments. ~~Exception:~~ In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power were interrupted or having a design that is not compatible with GFCI protection.

(B) Use of Other Outlets. For temporary wiring installations, ~~R~~ receptacles, other than those covered by 590.6(A)(1) through 590.6(A)(4)~~, 125-volt, single-phase, 15-, 20-, and 30-ampere receptacles~~ used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, shall have protection in accordance with (B)(1) or the assured equipment grounding conductor program in accordance with (B)(2).

(Remainder of subsection to remain as is.)

Substantiation: A similar change has been proposed in new 445.20 requiring all 125-volt, single phase, 15-, 20-, and 30-ampere on 15 kW or smaller generators to be GFCI protected but not requiring GFCI protection for 20-ampere, 30-ampere, and larger 120/240 single phase, 3-wire with ground receptacles as well as 3-phase receptacles so a small generator could be connected to a transfer switch for a house or a small commercial building where the potential for shock is much less than on a construction site. Providing the proper transfer switch or transfer method with the proper compliance with the requirements in Article 250 for separately derived systems or non-separately derived systems is incumbent upon the installer of the system.

The rewrite of 590.6(A) incorporates the existing text into five subsections. The new text in (A) provides an introduction for (A)(1) through (A)(5). Subsection (A)(1) provides all 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel to have ground-fault circuit-interrupter protection for personnel.

Subsection (A)(2) requires all 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets installed or existing as part of the permanent wiring of the building or structure and used for temporary electric power, ground-fault circuit-interrupter protection for personnel to be provided.

Subsection (A)(3) requires all 120 and 120/240 volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator to have listed ground-fault circuit interrupter protection for personnel.

New subsection (A)(4) covers the previous exception for receptacle outlets in industrial establishments with qualified personnel permitting the use of the assured equipment grounding program for those receptacles where loss of power from a tripped GFCI would create a greater hazard.

This proposal was developed by a Task Group composed of Task Group Chairman Paul Casparro and Chair of Panel 3 (NJATC); Jim Wiseman at Square D Schneider-Electric and Panel 15 (NEMA); John R. Kovacik with Underwriters Laboratories, Panels 10, 13 and the NEC TCC (UL); Richard Owen with City of St Paul, Minnesota, Panel 3, and the NEC TCC (IAEI); and Mark C. Ode with Underwriters Laboratories, Panels 3, 13, and the NEC TCC (UL).

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 3-140.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

CASPARRO, P.: Continue to Accept in Principle. See 3-140.

3-140 Log #4419 NEC-P03 **Final Action: Accept in Principle**
(590.6)

Submitter: Mark C. Ode, Underwriters Laboratories Inc.

Recommendation: Revise text to read as follows:

Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). ~~This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities.~~ This section shall apply to power derived from an electric utility company or from an on-site-generated power source. ~~For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.~~

(A) Receptacle Outlets. Temporary receptacle installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities shall comply with the requirements in 590.6(A)(1) through 590.6(A)(3), as applicable. Portable GFCI cord sets or devices shall be permitted to be used in accordance with 590.6(A)(4).

(1) Receptacle Outlets Not Part of Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.

(2) Receptacle Outlets Existing or Installed as Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets ~~If a receptacle(s) is~~ installed or existing as part of the permanent wiring of the building or structure and ~~is~~ used for temporary electric power, ground-fault circuit-interrupter protection for personnel shall be provided.

(3) Receptacle Outlets in Industrial Establishments. ~~Exception:~~ In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power were interrupted or having a design that is not compatible with GFCI protection.

(4) Portable GFCI Cord Sets or Devices. ~~For the purposes of this section,~~ Cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted but shall not be used as a substitute for any of the requirements in 590.6(A)(1) through 590.6(A)(3).

(B) Use of Other Outlets. For temporary wiring installations, ~~R~~ receptacles, other than those covered by 590.6(A)(1) through 590.6(A)(4)~~, 125-volt, single-phase, 15-, 20-, and 30-ampere receptacles~~ used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, shall have protection in accordance with (B)(1) or the assured equipment grounding conductor program in accordance with (B)(2).

(Remainder of Section is unchanged.)

Substantiation: The section was rewritten to provide ease of use and user-friendliness, as has been the goal for many of the changes in the past three or four Code cycles. In addition, the intent of the change in the use of portable GFCI cord sets or devices is to continue to permit personal portable GFCI devices during construction, remodeling, maintenance, repair, or demolition of buildings but require GFCI protection at the source of the circuit, rather than at the end of the circuit. A cable is often installed from the source of supply for the temporary circuit to a spider box or other splitting device or cord where the supply cord can and often is damaged. Since GFCI protection is located at the spider box or splitting device or cord, there isn't GFCI protection for the temporary cable where damage may have occurred. This suggested change will still permit spider box GFCI protection or personal GFCI protection but will additionally require the supply to be GFCI protected, however, the personal device cannot be used as a substitute for protecting temporary wiring, thus protecting the worker on the construction site to damaged supply cables.

This proposal was developed by a Task Group composed of Task Group Chairman Paul Casparro and Chair of Panel 3 (NJATC); Jim Wiseman at Square D Schneider-Electric and Panel 15 (NEMA); John R. Kovacik with Underwriters Laboratories, Panels 10, 13 and the NEC TCC (UL); Richard Owen with City of St Paul, Minnesota, Panel 3, and the NEC TCC (IAEI); and Mark C. Ode with Underwriters Laboratories, Panels 3, 13, and the NEC TCC (UL).

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

"590.6 Ground-Fault Protection for Personnel.

Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

(A) Receptacle Outlets. Temporary receptacle installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities shall comply with the requirements in 590.6(A)(1) through 590.6(A)(3), as applicable.

Exception: In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power were interrupted or having a design that is not compatible with GFCI protection.

(1) Receptacle Outlets Not Part of Permanent Wiring. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel.

(2) Receptacle Outlets Existing or Installed as Permanent Wiring. Ground-fault circuit-interrupter protection for personnel shall be provided for all 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets ~~If a receptacle(s) is~~ installed or existing as part of the permanent wiring of the building or structure and ~~is~~ used for temporary electric power. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.

(3) Receptacles on 15 kW or less Portable Generators. All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15 kW or smaller portable generator shall have listed ground-fault circuit interrupter protection for personnel. Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15kW or less portable generators manufactured or remanufactured prior to January 1, 2011.

(B) Use of Other Outlets. For temporary wiring installations, ~~R~~ receptacles, other than those covered by 590.6(A)(1) through 590.6(A)(3)~~, 125-volt, single-phase, 15-, 20-, and 30-ampere receptacles~~ used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, shall have protection in accordance with (B)(1) or the assured equipment grounding conductor program in accordance with (B)(2).

The remainder of subsection to remain as is.

Panel Statement: The revised wording retains the exception for industrial locations as found in the 2008 NEC.

In addition, the provisions for permanent and non-permanent applications for GFCI protection were clarified with the provision for use of portable GFCI protection in permanent wiring locations.

The revisions to the wording also clarified the requirements for GFCI protection on 15 kW or less portable generators, with information added, that will ensure that this requirement does not apply to manufactured or remanufactured generators prior to January 1, 2011.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

CASPARRO, P.: Continue to Accept in Principle. Ground-fault protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

3-141 Log #2280 NEC-P03 **Final Action: Reject**
(590.6(A))

Submitter: David H. Kendall, Thomas & Betts Corp.

Recommendation: Add the following text to the end of 590.6(A), before the exception:

(A) Receptacle Outlets. All 125-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel. If a receptacle(s) is installed or exists as part of the permanent wiring of the building or structure and is used for temporary electric power, ground-fault circuit-interrupter protection for personnel shall be provided. For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted. 15- and 20-ampere, 125- and 250-volt receptacles, that are part of a separately derived system, such as a portable generator, installed in a damp or wet location shall comply with Section 406.8.

Substantiation: Receptacles that are part of separately derived systems, such as portable generators, commonly used in temporary installations, present the same risks as fixed installations in damp, wet and dry locations. GFCI protection is required for such receptacles, and the GFCI receptacles should also be given the same degree of protection as is called for in 406.8. These generators typically come with cautions for use only in areas protected from weather. However, since they are usually gas powered the user is directed to only use the equipment outdoors with sufficient ventilation.

Panel Meeting Action: Reject

Panel Statement: Requiring a portable generator to comply with 406.8, where used in a damp or wet location during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities, would be almost impossible to enforce.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

EASTER, L.: This proposal should have been accepted by Panel 3. The entire Article 590 requires inspection. The panel statement that this requirement would be "unenforceable" seems to imply that the protection needs to be added to the generator by the installer. In fact, with the force of the Code, generator manufacturers would be compelled to provide the required protection, and thus the degree of safety required by 406.8. GFCI receptacles in portable generators on job sites should have WIU protection.

3-142 Log #2448 NEC-P03 **Final Action: Reject**
(590.6(A))

Submitter: Michael Baxter, Energy Safe Technologies Inc.

Recommendation: Revise text to read as follows:

590.6 ~~Ground Fault~~ Power Safe Protection for Personnel.

~~Ground-fault protection~~ Power Safe Protection for personnel for all temporary wiring installations shall be provided to comply with 590.6(A) and (B). This section shall apply only to temporary wiring installations used to supply temporary power to equipment used by personnel during construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities. This section shall apply to power derived from an electric utility company or from an on-site-generated power source.

(A) Receptacle Outlets.

(1) 15 and 20 Ampere Receptacles. All 125-volt, single-phase, 15- and 20-, ~~and 30-~~ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel. If a receptacle(s) is installed or exists as part of the permanent wiring of the building or structure and is used for temporary electric power, ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel shall be provided. For the purposes of this section, cord sets or devices incorporating listed ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel identified for portable use shall be permitted.

(2) 30 Ampere Receptacles. All 125-volt, single-phase, ~~15-, 20-, and~~ 30-ampere receptacle outlets that are not a part of the permanent wiring of the building or structure and that are in use by personnel shall have ground-fault circuit-interrupter protection for personnel. If a receptacle(s) is installed or exists as part of the permanent wiring of the building or structure and is used for temporary electric power, ground-fault circuit-interrupter protection for personnel shall be provided. For the purposes of this section, cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.

Exception: In industrial establishments only, where conditions of maintenance and supervision ensure that only qualified personnel are involved, an assured equipment grounding conductor program as specified in 590.6(B)(2) shall be permitted for only those receptacle outlets used to supply equipment that would create a greater hazard if power were interrupted or having a design that is not compatible with ~~GFCI~~ power safe protector protection.

Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.

2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel does not agree with the submitter's substantiation and supporting material for the following reasons:

1. On page 13 of the supporting material, the submitter states: "tests conducted by Energy Safe, Inc. showed that this current (GFCI protected circuit) can be several amperes, which is enough to be fatal under certain circumstances."

Based on testing for GFCIs, the UL 943 standard, and the FPN in the Article 100 definition in the NEC for GFCI, Class A ground-fault circuit interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA. For further information, see UL 943, Standard for Ground-Fault Circuit Interrupters. Since GFCIs have a proven track record of saving lives by tripping off during a ground fault involving a person, one would have to take exception to the allegation that a GFCI protected circuit could still provide a fatal shock.

2. There was no technical substantiation provided that the Power Safe device provided the same level of shock protection for personnel and that the Power Safe device provided the same circuit protection as a combination AFCI device.

3. The problem needs more study into the fire hazards and risks associated with receptacle devices, and the possible technologies to address these hazards.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

3-143 Log #626 NEC-P03 **Final Action: Reject**
(590.8 (New))

Submitter: Travis Edward Whitesides, Prevention Products Inc.

Recommendation: Add new text to read as follows:

During the period of construction, socket guard covers must be installed in order to prevent electrical shock. Also, operational Switch Guard Covers need to be installed as well. This will enable a safe working environment for the job.

Substantiation: The purpose of proposal is not only to prevent electrical shock on receptacles and light switches during construction, but also to prevent paint, and sheetrock mud from filling the boxes and making wires unnoticeable for electricians.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: These covers are already permitted by the NEC, but not required. The design of the covers appears, based on the pictures provided with the proposal to fit into the receptacle and to screw on the switch.

The submitter did not provide any technical substantiation or reasoning why regular switch or receptacle covers could not be installed, since the switches and receptacles were already installed and energized on the jobsite.

The other trades, such as painters and drywall installers, must provide a reasonable amount of protection for the installed receptacles and switches while doing their work.

This does not appear to be a safety issue.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

ARTICLE 600 — ELECTRIC SIGNS AND OUTLINE LIGHTING

18-197 Log #4020 NEC-P18 **Final Action: Accept in Part**
(600.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
This article covers the installation of conductors, ~~and~~ equipment, and field wiring for electric signs and outline lighting, decorative elements, skeleton tubing, or art forms, regardless of voltage. All installations and equipment ~~using~~ for electric signs and outline lighting, including but not limited to the following light sources, are covered by this article: cold cathode luminous neon tubing, high intensity discharge lamps, fluorescent or incandescent lamps, light emitting diodes (LEDs), electroluminescent and inductance lighting. ~~such as signs, decorative elements, skeleton tubing or art forms, are covered by this article.~~
Substantiation: Scope statement does not provide a complete description of light sources and voltages used for electric signs. The application of light sources other than neon and illumination techniques with a wide range of secondary circuit voltages is included within the scope of electric signs in UL's *Guide for Electrical Equipment*. Additionally, the changes recommended harmonize Article 600.1 with scope statements for electric signs in UL48 and the Canadian Electrician Code, Part 1. Amending the Scope Statement facilitates the introduction of rules for secondary sign circuit field wiring for other than high voltage neon tubing.
The following references were used as a basis for the substantiation:
2007 Guide Information for Electrical Equipment® Underwriters Laboratories Inc.
This category covers electric signs employing incandescent lamps, LEDs (light emitting diodes), electro-luminescent panels, neon tubing, fluorescent lamps, high intensity discharge lamps or combinations thereof for installation in accordance with Article 600 of NFPA 70, "National Electrical Code."
UL 48 Standard for Electric Signs (14th Edition)
1 Scope 1.1 These requirements cover electric signs, referred to as signs, using incandescent lamps, fluorescent lamps, HID lamps, neon tubing and other combinations, for use in accordance with the National Electrical Code, NFPA 70.
UL 48 Standard for Electric Signs (15th Edition in STP process)
1 Scope 1.1, 1.2 These requirements cover all signs, art forms and outline lighting for use in accordance with the National Electrical Code, NFPA 70. Electric signs include all signs that are electrically operated and/or electrically illuminated, including but not limited to the following methods of illumination: incandescent, fluorescent, high intensity discharge (HID), electric discharge tubing including neon, light emitting diode (LED), skeletal neon tubing, cold-cathode lighting systems, and electroluminescenct lighting. [UL 48, 1 Scope 1.1, 1.2 (15th Edition in STP process)]
34-000 Scope 2006 Canadian Electrical Code, Part 1
(1) This Section applies to signs and outline lighting with which the sources of light are
(a) incandescent lamps;
(b) fluorescent lamps;
(c) high-voltage luminous discharge tubes, commonly known as cold-cathode or neon tubes;
(d) high intensity discharge lamps; and
(e) other light-emitting sources, such as the LED
Panel Meeting Action: Accept in Part
600.1 to read as follows:
600.1 Scope. This article covers the installation of conductors, ~~and~~ equipment and field wiring for electric signs and outline lighting regardless of voltage. All installations and equipment using neon tubing, such as signs, decorative elements, skeleton tubing, or art forms are covered by this article.
FPN: Sign and outline lighting illumination systems include, but are not limited to cold cathode neon tubing, high intensity discharge lamps (HID), fluorescent or incandescent lamps, light emitting diodes (LEDs), and electroluminescent and inductance lighting.
Panel Statement: CMP-18 refers the proposed changed scope to the TCC for their consideration and direction.
CMP-18 accepts those portions of the proposal pertaining to "wiring" and "regardless of voltage."
CMP-18 does not accept the other mandatory sections and they are instead included as a FPN.
There is a concern in the industry that the scope did not cover all the wiring and illumination systems employed in the industry. The FPN was added to the scope for clarity. The fine print note was added to "neon tubing" to explain that when cold cathode electric discharge tubing is used in signs and outline lighting it is called "neon tubing" and listed under UL 48. When used for general illumination, electric discharge tubing is referred to as "cold cathode" and listed under UL IFAY.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-198 Log #3545 NEC-P18 **Final Action: Accept in Principle**
(600.2.LED Lighting)

Submitter: Randall K. Wright, RKW Consulting
Recommendation: Add new text to read as follows:
LED Lighting. A complete listed lighting system for use in signs and outline lighting classified to be used together consisting of light sources (LEDs), power supplies with a class II secondary output in accordance with UL 1310, and the wire and connectors to complete the installation.
Substantiation: The new definition should clarify that this is a system needed to be classified to be used together and rule out mixing and matching a bag of parts.
Panel Meeting Action: Accept in Principle
Add new definition for LED Sign Illumination System to 600.2 in alphabetical order to read as follows:
LED Sign Illumination System. A complete lighting system for use in signs and outline lighting consisting of light emitting diode (LED) light sources, power supplies, wire, and connectors to complete the installation.
Panel Statement: This definition is needed to clarify that certain compatible components are needed to be used together to provide a system for sign illumination.
CMP-18 edited the definition for clarity. 4.2 of the NEC Style Manual prohibits references to other standards.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-199 Log #4023 NEC-P18 **Final Action: Reject**
(600.2.Light Emitting Diode. (LED))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Add new title as follows:
Light Emitting Diode. (LED) A semiconductor that emits light when an electric current is applied in the forward direction of the device, as in the simple LED circuit.
Substantiation: Wide application of LEDs in signs, outline lighting and section signs requires a definition for designating applicable low voltage installation rules.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-198.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-200 Log #4021 NEC-P18 **Final Action: Accept in Principle**
(600.2.Neon Tubing)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
Neon Tubing. Electric-discharge cold cathode luminous tubing filled with various inert gases that is manufactured into shapes ~~that~~ to illuminate signs and outline lighting, form letters, parts of letters, skeleton tubing, ~~outline lighting,~~ other decorative elements, or art forms ~~and filled with various inert gases~~.
Substantiation: The production of neon tubing utilizes technology that is distinguished from other luminous tubes by the use of cold cathode electrodes in combination with high voltage. Defining neon by labeling it as a "cold cathode luminous tube" accurately describes neon tubing and is necessary to clear up a gray area in the Code. Luminous tubing with the trade moniker "cold cathode" is used in a variety of configurations, including cold cathode fluorescent lamps (CCFLs) for sign illumination. This raises an issue as to what Chapter in the Code is applicable — 410 or 600.
Where cold cathode luminous tubes, (neon tubes) are installed for general illumination, Article 410 of the NEC applies. Luminous tube lighting is required to be listed in 410.140(A). Cold cathode luminous tubing, (neon tubing) installed as outline lighting or for sign illumination are covered by Article 600. With the exception of skeleton neon tubing installations, signs with cold cathode neon light sources are also required to be listed. 600.3.
The application/use of luminous cold cathode neon tubes determines the NEC installation rules that apply and the appropriate UL Standard for listing.
Inserting "to illuminate signs" in the neon tubing definition depicts cold cathode as having uses besides being manufactured into letter font shapes, decorative elements or art forms. This reflects the current practice in the sign industry where cold cathode luminous tubing is used within signs as a light source. It also clears up the gray area now in the Code by stipulating that luminous tubing with the trade name "cold cathode," when used to illuminate electric signs and outline lighting, is governed by 600 rules and not 410.
Referencing the following sources illustrates the inseparable relationship of cold cathode terminology with neon tubing.
"This category covers indoor and outdoor use cold cathode transformers and power supplies for use as part of a cold cathode electric discharge lighting system, sign, field-assembled skeletal neon sign and outline lighting system, or field-installed neon outline lighting system." [Cold Cathode Transformers and power Supplies (DUEC), UL *General Information for Electrical Equipment*]

1.3.46 NEON TUBING – An industry term for electric-discharge lamps or tubing used in signs and outline lighting, including cold-cathode lamps, regulated by Article 600 of the National Electric Code, NFPA 70. [UL 879 Electric Sign Component Standard]

The encyclopedia Wikipedia Web Site describes cold cathode luminous tubes in several ways: "A neon tube is a luminous tube with cold cathode electrodes." "A common cold cathode application is in neon signage." "Neon lamps are a very common example of a cold cathode lamp."

UL 879 / 1.3.46 NEON TUBING – An industry term for electric-discharge lamps or tubing used in signs and outline lighting, including cold-cathode lamps, regulated by Article 600 of the National Electric Code, UL879.

The standard for cold Cathode Luminaires is a combination of the Standard for Luminaires, UL 1598 and Standard for Signs, UL 48. UL 48 is used because UL 1598 does not have requirements for voltages above 1000 volts.

Panel Meeting Action: Accept in Principle

Add new definition for Neon Tubing to 600.2 in alphabetical order to read as follows:

Neon Tubing. Electric-discharge luminous tubing that is manufactured into shapes that illuminate signs, form letters, parts of letters, skeleton tubing, outline lighting, other decorative elements, or art forms and filled with various inert gases.

FPN. Where used in illumination systems for signs, outline lighting or skeleton tubing, decorative elements or art forms, cold cathode luminous tubes are neon tubing as defined by this article.

Panel Statement: CMP-18 edited the text and added the FPN for clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-201 Log #4022 NEC-P18 **Final Action: Accept**
(600.2.Skeleton Tubing)

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Revise text to read as follows:

Skeleton Tubing. Neon tubing that is itself the sign or outline lighting and is not attached to an enclosure or sign body.

Substantiation: Insertion of new word is an editorial revision for grammatical clarity.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-202 Log #4024 NEC-P18 **Final Action: Accept**
(600.3)

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Revise text to read as follows:

600.3 Listing. Electric signs, section signs, and outline lighting — fixed, mobile, or portable — regardless of voltage shall be listed and installed in conformance with that listing, unless otherwise approved by special permission.

Substantiation: The text revision eliminates a gray area in the *Code*. Power limited circuits or the equipment such circuits energize, are not required in 725 to be listed systems. Article 600 identifies and applies numerous requirements in 725 for low voltage sign and outline lighting illumination systems, leading some to the conclusion that signs and outline lighting with low voltage illumination systems are exempt from listing. Adding "regardless of voltage" to the listing requirement clarifies that there are no exceptions to sign listing based on operating voltages.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-203 Log #394 NEC-P18 **Final Action: Accept**
(600.4(B))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise text to read as follows:

Change "per" to "for each".

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-204 Log #4025 NEC-P18 **Final Action: Accept in Principle**
(600.4(B))

TCC Action: The Technical Correlating Committee understand that the statement refers to Proposal 18-206a.

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Add new text to read as follows:

(B) Visibility. The markings required in (A) and listing labels shall be visible at time of installation but shall not be required to be visible after installation.

Substantiation: Electric signs and outline lighting are unique, custom manufactured electrical equipment and are widely accepted as art forms. Because signs are tools for branding and marketing in the public environment, graphic and structural design is integrated by design professionals. Signs may also convey subliminal messages through the use of exotic materials and sophisticated illumination schemes. All of this is effort, expense and design management is compromised by the application of rules that require signs to display listing labels that are visible after installation. Listing labels on electrical equipment are not marks intended to be viewed by the general public. Listing is employed as a basis for approval and used exclusively by the AHJ.

An effort was made to correct this situation in the 1999 NEC by removal of the requirement that marks specified in 600.4(A) be visible after installation. This proposal further clarifies that listing marks are included with the general marking requirements and visibility of marks on signs is no different than other electrical equipment after completion of the approval process by the AHJ.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-136a.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

COSTELLO, P.: The panel statement is incorrect it should refer to the panel proposal 18-206a.

WRIGHT, R.: See Panel Action and Statement on Proposal 18-136a.

I feel the panel statement for the three proposals above is either a typo or incorrectly recorded. My notes reflect the panel statement reference is incorrect it should refer to the panel proposal 18-206a

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18-205 Log #1230 NEC-P18 **Final Action: Accept in Principle**
(600.4(B) and (C))

TCC Action: The Technical Correlating Committee understand that the statement refers to Proposal 18-206a.

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add "and durable" after "installed" in (B).

In (C) add "which in wet locations shall be weatherproof".

Substantiation: Edit. Marking should be suitable for the environment. "Suitable" in Code provisions is a term to be avoided per the Style Manual.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-136a.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

COSTELLO, P.: The panel statement is incorrect it should refer to the panel proposal 18-206a.

WRIGHT, R.: See my Comment on Affirmative on Proposal 18-204 (Log #4025).

18-206 Log #4026 NEC-P18 **Final Action: Accept in Principle**
(600.4(C)and (D))

TCC Action: The Technical Correlating Committee understand that the statement refers to Proposal 18-206a.

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Revise text to read as follows:

~~(B)~~ (**C**) **Signs with Lampholders for Incandescent Lamps**. Signs and outline lighting systems with lampholders for incandescent lamps shall be marked to indicate the maximum allowable lamp wattage per lampholder. The markings shall be permanently installed, in letters at least 6 mm (1/4 in.) high, and shall be located where visible during relamping.

~~**(C)**~~ **(D)** Section Signs. Section signs shall be marked to indicate that field-wiring and installation instructions are required.

Substantiation: Relabel (B) with (C) and (C) with (D) to maintain alpha sequence of 600.4 required to accommodate proposed new rule in 600.4.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-136a.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

COSTELLO, P.: The panel statement is incorrect it should refer to the panel proposal 18-206a.

WRIGHT, R.: See my Comment on Affirmative on Proposal 18-204 (Log #4025).

18-206a Log #CP1800 NEC-P18 **Final Action: Accept**
(600.4(C) and (D) (New))

Submitter: Code-Making Panel 18,
Recommendation: Add (C) Visibility and (D) Durability to read as follows:
(C) Visibility. The markings required in (A) and listing labels shall not be required to be visible after installation but must be permanently applied in a location visible during servicing.
(D) Durability. Marking, labels shall be permanent, durable and when in wet locations shall be weatherproof.
Renumber existing (C) to (E) to read as follows:
(E) Section Signs. Section signs shall be marked to indicate that field-wiring and installation instructions are required.
Substantiation: CMP-18 clarified the long standing issue that the labels required in (A) are not required to be visible, only available, after installation. CMP-18 provided a renumbered list of items to include visibility and durability.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-206b Log #CP1801 NEC-P18 **Final Action: Accept**
(600.5(B))

Submitter: Code-Making Panel 18,
Recommendation: Revise 600.5(B) to read as follows:
(B) Rating. Branch circuits that supply signs shall be rated in accordance with 600.5(B)(1) or (B)(2).
(1) Neon Signs. Branch circuits that supply neon tubing installations shall not be rated in excess of 30 amperes.
(2) All Other Signs. Branch circuits that supply all other signs and outline lighting systems shall be rated not to exceed 20 amperes.
Substantiation: CMP-18 added text to 600.5(B) to accommodate the new sign technologies and eliminate conflict with existing 600.5(B)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-207 Log #4752 NEC-P18 **Final Action: Accept in Principle**
(600.5(B))

Submitter: Charles M. Trout, Maron Electric Company
Recommendation: Add revised text to read as follows:
600.5(B) Rating. Branch circuits that supply signs shall be rated in accordance with 600.5(B)((1) or (B)(2) and shall be considered to be continuous loads.
Substantiation: Signs are in almost all cases required to be in operation for periods exceeding three hours. Signs are energized in most establishments in conformance with the hours of operation of the establishment.
Panel Meeting Action: Accept in Principle
600.5(B) to read as follows:
600.5(B) Rating. Branch circuits that supply signs shall be rated in accordance with 600.5(B)((1) or (B)(2) and shall be considered to be continuous loads for the purposes of calculations.
Panel Statement: CMP-18 wants to ensure that the designer and the installer treat a sign as a continuous load.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-208 Log #4027 NEC-P18 **Final Action: Accept in Principle**
(600.5(B)(1))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
~~Incandescent and Fluorescent~~ Signs and Outline Lighting. Branch circuits that supply signs and outline lighting systems ~~containing incandescent and fluorescent forms of illumination~~ shall be rated not to exceed 20 amperes.
Substantiation: As identified in the Scope for 600, light sources and associated equipment other than incandescent and fluorescent are used in electric sign systems. Heading of section needs to be general in description. Forms of lighting supplied by power limited sources are rated for use on 20 ampere circuits as required by *Code* and by Underwriters Laboratories.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-206b.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-209 Log #1294 NEC-P18 **Final Action: Reject**
(600.5(C)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:
...shall be permitted to contain ~~both~~ branch circuits, feeders, and secondary circuit conductors of ballasts, transformers, and electronic power supplies provided the enclosure conductor fill requirements and dimensions comply with applicable provisions of Article 314.
Substantiation: Feeders supplying the signs should also be included. Since branch circuits are generally secondary circuits, “secondary” appears intended to apply to ballasts, transformers, and electronic power supplies. The proposed reference to Article 314 clarifies that applicable provisions are not modified.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-210 Log #1013 NEC-P18 **Final Action: Accept in Principle in Part**
(600.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: DISCONNECTS. Each feeder and branch circuit supplying a sign(s) or outline lighting system(s) shall be supplied by a circuit breaker or fused switch that simultaneously opens all ungrounded conductors of the circuit it controls. Signs and outline lighting systems located within pools or fountains shall have the disconnecting means located in accordance with 680.12. The branch circuit switch or circuit breaker shall be the disconnecting means for exit signs. The disconnecting means for cord-connected signs shall be permitted to be an attachment plug.
(A) LOCATION
(1) WITHIN SIGHT OF THE SIGN. The disconnecting means shall be within sight of the sign(s) or outline lighting system(s) and shall have identified permanent integral means for locking in the open (off) position.
Exception: The branch circuit or feeder disconnecting means shall not be required to be within sight of the sign(s) or outline lighting system(s) or lockable where an approved disconnecting means is in or on the sign(s) or outline lighting system(s). The presence and location of such disconnecting means shall be plainly and durably marked at the sign(s) and outline lighting system(s).
Substantiation: The disconnecting means should simultaneously open all ungrounded conductors of the circuit it controls not “all” ungrounded conductors of more than one circuit. A disconnecting means is required for exit signs in the sense that the supply branch circuit requires one. An attachment plug for cord-connected signs is a disconnecting means even though Exception No. 2 implies it is not. Signs that have a component disconnecting means should not require lockable branch circuit or feeder disconnecting means. The provisions for locking should be identified for the use, permanent, and integral to the disconnecting means and lock the device, not the cover in the open (off) position. Present wording does not preclude makeshift methods.
Panel Meeting Action: Accept in Principle in Part
600.6 to read as follows:
Each sign and outline lighting system, or feeder circuit, or branch circuit supplying a sign or outline lighting system shall be controlled by an externally operable switch or circuit breaker that will open all ungrounded conductors and controls no other load. Signs and outline lighting systems located within fountains shall have the disconnect located in accordance with 680.12.
Retain remainder of text.
Panel Statement: CMP-18 reaffirms the principle that the disconnect controls only the sign and adds the term “controls no other load.”
CMP-18 does not accept other changes proposed by the submitter as they do not add clarity. CMP-18 disagrees with the submitter’s substantiation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-211 Log #1292 NEC-P18 **Final Action: Reject**
(600.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
Each sign and outline lighting system or feeder ~~or~~ and branch circuit supplying a sign or outline lighting system shall be controlled by a manually externally operable switch or circuit breaker. That ~~will~~ simultaneously opens all ungrounded conductors of the circuit it controls. Signs and outline lighting systems located within fountains or reflecting pools shall have the disconnecting means located in accordance with 680.12.
Exception No. 1: A disconnecting means other than the branch circuit disconnecting means shall not be ~~required~~ provided for an exit or other directional sign located in a building or structure.
Exception No. 2: A disconnecting means other than the branch circuit disconnecting means shall not be required for cord-and-plug connected signs ~~with an attachment plug~~.
Substantiation: Disconnecting means should be provided for both branch circuits and feeders, not "or" one or the other and should open ungrounded conductors it controls, not "all" conductors, which includes other circuits. Reflecting pools should be included. In the reference to 680.12, Exception No. 1 should clearly not include a branch circuit disconnect and should include structures which are not deemed "buildings". All directional signs (which may be related to safety) should be included with exit signs. "Will" does not comply with the Style Manual which states "do not write in future tense".
Panel Meeting Action: Reject
Panel Statement: Stating that something "should" be done does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.
See panel action and statement on Proposal 18-210.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-212 Log #4028 NEC-P18 **Final Action: Accept in Principle**
(600.6)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
Each sign and outline lighting system, or feeder circuit or branch circuit supplying a sign ~~or,~~ outline lighting system or skeleton neon tubing, shall be controlled by an externally operable switch or circuit breaker that will open all ungrounded conductors. Signs and outline lighting systems located within fountains shall have the disconnect located in accordance with 680.12.
Substantiation: Unlisted skeleton tubing must comply with the rules in Part 1 as well as Part 2. [600.30] There is no exception to the disconnect rule in Part 1 for skeleton neon installations. Revising the text to include skeleton neon tubing in the requirement for a disconnect dispenses with a gray area in the *Code*, while at the same time advancing electrical safety.
Panel Meeting Action: Accept in Principle
Change the first paragraph of 600.6 to read as follows:
Each sign and outline lighting system, feeder circuit, or branch circuit supplying a sign, outline lighting system, or skeleton tubing shall be controlled by an externally operable switch or circuit breaker that will open all ungrounded conductors. Signs and outline lighting systems located within fountains shall have the disconnect located in accordance with 680.12.
Panel Statement: CMP-18 changed skeleton neon tubing to skeleton tubing for consistency.
CMP-18 clarifies that the change only impacts the first paragraph.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-213 Log #1570 NEC-P18 **Final Action: Accept in Part**
(600.6(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered by Code-Making Panel 18 based upon the action of Code-Making Panel 1 taken on Proposal 1-63.
This action will be considered by the panel as a public comment.
Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(A) Location.
(1) Within Sight of the Sign. The disconnecting means shall be within sight of the sign or outline lighting system that it controls. Where the disconnecting means is out of the line of sight from any section that is able to be energized **the disconnecting means shall be lockable**. ~~the disconnecting means shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~
(2) Within Sight of the Controller. The following shall apply for signs or outline lighting systems operated by electronic or electromechanical controllers located external to the sign or outline lighting system:
(1) The disconnecting means shall be permitted to be located within sight of the controller or in the same enclosure with the controller.
(2) The disconnecting means shall disconnect the sign or outline lighting system and the controller from all ungrounded supply conductors.
(3) The **lockable** disconnecting means shall be designed such that no pole can be operated independently ~~and shall be capable of being locked in the open position. The provisions for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Accept in Part
600.6(A) to read as follows:
(A) Location.
(1) Within Sight of the Sign. The disconnecting means shall be within sight of the sign or outline lighting system that it controls. Where the disconnecting means is out of the line of sight from any section that is able to be energized the disconnecting means shall be lockable. The provision for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.
(2) Within Sight of the Controller. The following shall apply for signs or outline lighting systems operated by electronic or electromechanical controllers located external to the sign or outline lighting system:
(1) The disconnecting means shall be permitted to be located within sight of the controller or in the same enclosure with the controller.
(2) The disconnecting means shall disconnect the sign or outline lighting system and the controller from all ungrounded supply conductors.
(3) The lockable disconnecting means shall be designed such that no pole can be operated independently and shall be capable of being locked in the open position. The provisions for locking or adding a lock to the disconnecting means must remain in place at the switch or circuit breaker whether the lock is installed or not. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.
Panel Statement: CMP-18 accepts the proposed revisions except the deletion of the new text added in 2008 to 600.6(A)(1) and (A)(2)(3).
No substantiation was presented addressing deletion of these sentences.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
CARPENTER, F.: Since the proposal (1-63) which would have added an Article 100 definition for "Disconnecting Means, Lockable" was rejected by CMP-1, this terminology should not be used in this section of the code.

18-214 Log #4648 NEC-P18 **Final Action: Reject**
(600.6(A)(1) Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following exception:
A sign or outline lighting system operated by an electronic or electromechanical controller shall be permitted to omit the disconnect by 600.6(A)(1) where the disconnect described in 600.6(A)(2) controls the sign or outline lighting system and no other load.
Substantiation: The question of what constitutes "operated by electronic or electromagnetic controllers" in 600.6(A)(2) frequently arises in the context of modern energy management systems that turn signs on and off along with other building lighting. The purpose of the disconnect rule is to provide maintenance personnel with a secure means to ensure that the equipment they are working on is disconnected and that it will stay that way until they are ready to reenergize it. By long usage and custom, a maintenance disconnect is unique to its equipment. No one would seriously suggest that because a service disconnect could be locked in the open position, all NEC requirements for disconnects of specific loads were met. Any maintenance worker on any downstream equipment would feel compelled to work the downstream equipment hot rather than inconvenience the enterprise to that extent. Therefore, if the energy management system operates a contactor for a sign among other control devices for other loads, this proposal requires that contactor to be in sight of a disconnect, that disconnect will be capable of being locked open, and a second disconnect would not be required at the sign location. On the other hand, if the contactor operated a lighting panel for which the sign was one load among many, then this proposal requires that a local disconnect for the sign must be installed.

This submitter was involved in the litigation of a fatality caused in part by the lack of clarity in this part of the Code. No local disconnect was provided because the neon lighting was controlled through a panel that controlled many other loads, and the lighting in question was energized through this panel. The worker felt constrained not to shut the panel down, and was killed when working on the live parts. Consider a service disconnect with a lock-open capability for an entire shopping mall sitting within sight of a lighting panel supplying signs and outline lighting fed through a contactor. As noted, the literal text of this section can be read to omit a local disconnect for that equipment. If this sounds outrageous, it is, but look at 600.6(A)(2) (1-3). The lock-open service switch clearly meets conditions (1), (2), and (3). This has been an area of controversy for decades, and now has contributed to at least one fatality. It is time to clarify this once and for all.

Panel Meeting Action: Reject

Panel Statement: The submitter uses a code violation as his substantiation. The first sentence in 600.6(A)(2) states “The following shall apply” CMP-18 sees no use in attempting to further clarify its intent.

See panel action and statement on Proposal 18-210.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-215 Log #1005 NEC-P18 **Final Action: Reject**
(600.6(A)(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

(1) The disconnecting means shall be ~~permitted to be~~ located within sight of the controller or in the same enclosure with the controller.

(2) The disconnecting means shall ~~be designed so that no pole can be operated independently~~ simultaneously open all ungrounded conductors of the circuit it controls and shall ~~be capable of being locked in the open position~~ have identified permanent integral means for locking in the open (off) position. ~~The provision for locking or adding a lock to the disconnecting means shall remain in place at the switch or circuit breaker whether or not the lock is installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~

Substantiation: “Permitted” does not provide a requirement; (See 90.5(B)). Proposal provides for specific locking requirements which are identified for the use, permanent, and integral to the disconnecting means and “off” applies to the mechanism not the cover of the disconnecting means.

Panel Meeting Action: Reject

Panel Statement: The use of “permitted” is correct. As to the balance of the proposal, it does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.

See 3.1.2 for permissive rules in the NEC Style Manual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-216 Log #1215 NEC-P18 **Final Action: Reject**
(600.7)

Submitter: Dan Leaf, Seneca, SC

Recommendation: In (A)(1), Exception, insert “listed” between “a” and “system”.

Delete (A)(2), (A)(3) and (B)(2).

In (B)(1), delete “and shall meet the requirements of 250.90.

Substantiation: Edit. Double insulated systems should be listed. The proposed are superfluous; Article 250 already applies unless amended.

Panel Meeting Action: Reject

Panel Statement: The proposed revision is not considered editorial; it adds a requirement for a “listed” system of double insulation, whatever that is. Also, products are listed, not systems.

The balance of the proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem.

The submitter does not take into account the fact that all signs do not need to be listed per 600.3.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-217 Log #3018 NEC-P18 **Final Action: Reject**
(600.7)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

600.7 Grounding and Bonding.

~~(A) Grounding.~~

~~(1)~~ (A) Equipment Grounding. Signs and metal equipment of outline lighting systems shall be grounded by connection to the equipment grounding conductor of the supply branch circuit(s) or feeder using the types of equipment grounding conductors specified in 250.118.

Exception: Portable cord-connected signs shall not be required to be connected to the equipment grounding conductor where protected by a system of double insulation or its equivalent. Double insulated equipment shall be distinctively marked.

~~(2) Size of Equipment Grounding Conductor. The equipment grounding conductor size shall be in accordance with 250.122 based on the rating of the overcurrent device protecting the branch circuit or feeder conductors supplying the sign or equipment.~~

~~(3) Connections. Equipment grounding conductor connections shall be made in accordance with 250.130 and in a method specified in 250.8.~~

~~(4) Auxiliary Grounding Electrode. Auxiliary grounding electrode(s) shall be permitted for electric signs and outline lighting systems covered by this article and shall meet the requirements of 250.54.~~

~~(5) Metal Building Parts. Metal parts of a building shall not be permitted as a secondary return conductor or an equipment grounding conductor.~~

~~(B) Bonding.~~

~~(1) Bonding of Metal Parts. Metal parts and equipment of signs and outline lighting systems shall be bonded together and to the associated transformer or power-supply equipment grounding conductor of the branch circuit or feeder supplying the sign or outline lighting system and shall meet the requirements of 250.90.~~

~~(2) Bonding Connections. Bonding connections shall be made in accordance with 250.8.~~

~~(3) Metal Building Parts. Metal parts of a building shall not be permitted to be used as a means for bonding metal parts and equipment of signs or outline lighting systems together or to the transformer or power-supply equipment grounding conductor of the supply circuit.~~

~~(4)~~ (B) Flexible Metal Conduit Length. Listed flexible metal conduit or listed liquidtight flexible metal conduit that encloses the secondary circuit conductor from a transformer or power supply for use with neon tubing shall be permitted as a bonding means if the total accumulative length of the conduit in the secondary circuit does not exceed 30 m (100 ft).

~~(5)~~(C) Small Metal Parts. Small metal parts not exceeding 50 mm (2 in.) in any dimension, not likely to be energized, and spaced at least 19 mm (¾ in.) from neon tubing, shall not require bonding.

~~(6)~~ (D) Nonmetallic Conduit. Where listed nonmetallic conduit is used to enclose the secondary circuit conductor from a transformer or power supply and a bonding conductor is required, the bonding conductor shall be installed separate and remote from the nonmetallic conduit and be spaced at least 38 mm (1½ in.) from the conduit when the circuit is operated at 100 Hz or less or 45 mm (1¾ in.) when the circuit is operated at over 100 Hz.

~~(7)~~ (E) Bonding Conductors. ~~Bonding conductors shall comply with (a) and (b).~~

~~(a) Bonding conductors shall be copper and not smaller than 14 AWG.~~

~~(b)~~ Bonding conductors installed externally of a sign or raceway shall be protected from physical damage.

~~(8)~~ (F) Signs in Fountains. Signs or outline lighting installed inside a fountain shall have all metal parts bonded to the equipment grounding conductor of the branch circuit for the fountain recirculating system. The bonding connection shall be as near as practicable to the fountain and shall be permitted to be made to metal piping systems that are bonded in accordance with 680.53.

FPN: Refer to 600.32(J) for restrictions on length of high-voltage secondary conductors.

Substantiation: The proposed deleted text is simply repetitive text. These provisions are already found in Article 250, and nothing in Article 600 supplements or modifies the requirements (90.3). The real problem, however, is that when two different code making panels have the same provisions in their articles, over time they change and become inconsistent. This makes an unneeded burden on the installer, the inspector and the designer.

Panel Meeting Action: Reject

Panel Statement: The sections are in this location as a reminder to the inspector, the installer, and the designer. Article 600 is intended to modify the requirements of Chapters 1 thru 4. The submitter has failed to comply with the provisions of 4.3.3 of the NFPA Regulations Governing Committee Projects and provide sufficient substantiation.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-218 Log #4031 NEC-P18 **Final Action: Reject**
(600.7(A)(1))

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Revise text to read as follows:

Exception No. 1: Portable cord-connected signs shall not be required to be connected to the equipment grounding conductor where protected by a system of double insulation or its equivalent. Double insulated equipment shall be distinctively marked.

Substantiation: Adding proposed new Exception No. 2 to 600.7 requires a numerical revision.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.

Renumbering is an editorial function.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-219 Log #4030 NEC-P18 **Final Action: Reject**
(600.7(A)(1) Exception No. 2 (New))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Add new text to read as follows:
Exception No. 2: Metal parts of a section sign or outline lighting system that are electrically isolated from a Class 2 power source, shall not be required to be connected to an equipment grounding conductor.
Substantiation: Dead metal on the load side containing only Class 2 components should not be required to be grounded. The connection of dead metal in a section sign or outline lighting to the equipment grounding conductor serves no purpose.

According to Underwriters Laboratories, Class 2 requirements specify that the output of a Class 2 supply must be isolated from the line and ground. This being the case, grounding dead metal that houses Class 2 components will not result in clearing a fault at the branch circuit. Should a Class 2 circuit become grounded for some reason, the energy will not go to ground since the secondary circuit is not ground referenced. Grounding of the dead metal has absolutely no benefit. A Class 2 power source secondary circuit is isolated from ground and supply. The output from the power source has no ground reference so the potential for a shock or fire hazard due to ground fault is reduced to zero. Should the output contact dead metal that is grounded, the output would then become ground referenced. This could result in the supply side of the output becoming more of a potential hazard since most problems occur when there is a ground fault.

CMP18 established that lighting systems operating at 30 volts or less are exempt from grounding. 411.415(A) Class II power sources used with sign lighting systems are limited to 30 volts or less by UL Standards and the *Code.* What electrical theory distinguishes low voltage lighting used in outline lighting and signs from low voltage systems used for general lighting under 411? If a fire and shock hazard is the basis for requiring grounding for listed signs with low voltage illumination, how was it determined that no hazard existed with lighting systems operating at 30 volts or less, energized by a isolating power supply?

Shock from low voltage (30 volts or less) landscape lighting, to which 411 has been applied since 1996 has not been a safety issue. Landscape lighting contains metal parts and is embedded in the ground in wet locations, at pedestrian level while section signs and outline lighting is mostly accessible to qualified service personnel only.

Article 90 provides that the rules in Chapters 1-4 apply generally and allows the general rules to be modified or supplemented in Chapters 5, 6, and 7. In its rejection of a similar proposal during the 2008 Code Cycle, CMP 18 stated:

According to 250.112(I), the exceptions for grounding that may exist in Article 725 only apply to Class 2 or Class 3 circuits used for remote-control, signaling, or fire alarm circuits. This exception does not apply to a low-voltage lighting circuit of the type used in section signs.

The exception being sought is not from Article 725 but Article 600.7. The exception to grounding metal parts of signs powered by power limited power sources is being pursued in Article 600 because listed section signs or outline lighting are "electrical utilization equipment" to which 725 is not applicable. The scope of 725 is:

This article covers remote-control, signaling and power limited circuits that are not an integral part of a device or appliance.

While an electric sign is not an "appliance," by Code definition it shares the same distinction since an appliance like an electric sign is "utilization equipment."

In an article published in Electrical Contractor, January 2000, Mark Ode, a UL Engineer and contributor to a number of published papers on the subject of low voltage lighting, noted regarding the wording in the Scope of 725, "similar wording is in Section 300-1(B) and both the Scope Statements in 300 and 725 make it totally clear that the interior wiring of equipment are not covered by this article."

Field wiring on Section Signs or outline lighting systems is not "interior wiring." The listed section sign is an assembly of components that include the electrical connections (field wiring) of subassemblies. Field wiring rules for neon and other sign lighting sources are covered by 600. And as specified in 600, field wiring rules for power limited circuits in listed signs or outline lighting are covered in Article 725. But 725 contains no rules for grounding or wiring of listed equipment.

Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Reject
Panel Statement: CMP-18 does not agree that this change is required for grounding. This should be located in the bonding section.

See panel action and statement on Proposal 18-223.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-220 Log #4787 NEC-P18 **Final Action: Reject**
(600.7(A)(1) Exception No. 2)

Submitter: Terry T. Maier, City of West Allis Wisconsin
Recommendation: Add the following new text:
Exception No. 2: Metal equipment supplied from the load side of a Class 2 transformer shall not be required to be connected to the equipment grounding conductor where LED lighting is the sole light source. The transformer supply shall not exceed 150 volts to ground.
Substantiation: The load side wiring of LED signs are usually wired with a Class 2 cable that does not provide a ground path. 600.12(C)(2) allows Class 2 cables to be used. Why allow Class 2 cables if a grounding means is required. Proposal to delete 600.24(B) will be separate submittal.

Per 2008 NEC Article 725.2 Definitions, a Class 2 circuit limits fire initiation and provides acceptable protection from electric shock.

Per 2008 NEC 250.20(A) A Class 2 power supply is not required to have the load side grounded under conditions used for wiring signs.

Grounding the signs would not provide any useful function.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-219.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-221 Log #3344 NEC-P18 **Final Action: Reject**
(600.7(A)(2) and (3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by the referenced sections which apply unless amended. (A)(2) does amend 250.122 which provides that flexible cords, for example, may have an equipment grounding conductor smaller than required in Table 250.122.
Panel Meeting Action: Reject
Panel Statement: Delete what?

The proposal does not comply with 4.3.3(c) and (d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-222 Log #1214 NEC-P18 **Final Action: Reject**
(600.7(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (6), change "required" to "installed".

Revise 7(B): Bonding conductors installed externally of a sign or raceway or cable shall be protected where likely to be subject to physical damage.
Substantiation: Edit. The provision should apply where a bonding conductor is optionally installed and not required, and also where a cable type wiring method is used. "Likely" is defined as a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The proposed revisions are not considered editorial.

The requirement for an external bonding conductor is to eliminate the cross talk that happens with high voltage currents. 600.7(B)(1) requires the installation of an external bonding conductor. This is not an option. In the proposed changes to (B)(7), the submitter is attempting to require the bonding conductor to be a part of the GTO Cable.

"Likely" is vague and unenforceable according to 3.2.1 of the NEC Manual of Style.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-223 Log #4789 NEC-P18 **Final Action: Accept in Principle**
(600.7(B)(1))

Submitter: Terry T. Maier, City of West Allis Wisconsin
Recommendation: Add the following new text:
Exception No. 1: Metal equipment supplied from the load side of a Class 2 transformer shall not be required to be bonded together or connected to the equipment grounding conductor where LED lighting is the sole light source. The transformer supply shall not exceed 150 volts to ground.
Substantiation: The load side wiring of LED signs are usually wired with a Class 2 cable that does not provide a bonding path.

Per 2008 NEC Article 725.2 Definitions, a Class 2 circuit limits fire initiation and provides acceptable protection from electric shock.

Per 2008 NEC 250.90 Bonding is provided to conduct safely any fault current. A Class 2 circuit provides suitable protection in its power supply.

Bonding the metal parts together would not provide any additional safety.
Panel Meeting Action: Accept in Principle

Add new exception to 600.7(B)(1) to read as follows:

Exception: Remote metal parts of a section sign or outline lighting system only supplied by a remote Class 2 power supply shall not be required to be bonded to an equipment grounding conductor.

Panel Statement: Without altering the intent of the proposal, CMP-18 changed the wording for clarity and usability.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-224 Log #4032 NEC-P18 **Final Action: Accept in Principle**
(600.7(B)(1) Exception (New))

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Add new text to read as follows:

Exception: Metal parts of a section sign or outline lighting system that are electrically isolated from a Class 2 power source, shall not be required to be bonded.

Substantiation: Dead metal on the load side containing only Class 2 components should not be required to be bonded to the equipment ground. The connection of dead metal in a section sign or outline lighting to the equipment ground conductor serves no purpose.

According to Underwriters Laboratories, Class 2 requirements specify that the output of a Class 2 supply must be isolated from line and ground. This being the case, grounding dead metal that houses Class 2 components will not result in clearing a fault at the branch circuit. Should a Class 2 circuit become grounded for some reason, the energy will not go to ground because the secondary circuit is not ground referenced. Bonding of the dead metal has absolutely no benefit. A Class 2 power source secondary circuit is isolated from ground and supply. The output from the power source has no ground reference so the potential for a shock or fire hazard due to ground fault is zero. In the event the output contact dead metal that is grounded, the output would then become ground referenced. This could result in the supply side of the output becoming more of a potential hazard because most problems occur when there is a ground fault.

CMP18 established that lighting systems operating at 30 volts or less are exempt from grounding. 411.415(A) Low voltage LED lighting systems, 30 volts or less are used in outline lighting and section signs. What electrical theory distinguishes low voltage lighting used in outline lighting and signs form low voltage systems used for general lighting under 411? If a fire and shock hazard are the basis for requiring grounding for listed signs with low voltage illumination, how was it determined that no hazard existed with lighting systems operating at 30 volts or less, energized by a isolating power supply?

Shock from low voltage (30 volts or less) landscape lighting, to which 411 has been applied since 1996 has not been a safety issue. Landscape lighting contains metal parts and is embedded in the ground in wet locations, at pedestrian level while section signs and outline lighting is mostly accessible to qualified service personnel only.

Article 90 provides that the rules in Chapters 1-4 apply generally and allows the general rules to be modified or supplemented by Chapters 5, 6, and 7. In its rejection of a similar proposal during the 2008 Code Cycle, CMP 18 stated:

According to 250.112(I), the exceptions for grounding that may exist in Article 725 only apply to Class 2 or Class 3 circuits used for remote-control, signaling, or fire alarm circuits. This exception does not apply to a low-voltage lighting circuit of the type used in section signs.

The exception being sought is not from Article 725 but Article 600.7. The exception to grounding metal parts of signs powered by power limited power sources is being pursued in Article 600 because listed section signs or outline lighting are “electrical utilization equipment” to which 725 does not apply. The scope of 725 is:

This article covers remote-control, signaling and power limited circuits that are not an integral part of a device or appliance.

While an electric sign is not an “appliance,” by Code definition it shares the same distinction because an appliance, like an electric sign, is “utilization equipment.”

In an article published in Electrical Contractor, January 2000, Mark Ode, a UL Engineer and contributor to a number of published papers on the subject of low voltage lighting, noted regarding the wording in the Scope of 725, “similar wording is in Section 300-1(B) and both the Scope Statements in 300 and 725 make it totally clear that the interior wiring of equipment is not covered by this article.”

Field wiring on Section Signs or outline lighting systems is not “interior wiring.” The listed section sign is an assembly of components that include the electrical connections, (field wiring) of subassemblies. Field wiring rules for neon and other sign lighting sources are covered by 600. And as specified in 600, field wiring rules for power limited circuits in listed signs or outline lighting are covered in Article 725. But 725 contains no rules for grounding or wiring listed equipment.

Section 3.3.4 of the NEC Style Manual states that “where” should not be used to mean “when” or “if.” This proposal intends to use the word “if” where appropriate.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-223.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-225 Log #2549 NEC-P18 **Final Action: Reject**
(600.7(B)(4))

Submitter: Thomas Sanford, Huron Sign Co.

Recommendation: Add new text as follows:

Listed flexible metal conduit or listed liquidtight flexible metal conduit that encloses the secondary circuit conductor from a transformer or power supply for use with neon tubing <u>or that encloses the secondary wiring from class 2 power sources</u> shall be permitted as a bonding means if the total accumulative length of the conduit in the secondary circuit does not exceed 30 m (100 ft).

Substantiation: Language is added to update this section of the code to include the now common use of class 2 wiring in this type of section sign.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

The present allowance for the use of up to 100 ft of flexible metal conduit for bonding of remote sign sections is based on the technical rationale associated with the impedance characteristics of high voltage neon conductors run in the flexible metal conduit. No technical substantiation was provided to support a similar acceptance of up to 100 ft of flexible metal conduit for bonding of remote sign sections supplied by low voltage Class 2 supplies such as those used for LED sign sections.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-226 Log #1219 NEC-P18 **Final Action: Reject**
(600.8(A) and (D))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

(A) Enclosures shall have ~~ample~~ strength and rigidity identified for the use.

(D) Metal parts of equipment shall be <u>corrosion resistant or</u> protected from corrosion <u>by identified methods</u>.

Substantiation: Edit. “Ample” is subjective and not defined. “Approved” is not necessarily the same as “identified”. Present wording of (D) should specify that protection other than corrosion resistant metal should be by methods suitable for the use.

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

CMP-18 has no idea what an “identified method” is.

The proposed editorial revisions do not substantially improve clarity of the present requirements and, in general, these requirements are currently addressed more specifically and in greater detail in the product safety standard applicable to these when evaluated for listing.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-227 Log #1218 NEC-P18 **Final Action: Reject**
(600.10)

Submitter: Dan Leaf, Seneca, SC

Recommendation: In (A), change “adequately” to “securely”.

Revise text of (B): An attachment plug shall be provided for each portable or mobile sign <u>except those that are an integral part of self-contained equipment including a generator battery, solar voltaic, or other power supply as the sole source of power.</u>

Delete text of (C)(1) and substitute: Field–installed flexible cords shall be hard service or junior hard service types covered in Table 400.4, identified for the use and sunlight resistant where exposed to direct sunlight. Cords shall contain an equipment grounding conductor. The cord shall not exceed 4.5 m (15 ft) in length.

Delete (D).

Substantiation: Edit. Although “adequately” and “securely” are possibly unenforceable terms, securely is an often used term in the Code and more readily determined. The provisions should recognize portable and mobile signs that have an associated independent power supply. The proposal for (C)(1) covers the requirements of (D).

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

There was no technical substantiation provided to change the wording. The proposed changes will not result in additional safety or clarity to the code.

This proposal is not considered an editorial change.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-228 Log #4798 NEC-P18 **Final Action: Reject**
(600.10(C)(2))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
600.10(C) Wet or Damp Location.
(2) ~~Ground-Fault Circuit Interrupter~~ **Power Safe Protector.** Portable or mobile signs shall be provided with factory-installed ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel. The ~~ground-fault circuit interrupter~~ power safe protector shall be an integral part of the attachment plug or shall be located in the power-supply cord within 300 mm (12 in.) of the attachment plug.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a “Power Off” safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle is actively supplying power to an appliance, it provides traditional GFCI protection.
2. PSP receptacles monitor the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 18-11.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-229 Log #3546 NEC-P18 **Final Action: Accept in Principle**
(600.12)

Submitter: Randall K. Wright, RKW Consulting
Recommendation: Revise text to read as follows:
600.12 Field-Installed Secondary Wiring. Field-installed secondary circuit wiring for electric signs and outline lighting systems shall be in accordance with their installation instructions and 600.12(A), (B), or (C).
Substantiation: To add the words as a reminder to inspection that installation instructions are required by their listing.
Panel Meeting Action: Accept in Principle
600.12 to read as follows:
600.12 Field-Installed Secondary Wiring. Field-installed secondary circuit wiring for electric signs, outline lighting systems and skeleton tubing systems shall be in accordance with their installation instructions and 600.12(A), (B), or (C).
Panel Statement: CMP-18 combined the parts of 18-229 and 18-230 and added skeleton tubing systems. In addition, the inclusion of installation instructions broadens the intent of 600.4 to include outline lighting and skeleton tubing.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-230 Log #4029 NEC-P18 **Final Action: Accept in Principle**
(600.12)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
Field-installed secondary circuit wiring for electric signs, outline lighting and skeleton tubing systems shall be in accordance with 600.12 (A), or (B).
Substantiation: The rules for secondary field wiring described in this section are also applicable to skeleton tubing.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-229.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-231 Log #4033 NEC-P18 **Final Action: Reject**
(600.12)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
Field-installed secondary circuit wiring for electric signs and outline lighting systems shall be in accordance with 600.12(A), (B), or (C). Field installed secondary wiring for skeleton tubing systems shall be in accordance with Part II.
Substantiation: The rules for secondary field wiring described in this section are also applicable to skeleton tubing. Part II contains special rules for unlisted skeleton tubing installations. Over the past two *Code* cycles, sections of Part II originally designated for skeleton tubing, 600.31 and 600.32 have been assigned to field installed wiring for listed section signs in 600.12. This additional text removes a gray area in the *Code* and clarifies all of Part II apply to skeleton tubing installations.
Panel Meeting Action: Reject
Panel Statement: CMP-18 believes that the current wording adequately describes the requirements. No further change is required.
The submitter has not adequately described the “gray area.”
See panel action and statement on Proposal 18-229.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-232 Log #3547 NEC-P18 **Final Action: Accept in Principle in Part**
(600.12(C))

TCC Action: It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.
This action will be considered by the panel as a public comment.
Submitter: Randall K. Wright, RKW Consulting
Recommendation: Revise text to read as follows:
(C) Class 2 Less Than ~~50~~ 30 Volts. Secondary class 2 circuit wiring less than ~~50~~ 30 volts shall be installed in accordance with either of the following:
(1) Any wiring method included in Chapter 3 suitable for the conditions.
(2) Where the power source provides class 2 output, complies with the output voltage in accordance with UL 1310 and the requirements in ~~725.121, wiring methods shall be permitted to be installed in accordance with 725.130(A) or (B).~~ 600.33.
Substantiation: To clarify class 2 output in accordance with a UL requirement. This is needed because I am proposing to allow the secondary circuits to not require an equipment grounding conductor on dead metal parts and the only way to insure the safety of the output is the current UL reference. I have also proposed to write the wiring regulations for signs in 600.33 and not reference a general low voltage section because of confusion.
Panel Meeting Action: Accept in Principle in Part
600.12(C) to read as follows:
(C) Class 2. Secondary Class 2 circuit wiring shall be installed in accordance with either of the following:
(1) Any wiring method identified in 600.33 and in Chapter 3 suitable for the conditions
(2) Where the power source provides Class 2 output and complies with the requirements in 600.33
Panel Statement: CMP-18 does not accept the technical justification for citing voltage.
Mandatory references to other standards is not permitted by 4.2 of the NEC Style Manual.
(4.2 References to Other Standards. References to other standards shall not be in mandatory Code text. References to product standards shall be in an informative annex. References to other Standards shall be in the Fine Print Notes.)
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
COSTELLO, P.: The reference in (2) is incorrect it should refer to 600.24 not 600.33.

18-233 Log #4034 NEC-P18 **Final Action: Accept in Principle**
(600.12(C))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
(C) Less Than 50 Volts. Secondary circuit wiring less than 50 volts shall be installed in accordance with ~~either of the following~~ 600.33.
~~(1) Any wiring method included in Chapter 3 suitable for the conditions.~~
~~(2) Where the power source complies with the requirements in 725.121, wiring methods shall be permitted to be installed in accordance with 725.130 (A) or (B).~~
Substantiation: Refer to substantiation for new 600.33.
(1) and (2) are deleted and referenced in new Section 600.33.
The use of LEDs in Section Letter signs and outline lighting presents a unique situation. Chapter 6 contains Article 600, which is designated for Electric Signs and Outline Lighting. The purpose of this proposal is to consolidate the majority of the rules for power limited wiring used in signs and outline lighting into the chapter that regulates signs.
Signs, including listed Section Signs, are defined as “electrical utilization equipment.” These signs may require types of field wiring other than neon circuitry to complete the installation. In the past two Code Cycles, 2005 and 2008, CMP 18 has recognized this and from within Article 600 has included various references to Article 725 for rules applicable to power limited circuit wiring.

However the Scope of Article 725 only covers remote-control, signaling, and power limited circuits that are *not an integral part of a device or appliance*. A sign is not an appliance, but Code definitions link *appliance* and *sign* because both are electrical utilization equipment. [100. Definitions]

In an article published in *Electrical Contractor* January 2000, Mark Ode, a UL engineer noted regarding the wording in the Scope of 725, "similar wording is in Section 300-1(b) and both the Scope Statements in 300 and 725 make it totally clear that the interior wiring of equipment is not covered by this article."

It may be argued that field wiring is not "interior wiring" but a Section Sign with all its remote parts, including the field wiring between remote sections, comprises the sign as described on the installation instructions.

Section signs and outline lighting are listed electrical equipment, and according to Mark Ode's interpretation, Article 725 would not apply to electric signs. Code panel 18 hinted at this during the 2008 Code Cycle, by suggesting that grounding exemptions applied only to Remote-Control, Signaling and Fire Alarm circuits. [Panel Statement, 2008 ROC] Adding a new section to Article 600 renders this possible conflict with the *Code* moot. Placing requirements for sign wiring within the Code Article for Signs and Outline Lighting, Article 600 facilitates the NFPA goal to make the Code more user friendly and the industy's goal to keep all rules relating to sign wiring within Article 600.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-232.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-234 Log #1217 NEC-P18 **Final Action: Reject**
(600.12(C)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (1):

(1) Any wiring method included in Chapter 3 ~~suitable~~ <u>identified</u> for the conditions.

Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: CMP-18 believes that "suitable" in this instance is appropriate.

The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.

The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-235 Log #1216 NEC-P18 **Final Action: Reject**
(600.21(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

Ballasts, transformers, ~~and~~ electronic power supplies <u>and other equipment</u> shall be of the weather proof type or be ~~of the~~ <u>listed for</u> outdoor ~~type~~ <u>use</u> ~~,and~~ <u>or</u> shall be protected from the weather by a sign body or <u>identified</u> enclosure.

Substantiation: Equipment marked for outdoor use should not require additional weather protection of a sign body or separate enclosure.
Panel Meeting Action: Reject
Panel Statement: Transformers and power supplies used in the sign industry are marked for outdoor use but require additional enclosures when used in a wet location.

The proposal does not does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects in that there is no statement of the problem or why the proposal solves the problem. Stating that something should be changed is not substantiation, it is an opinion.

Equipment of the outdoor type requires additional protection.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-236 Log #1291 NEC-P18 **Final Action: Reject**
(600.22 Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add:

<u>Ballasts covered in 410.130(E)(2) and (3) shall not be required to have thermal protection and ballasts covered by 410.130(E)(3) and (4) shall not have thermal protection.</u>

Substantiation: Edit. Correlation between sections; this section amends and negates 410.130.
Panel Meeting Action: Reject
Panel Statement: 410.30 deals with supports and is not applicable here. The design of the Code is that Chapter 6 modifies the requirements of Chapters 1 thru 4. This is exactly what is happening here. See 4.3.3 of the NFPA Regulations Governing Committee Projects.

The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-237 Log #1471 NEC-P18 **Final Action: Accept in Principle**
(600.23(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: A transformer and electronic power supply equipment that has secondary circuit ground-fault protection shall be durably marked to indicate that provision.
Substantiation: Present wording requires all transformers and electronic power supplies to be marked even though ground-fault protection is not required for transformers specified in 600.23(B)(1) and (2).
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-238.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-238 Log #4647 NEC-P18 **Final Action: Accept**
(600.23(F))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows: "Transformers and electronic power supplies that are equipped with secondary-circuit ground-fault protection shall be so marked."
Substantiation: The marking requirement is misworded, since it literally applies to all power supplies whether or not they actually have this protection; and some supplies that meet the integral containment or limited voltage provisions will not have it. Obviously a transformer or power supply that does not have this protection should not be marked to say that it does, but the literal text of this paragraph requires exactly that.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-239 Log #4035 NEC-P18 **Final Action: Accept in Principle**
(600.24)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
<u>Power supplies and power sources for</u> ~~S~~signs and outline lighting systems ~~supplied by Class 2 transformers power supplies and power sources~~ shall comply with the applicable requirements of Article 600 and 600.24(A), (B), ~~and~~ (C), <u>and (D)</u>.
Substantiation: The title of this Section is **Class 2 Power Sources**. Current wording of combines the rules for wiring with power source requirements. Text is modified to represent more clearly that this section covers requirements for Class 2 Power sources and not the Class 2 wiring of the sign circuit which is proposed to be included in new Section 600.33.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-241.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-240 Log #4036 NEC-P18 **Final Action: Reject**
(600.24(A))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
(A) Listing. Class 2 Power supplies and power sources shall be listed ~~for use with electric signs and outline lighting systems~~ and shall comply with 725.121.
Substantiation: Not all UL Recognized Component LED arrays cataloged in the UL Sign Component Manual have power sources included in/with the LED system. A listed Class 2 or UL Recognized power source with the output voltage of the LED array may be required. The Class 2 power source may not have been specifically listed for use with an electric sign but as a component of a listed sign or outline lighting system is eligible without being listed for use specifically with electric signs. In as much as the power supply or power source is part of a listed sign, its acceptability would be determined by a QETL at time of listing. Description on the installation instructions for the sign would also confirm its eligibility for use in the sign or outline lighting system.
Panel Meeting Action: Reject
Panel Statement: Not all signs are required to be listed. See 600.3. In some areas, the special permission rule is used to allow non-listed signs. In these cases, the conformity with QETL is not assured.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-241 Log #3548 NEC-P18 **Final Action: Accept in Principle in Part**
(600.24(A), (B) and (C))

Submitter: Randall K. Wright, RKW Consulting
Recommendation: Revise text to read as follows:
600.24 Class 2 Power Sources. Signs and outline lighting systems supplied by Class 2 transformers, power supplies, and power sources shall comply with the applicable output voltage in UL 1310 and the requirements of Article 600 and 600.24(A), (B), and (C).
(A) Listing. Class 2 Power supplies and power sources shall be listed for use with electric signs and outline lighting systems and shall comply with ~~725.121.~~ the output voltage in accordance with UL 1310.
~~**(B) Grounding.** Metal parts of signs and outline lighting systems shall be grounded and bonded in accordance with 600.7.~~
(B) Wiring Methods on the Supply Side of the Class II Power Supply. Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Chapter 3. Transformers or other devices supplied from electric light or power circuits shall be protected by an overcurrent device rated not over 20 amperes, and shall be connected to an equipment grounding conductor.
(C) Secondary Wiring. Secondary wiring from Class 2 power sources shall comply with 600.12(C) and 600.33.
Exception No. 1: The secondary dead metal parts of a field installed section sign or outline lighting system shall not be required to have an equipment grounding conductor provided the power supply is remote and supplies Class II output voltage in accordance with UL 1310. The power supply is required to be connected to an equipment grounding conductor.
Substantiation: (A) The reference to UL 1310 is used to insure the secondary voltage is safe.
(B) Changed in include the requirements for the supply side of the power supply only
(C) Exception No. 1: When the secondary output is controlled as in accordance with UL 1310 we can be assured that the primary voltage can not short or otherwise bring line voltage to the secondary equipment therefore insuring it's safety from electric shock, and fire initiation.
Panel Meeting Action: Accept in Principle in Part
600.24 to read as follows:
600.24 Class 2 Power Sources. Signs and outline lighting systems supplied by Class 2 transformers, power supplies, and power sources shall comply with the requirements of Class 2 circuits and 600.24(A), (B), (C), and (D).
(A) Listing. Class 2 power supplies and power sources shall be listed for use with electric signs and outline lighting systems.
(B) Grounding. Metal parts of signs and outline lighting systems shall be grounded and bonded in accordance with 600.7.
(C) Wiring Methods on the Supply Side of the Class 2 Power Supply. Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Chapter 3.
(D) Secondary Wiring. Secondary wiring from Class 2 power sources shall comply with 600.12(C) and 600.33.
Panel Statement: CMP-18 revised the submitter's text for clarity.
CMP-18 did not accept the submitter's part (B) and exception.
Mandatory references to other standards is not permitted by 4.2 of the NEC Style Manual.
4.2 References to Other Standards. References to other standards shall not be in mandatory Code text. References to product standards shall be in an informative annex. References to other Standards shall be in the Fine Print Notes.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
WRIGHT, R.: I do not disagree with the panel action and comment. I do however feel there may need to have further clarification that class 2 power supplies need to be connected to an equipment grounding conductor where the primary voltage is terminated. If terminated within a sign letter or sign body then the equipment grounding conductor needs extended to that location. Each power supply listed for use with a sign, outline lighting and skeleton neon installation shall be provided with either a termination or terminal for the purpose.

18-242 Log #4037 NEC-P18 **Final Action: Reject**
(600.24(B))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
(B) Grounding. Metal parts of ~~signs and outline lighting systems~~ Class 2 power supplies and power sources shall be grounded and bonded in accordance with 600.7.
Substantiation: New text separates grounding requirements for metal parts of power sources from the grounding requirements for metal parts isolated from the power source in a Class 2 system. This harmonizes with proposed new grounding and bonding exceptions, 600.7(A)(1), 600.7(B)(1).
Panel Meeting Action: Reject
Panel Statement: The submitter failed to provide sufficient substantiation for the removal of signs and outline lighting systems. See 4.3.3 of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-243 Log #4788 NEC-P18 **Final Action: Reject**
(600.24(B))

Submitter: Terry T. Maier, City of West Allis Wisconsin
Recommendation: Delete the following text:
~~600.24(B) Grounding. Metal parts of signs and outline lighting systems shall be grounded and bonded in accordance with 600.7.~~
600.24(C) would become 600.24(B)
Substantiation: This is in conjunction with other proposals to change 600.7(A) and (B) by adding exceptions for Class 2 circuits
The load side wiring of LED signs are usually wired with a Class 2 cable that does not provide a ground path. 600.12(C)(2) allows Class 2 cables to be used. Why allow Class 2 cables if a grounding means is required. Proposal to delete 600.24(B) will be separate submittal.
Per 2008 NEC Article 725.2 Definitions, a Class 2 circuit limits fire initiation and provides acceptable protection from electric shock.
Per 2008 NEC 250.20(A) A Class 2 power supply is not required to have the load side grounded under conditions used for wiring signs.
Grounding the signs would not provide any useful function.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-244 Log #4038 NEC-P18 **Final Action: Accept in Principle**
(600.24(C))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Add new text to read as follows:
(C) Secondary Wiring. Secondary wiring from Class 2 power sources shall comply with 600.12(C) and 600.33.
600.33 Secondary Circuit Wiring, 30 Volts Nominal or Less.
These requirements are in addition to the requirements in Part I
Secondary Wiring. Secondary wiring shall be permitted to be installed using listed power limited cable rated for the installation environment as described in Table 725.154 and on Table 725.154(G) and 725.179
(1) Cable listed as a part of a LED sign and outline lighting system shall be permitted to be substituted when rated for the installation environment
(2) Power limited cable shall be permitted to be installed exposed.
(3) Exposed power limited cables shall be securely fastened in place and comply with 725.24, and 725.143.
(4) Connection of splices shall be made with listed, insulated splicing devices and shall not be required to be enclosed in a dry or damp location. Splices and connections in power limited cable shall be accessible after installation
(5) Conductors shall be sized for the load imposed on the secondary circuit and shall be short as possible and not smaller that 18 AWG.
Power sources and supplies. Power sources and supplies shall be securely fastened in place.
(1) Power sources shall comply with 600.24.
Substantiation: Field wiring requirements have been consolidated in new Section 600.33.
600.33 Substantiation
The use of LEDs in Section Letter signs and outline lighting presents a unique situation. Chapter 6 contains Article 600, which is designated for Electric Signs and Outline Lighting. The purpose of this proposal is to consolidate the majority of the rules for power limited wiring used in signs and outline lighting into the chapter that regulates signs.
Signs, including listed Section Signs are defined as "electrical utilization equipment." These signs may require field wiring of other than neon circuitry to complete the installation. In the past two Code Cycles, 2005 and 2008, CMP 18 has recognized this and from within Article 600, has included various references to Article 725 for rules applicable to power limited circuit wiring.
However the Scope of Article 725 only covers remote-control, signaling, and power limited circuits that are not an integral part of a device or appliance. A sign is not an appliance, but Code definitions link appliance and sign because both are electrical utilization equipment. [100. Definitions]
In an article published in Electrical Contractor January 2000, Mark Ode, a UL engineer noted regarding the wording in the Scope of 725, "similar wording is in Section 300-1(b) and both the Scope Statements in 300 and 725 make it totally clear that the interior wiring of equipment are not covered by this article."
It may be argued that field wiring is not "interior wiring" but a Section Sign with all its remote parts, including the field wiring between remote sections compromises the sign as described on the installation instructions.

Section signs and outline lighting are listed electrical equipment, and according to Mark Ode's interpretation, Article 725 would not apply to electric signs. Code panel 18 hinted at this during the 2008 Code Cycle, by suggesting grounding exemptions only applied to Remote-Control, Signaling and Fire Alarm circuits. [Panel Statement, 2008 ROC] Adding a new section to Article 600 renders this possible conflict with the Code moot. Placing requirements for sign wiring within the Code Article for Signs and Outline Lighting, Article 600 facilitates the NFPA goal to make the Code user friendly and the industries goal to keep all rules relating to sign wiring within Article 600.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 18-249a.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-245 Log #4039 NEC-P18 **Final Action: Reject**

(600.24(D))

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Add new text to read as follows:

<u>(D) Supply Side Wiring. Wiring methods on the supply side shall comply with 725.127.</u>

Substantiation: Establishes that Class 2 branch circuit wiring must comply with Articles 1-4 and circuits must be protected by a 20 ampere overcurrent device. Not all Class 2 power supplies are supplied with conduit fittings on the supply side. A suitable enclosure for the power source and the branch circuit connection would have to be provided with the installation to meet requirements of 300 and 250.

Panel Meeting Action: Reject

Panel Statement: The scope of Article 725 only covers remote control, signaling, and power limited cables that are not an integral part of a device or appliance. A sign is not an appliance. See substantiation on proposal 18-219.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-246 Log #4019 NEC-P18 **Final Action: Accept in Principle**

(600, Part II)

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Revise text to read as follows:

II. Field-Installed <u>Secondary</u> ~~Skeleton Tubing and~~ Wiring.

Substantiation: Revise title of Section to a general statement that applies Part II to all field installed secondary wiring for signs, outline lighting and skeleton neon tubing, regardless of voltage. The reference to secondary wiring harmonizes with 600.12, "Field-Installed Secondary Wiring." Refer to Substantiation for 600.30.

Panel Meeting Action: Accept in Principle

Article 600, Part II section title to read as follows:

II. Field-Installed Skeleton Tubing, Outline Lighting, and Secondary Wiring.

Panel Statement: CMP-18 revised the section title for clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-247 Log #4040 NEC-P18 **Final Action: Accept in Principle**

(600.30)

Submitter: Richard D. Gottwald, International Sign Association

Recommendation: Revise text to read as follows:

Part II of this article shall apply to all <u>field wiring for secondary circuits in signs, outline lighting, and skeleton tubing.</u> ~~of the following:~~

~~(1) Field installed skeleton tubing~~

~~(2) Filed installed skeleton tubing wiring~~

Substantiation: The sign industry CMP 18 principal introduced a reorganization of Article 600 during the 1996 Code Cycle that resulted in a more logical order of the requirements for sign installations and field wiring. The changes adopted for the 1996 Code made it easier for electric sign companies to follow the rules, and for the AHJ to apply them during the approval process.

During the re-write and updating of Article 600 in 1996, it was decided, that in addition to needed changes in the scope of Article 600, the goal would be to draft Article 600 as a performance code as opposed to a specification code. Whenever possible construction requirements would be eliminated where there were applicable UL 48 standards for listing that would apply.

To implement this new paradigm, Article 600 was divided into two parts, Part A and Part B. Part A was applicable generally to requirements for list signs and Part B for unlisted skeleton neon tubing. Construction requirements for listed signs were in the UL48 Standard, making the recitation of sign electrical equipment construction unnecessary in the Code. This was deemed necessary because UL48 did not have within its scope skeleton neon tubing, (which also was first defined in the Code in 1996). This category of neon was assembled and wired in the field and attached to structures that "could not be brought into the factory for evaluation by UL making listing unavailable at that time. As a result an exception to listing for skeleton tubing was added to 600-3.

In the 1996 Code, the first requirement under "B. Field Installed Skeleton Tubing", Article 600-30 read:

Part B of this article shall apply only to field installed skeleton tubing. These requirements are in addition to the requirements of Part A, General.

(Commencing with the 2002 NEC®, the designations for the two parts of Article 600 were changed from alpha "A" and "B" to numeric "1" and "2").

This description of the limited application of Part II remained in the Article 600-30 for three Code Cycles, 1999, 2002 and 2005 until the AHJ began to raise concerns about the lack of rules in Article 600 that could be applied to field wiring in listed Section Signs. As written, the Code wording that described neon field wiring was only applicable to "field installed skeleton neon tubing."

To address this omission, and mitigate this gray area in the Code, during 2005, new Section 600.12 was added referencing 600.31 and 600.32 in Part II as being applicable also to field wiring for listed signs. But the wording of 600.30 regarding the limited applicability of Part II was not changed during the 2005 Code Cycle.

More tweaking on the application of Part II, Article 600.30 occurred during the 2008 Code Cycle.

II. Field-Installed Skeleton Tubing and Wiring

600.30 Applicability. Part II of this article shall apply to all of the following:

(1) Field-installed skeleton tubing

(2) Field-installed skeleton tubing wiring

Clearly, the original intent of the sign industry and CMP 18, establishing Part II exclusively for wiring skeleton is no longer in play.

The rewrite and additions to Article 600.12 in the 2008 NEC® reference 600.31, 600.31 and are intended to cover other than field skeleton tubing or skeleton tubing wiring. But Part II continues to imply Part II applies principally to field installed skeleton tubing and wiring, when it fact it applies to field wiring for listed section signs with neon illumination schemes.

The original intent of this partition in 600 is no longer applicable because of new technology with field wiring for listed Section Signs employing other than neon illumination. Advancement in sign illumination technology during the interim from 1996 to 2011 is significant. The proposed amendments to the Scope of 600 during this Code Cycle and the proposal by the industry to add a new section in Part 2, applicable to power limited sign circuits, recommend changing the Applicability of 600.30 to include all field installed wiring in Part II.

Panel Meeting Action: Accept in Principle

600.30 to read as follows:

600.30 Applicability. Part II of this article shall apply to all of the following:

(1) Field installed skeleton tubing

(2) Field installed secondary circuits

(3) Outline lighting.

Panel Statement: CMP-18 chooses to retain subsections and adds a third section called "Outline Lighting" for clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-248 Log #1470 NEC-P18 **Final Action: Reject**

(600.32(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text to read as follows:

Conductors shall be so installed that they are not <u>likely to be</u> subject to physical damage.

Substantiation: Edit. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: The submitter failed to provide sufficient substantiation to require this change. See 4.3.3 of the NFPA Regulations Governing Committee Projects.

The requirement is that the conductors are to be installed in such a manner as to not be subject to any physical damage.

The proposed revision is not considered editorial.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

18-249 Log #3549 NEC-P18 **Final Action: Reject**

(600.32(G))

Submitter: Randall K. Wright, RKW Consulting

Recommendation: Revise text to read as follows:

(G) Conductors in Raceways. ~~The insulation on all conductors shall extend not less than 65 mm (21/2 in.) beyond the metal conduit or tubing.~~

<u>**(1) Damp or Wet Locations.** In damp or wet locations, the insulation on all conductors shall extend not less than 100 mm (4 in.) beyond the metal conduit or tubing.</u>

<u>**(2) Dry Locations.** In dry locations, the insulation on all conductors shall extend not less than 65 mm (21/2 in.) beyond the metal conduit or tubing.</u>

Substantiation: To return the time tested safety from the previous code. The code was changed based on a test, which was not real application of the environment this wiring is used in.

I have provided an e-mail correspondence as Supporting Material

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The Fact Finding Investigation providing the technical basis for the previous change was not repudiated or contradicted in the substantiation. Indeed, it appears to have been reconfirmed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-249a Log #CP1804 NEC-P18 **Final Action: Accept**
(600.33)

Submitter: Code-Making Panel 18,
Recommendation: Add new section 600.33 to read as follows:
600.33 LED Sign Illumination Systems, Secondary Wiring.
The wiring methods and materials shall be installed in accordance with the sign manufacturer's installation instructions using any applicable wiring methods from Chapter 3.
(A) Insulation and Sizing of Class 2 Conductors. Listed class 2 cable that complies with Table 725.154(G) shall be installed on the load side of the class 2 power source. The conductors shall not be smaller than 22 AWG.
a. Wet Locations. Class 2 cable used in a wet location shall be identified for use in wet locations or have a moisture-impervious metal sheath.
b. Damp Locations. Class 2 cable used in a damp location shall be identified for use in a damp location or shall have the outer jacket of sunlight- and moisture-resistant nonmetallic material.
c. Other locations. In other locations, any applicable cable permitted in Table 725.154(G) may be used.
(B) Installation. Circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D).
(C) Protection Against Physical Damage. Where subject to physical damage the conductors shall be protected, and installed in accordance with 300.4.
(D) Grounding and Bonding. Refer to 600.7 for grounding and bonding.
Substantiation: CMP-18 combined several proposals to provide needed LED sign illuminations system wiring requirements into 600.33.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
CARPENTER, F.: There are no Class 2 cables for damp locations. The Panel will have to address this section to allow for use of wet location cable in damp locations.

18-250 Log #3543 NEC-P18 **Final Action: Accept in Principle**
(600.33)

Submitter: Randall K. Wright, RKW Consulting
Recommendation: Add new text to read as follows:
600.33 **LED Secondary-Circuit Wiring Class II 30 volts or less.**
(A) Wiring Methods. Wiring methods and materials on the load side of the Class 2 power source shall be in accordance with the wiring methods in Chapter 3, as classified and specified per the systems installation instructions and 600.33 (A), (B), (C), (D).
(1) Insulation and Size. Conductors shall be type PLTC nonmetallic-sheathed, power-limited tray cable listed as being suitable for cable trays and shall consist of a factory assembly of two or more insulated conductors under a nonmetallic jacket. The insulated conductors shall be 22 AWG through 12 AWG. The conductor material shall be copper (solid or stranded). Insulation on conductors shall be rated for 300 volts. The cable shall be listed as being resistant to the spread of fire.
a. Wet Locations. Type PLTC cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.
b. Damp Locations. Type PLTC cable used in a damp location shall be listed for use in a damp location or shall have the outer jacket be a sunlight- and moisture-resistant nonmetallic material.
(2) Installation. Class 2 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed in a dry location on the surface of ceilings and sidewalls shall be supported by the interior building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(D).
(3) Protection Against Physical Damage. Where subject to physical damage, as where they transition from inside (dry) to outside to feed remote mounted letters or outline lighting (damp-wet) the conductors shall be protected, and installed in accordance with 300.4.
(B) Bonding and Grounding. Metal parts of a remote wired channel letter sign or outline light shall not be required to be connected to an equipment grounding conductor provided the power supply meets the class 2 output in accordance with UL 1310.
Substantiation: The requirements need to be in Article 600 to be clear for the requirements of the class 2 led circuits when used for electric signs and outline lighting.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-249a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-251 Log #4041 NEC-P18 **Final Action: Accept in Principle**
(600.33 (New))

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Add new text to read as follows:
600.33 Secondary Circuit Wiring, 50 Volts Nominal or Less.
These requirements are in addition to the requirements in Part I
Secondary Wiring. Secondary wiring shall be permitted to be installed using listed power limited cable rated for the installation environment as described in Table 725.154 and on Table 725.154(G) and 725.179
Exception: Listed power limited cable that is part of a listed sign or outline lighting system.
(1) Power limited cable shall be permitted to be installed exposed.
(2) Exposed power limited cables shall be securely fastened in place and comply with 725.24, and 725.143.
(3) In damp or dry locations, connection of splices shall be made with listed, insulated splicing devices and shall not be required to be enclosed.
(4) Conductors shall be sized for the load imposed on the secondary circuit and shall be short as possible and not smaller that 18 AWG.
Power sources and supplies. Power sources and supplies shall be securely fastened in place.
(1) Power sources shall comply with 600.24.
Substantiation: The use of LEDs in Section Letter signs and outline lighting presents a unique situation. Chapter 6 contains Article 600, which is designated for Electric Signs and Outline Lighting. The purpose of this proposal is to consolidate the majority of the rules for power limited wiring used in signs and outline lighting into the chapter that regulates signs.
Signs, including listed Section Signs, are defined as "electrical utilization equipment." These signs may require types of field wiring other than neon circuitry to complete the installation. In the past two Code Cycles, 2005 and 2008, CMP 18 has recognized this and from within Article 600 has included various references to Article 725 for rules applicable to power limited circuit wiring.
However the Scope of Article 725 only covers remote-control, signaling, and power limited circuits that are *not an integral part of a device or appliance*. A sign is not an appliance, but Code definitions link *appliance* and *sign* because both are electrical utilization equipment. [100. Definitions]
In an article published in *Electrical Contractor* January 2000, Mark Ode, a UL engineer noted regarding the wording in the Scope of 725, "similar wording is in Section 300-1(b) and both the Scope Statements in 300 and 725 make it totally clear that the interior wiring of equipment is not covered by this article."
It may be argued that field wiring is not "interior wiring" but a Section Sign with all its remote parts, including the field wiring between remote sections, comprises the sign as described on the installation instructions.
Section signs and outline lighting are listed electrical equipment, and according to Mark Ode's interpretation, Article 725 would not apply to electric signs. Code panel 18 hinted at this during the 2008 Code Cycle, by suggesting that grounding exemptions applied only to Remote-Control, Signaling and Fire Alarm circuits. [Panel Statement, 2008 ROC] Adding a new section to Article 600 renders this possible conflict with the *Code* moot. Placing requirements for sign wiring within the Code Article for Signs and Outline Lighting, Article 600 facilitates the NFPA goal to make the Code more user friendly and the industy's goal to keep all rules relating to sign wiring within Article 600.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 18-249a.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-252 Log #1472 NEC-P18 **Final Action: Reject**
(600.41)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Field-installed skeleton tubing shall not be installed where likely to be subject to physical damage. Where tubing is readily accessible to other than qualified persons, field-installed tubing shall be provided with ~~suitable~~ identified means of protection. ~~Guards or protected by other approved means.~~
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: "Likely" is also a term to be avoided. The panel is satisfied with "suitable." See 3.2.1 of the NEC Style Manual.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects for the substantiation does not contain a statement of the problem.
The proposed revision is not considered editorial.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-253 Log #4042 NEC-P18 **Final Action: Reject**
(600.41)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
600.41 Skeleton ~~Neon~~ **Tubing.**
Substantiation: When Part II was accepted by CMP 18 during the 1996 *Code* cycle, Part II contained rules designated exclusively for skeleton tubing. Skeleton tubing was (is) not covered by the UL 48 Sign Standard leading CMP 18 to adopt specifications for the secondary circuit wiring as well as the neon tubing, In as much as the in-force Standard UL 48 continues to exclude skeleton tubing form its scope, the Code must identify specifications for neon tubing and wiring used in these installations. As a safety measure, only listed parts are eligible for use with non-listed skeleton tubing.
Panel Meeting Action: Reject
Panel Statement: Neon tubing is the correct term and is more encompassing in that it includes skeleton tubing. The proposal did not provide sufficient substantiation to change it.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

18-254 Log #4018 NEC-P18 **Final Action: Reject**
(600.42)

Submitter: Richard D. Gottwald, International Sign Association
Recommendation: Revise text to read as follows:
600.42 Skeleton Tubing E**lectrode Connections.**
Substantiation: When Part II was accepted by CMP 18 during the 1996 *Code* cycle, Part II contained rules designated exclusively for skeleton tubing. Skeleton tubing was (is) not covered by the UL 48 Sign Standard leading CMP 18 to adopt specifications for the secondary circuit wiring as well as the neon tubing. In as much as the in-force Standard UL 48 continues to exclude skeleton tubing from its scope, the Code must identify specifications for neon tubing and wiring used in these installations. Because a qualified electrical test laboratory does not evaluate skeleton tubing, as a safety measure, only listed parts are eligible for the use with non-listed skeleton tubing installations.
Panel Meeting Action: Reject
Panel Statement: 600.42 is in Part II, which covers field installed skeletal tubing, and the recommendation is therefore redundant.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 604 — MANUFACTURED WIRING

19-278 Log #3019 NEC-P19 **Final Action: Reject**
(604)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Relocate Article 604 to a new Article 3xx, under the purview of CMP 7.
Substantiation: Manufactured wiring systems are more of a “wiring method” than “special equipment”. As such, the requirements should be in Chapter three, near the cable wiring method articles.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree with the submitter’s substantiation. A manufactured wiring system, by definition, is an off-site assembly of components put together using the wiring methods of Chapter 3. It cannot be inspected on site without damage or destruction of the assembly. The code-making panel does not have the authority to relocate an existing article in the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-279 Log #4339 NEC-P19 **Final Action: Reject**
(604.1)

Submitter: Ralph Occhipinti, ADCO Electrical Corp.
Recommendation: Add the following new text:
(*) Multiwire Manufactured Wiring System circuits shall comply with **Article 210 Section.4** provided with a means that will simultaneously disconnect all ungrounded conductors at the point where the branch circuit originates.
Substantiation: My objections of Manufacturing Wiring Systems reflect more restrictive consideration towards the installation used as general branch building wiring. Non Qualified persons can compromise the integrity of the installation of Manufacturing Wiring Systems. Therefore, Manufacturing Wiring Systems used as a substitute of general wiring methods such as conduit and wire or listed armored cabling (AC / MC)shall have limitations and confined to within specified locations such as modular furniture or prewired store fixtures.
Panel Meeting Action: Reject
Panel Statement: Section 90.3 implies that the requirements of Article 210, Section 4 already apply to installations of manufactured wiring systems.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-280 Log #4462 NEC-P19 **Final Action: Reject**
(604.1)

Submitter: Ross Johnson, Haworth Inc.
Recommendation: Revise text to read as follows:
604.1 Scope. The provisions of this article apply to field-installed wiring using off-site manufactured subassemblies for branch circuits, remote-control circuits, signaling circuits, and communications circuits ~~in accessible areas~~.
Substantiation: The words “in accessible areas” are out of place in the “Scope” section of article 604. Sections 604.4 and 604.5 are the sections that clearly and fully define the permitted and not permitted uses of manufactured wiring systems. Sections 604.4 and 604.5 already include the requirements for “accessible” along with additional requirements and exceptions for manufactured wiring systems.
Panel Meeting Action: Reject
Panel Statement: The intention of the scope is to limit manufactured wiring assemblies to “accessible areas” only, except as permitted by limited exception in Section 604.4.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-281 Log #2803 NEC-P19 **Final Action: Accept**
(604.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~604.3 Other Articles.~~
~~Except as modified by the requirements of this article, all other applicable articles of this Code shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 604.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other “Special” articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-282 Log #4287 NEC-P19 **Final Action: Accept**
(604.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~604.3 Other Articles.~~
~~Except as modified by the requirements of this article, all other applicable articles of this Code shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 604.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other “Special” articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-283 Log #4335 NEC-P19 **Final Action: Reject**
(604.4)

Submitter: Ralph Occhipinti, ADCO Electrical Corp.
Recommendation: Add the following next text:
(*) Manufactured Wiring System branch circuit wiring shall only be used for general lighting circuits above the finished hung ceiling line and not exposed to unfinished open ceilings.
Substantiation: My objections of Manufacturing Wiring Systems reflect more restrictive consideration towards the installation used as general branch building wiring. Non Qualified persons can compromise the integrity of the installation of Manufacturing Wiring Systems. Therefore, Manufacturing Wiring Systems used as a substitute of general wiring methods such as conduit and wire or listed armored cabling (AC / MC)shall have limitations and confined to within specified locations such as modular furniture or prewired store fixtures.
Panel Meeting Action: Reject
Panel Statement: The statement is an opinion and is not substantiated by the submitter. All wiring systems can be compromised by non-qualified persons. Per Section 604.2, the definition of a manufactured wiring system, not being able to inspect the component parts, makes it less likely to be accessed by non-qualified persons.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-284 Log #4336 NEC-P19 **Final Action: Reject**
(604.4)

Submitter: Ralph Occhipinti, ADCO Electrical Corp.
Recommendation: Add the following new text:
(*) Manufactured Wiring System zone distribution boxes shall be listed and marked by the Manufacturer with their volume in accordance with **Article 314 Section.16.**
Substantiation: My objections of Manufacturing Wiring Systems reflect more restrictive consideration towards the installation used as general branch building wiring. Non Qualified persons can compromise the integrity of the installation of Manufacturing Wiring Systems. Therefore, Manufacturing Wiring Systems used as a substitute of general wiring methods such as conduit and wire or listed armored cabling (AC / MC)shall have limitations and confined to within specified locations such as modular furniture or prewired store fixtures.
Panel Meeting Action: Reject
Panel Statement: No explanation of a “zone distribution box” is provided. Since this component is not addressed elsewhere in 604.6, it is presumed to be covered by 604.6(D) which would meet the submitter’s intent for listing of the component. According to Section 90.3, the requirement in 314.16 also applies to boxes.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-285 Log #4337 NEC-P19 **Final Action: Reject**
(604.4)

Submitter: Ralph Occhipinti, ADCO Electrical Corp.
Recommendation: Add the following next text:
(*) Manufactured Wiring System branch circuit wiring shall comply with **Article 210 Section.19** for allowance of 3% volt drop at the last outlet supplying power and light.
Substantiation: My objections of Manufacturing Wiring Systems reflect more restrictive consideration towards the installation used as general branch building wiring. Non Qualified persons can compromise the integrity of the installation of Manufacturing Wiring Systems. Therefore, Manufacturing Wiring Systems used as a substitute of general wiring methods such as conduit and wire or listed armored cabling (AC / MC) shall have limitations and confined to within specified locations such as modular furniture or prewired store fixtures
Panel Meeting Action: Reject
Panel Statement: As explicitly stated in Section 90.3, the requirements in Article 210, Section 19 already apply to installations of manufactured wiring systems. Section 90.3 provides this general guidance for Chapters 5, 6 and 7. The reference in NEC 210.19 to a 3 percent voltage drop is in a fine print note (FPN No. 4). Fine print notes are not enforceable code; they are explanatory only.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-286 Log #4338 NEC-P19 **Final Action: Reject**
(604.4)

Submitter: Ralph Occhipinti, ADCO Electrical Corp.
Recommendation: Add the following new text:
(*) Manufactured Wiring System branch circuits for lighting and power shall be provided to supply the loads calculated in accordance with **Article 220 Section.10**.
Substantiation: My objections of Manufacturing Wiring Systems reflect more restrictive consideration towards the installation used as general branch building wiring. Non Qualified persons can compromise the integrity of the installation of Manufacturing Wiring Systems. Therefore, Manufacturing Wiring Systems used as a substitute of general wiring methods such as conduit and wire or listed armored cabling (AC / MC) shall have limitations and confined to within specified locations such as modular furniture or prewired store fixtures
Panel Meeting Action: Reject
Panel Statement: As explicitly stated in Section 90.3, the requirements in Article 220, Section 10 already apply to installations of manufactured wiring systems. Section 90.3 provides this general guidance for Chapters 5, 6, and 7.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-287 Log #4461 NEC-P19 **Final Action: Reject**
(604.4 Exception No. 3 (New))

Submitter: Ross Johnson, Haworth Inc.
Recommendation: Add new text to read as follows:
<u>Exception No. 3: In concealed spaces, manufactured wiring system assemblies shall be permitted where all field wiring connections are accessible.</u>
Substantiation: In a manner consistent with current wiring practices regarding concealed spaces and accessible field terminations, this exception would allow wider use of manufactured wiring systems to satisfy the industry’s requirement for quicker and less expensive wiring options.
Exception No. 3 would allow manufactured wiring system assemblies to route through or be located in a concealed space as long as the field wiring connections are accessible. The field wiring connections being receptacle connections and other connection openings described in section 604.6(C).
Section 604.3 would not allow assemblies to be used in concealed locations not permitted for the cable or conduit type used in the assembly’s construction. Additionally, section 604.7 would require the same installation conditions be met in those concealed spaces as are required for the cable or conduit type used.
This exception is consistent with the current permitted uses of the cable and conduit used in manufactured wiring system assemblies. This exception is consistent with current general wiring practices that require field terminations to be accessible. The internal connections of a manufactured wiring system component are highly reliable, they must pass extensive UL testing before being listed, and are 100% factory tested. In addition, the internal connections of a manufactured wiring system are not serviceable, are not accessible by field personnel, and are fully enclosed.
Panel Meeting Action: Reject
Panel Statement: Manufactured wiring systems are not required to be listed, only the components of the system addressed in Section 604.6(D). The present limits imposed on installations of manufactured wiring systems in concealed locations are due to the nature of their assembly, which by the definition is not able to be fully inspected at the point of installation. The submitter presented the panel with information on the specific product design addressed by his proposal and it appears to rely on electrical connections that are not enclosed in the box, which is not permitted in concealed locations.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-288 Log #4460 NEC-P19 **Final Action: Reject**
(604.4 Exception No. 4 (New))

Submitter: Ross Johnson, Haworth Inc.
Recommendation: Add new text to read as follows:
<u>Exception No. 4: Manufactured wiring systems installed in concealed spaces shall be listed for use in concealed spaces.</u>
Substantiation: This exception would allow wider use of manufactured wiring systems to satisfy the industry’s requirement for quicker and less expensive wiring options.
New technology has improved connections and connectors to the point that industry should be allowed to develop stringent listing standards that allow wider use of modular wiring systems in building wiring systems.
Panel Meeting Action: Reject
Panel Statement: The present limits imposed on installations of manufactured wiring systems in concealed locations are due to the nature of their assembly, which by the definition, is not able to be fully inspected at the point of installation. The code does not imply that listing of a product is a substitute for field inspection at the point of installation.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-289 Log #68 NEC-P19 **Final Action: Reject**
(604.6 and 604.7 (New))

Note: This Proposal appeared as Comment 19-49 on Proposal 19-131 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 19-131, which was also held, was:
Revise text to read as follows:
604.6(A) Cable or Conduit Types. <u>Manufactured wiring systems shall be listed as manufactured wiring systems assemblies or shall be constructed in accordance with (1), (2) or (3). FPN: One method of determining applicable requirements for listing of manufactured wiring systems is to refer to ANSI/UL 183-2004, the Standard for Manufactured Wiring Systems.</u> Remainder of section unchanged.
Submitter: Dean Negrelli, Wiremold/Legrand
Recommendation: Note: The panel “held” only the portions of Comment 19-49 from the 2007 Annual Meeting Report on Comments as shown below:
Revise text to read as follows:
<u>604.6 Listing Requirements. Manufactured wiring systems shall be listed manufactured wiring systems or shall be constructed in accordance with 604.7.</u>
<u>FPN: One method of determining applicable requirements for listing of manufactured wiring systems is to refer to ANSI/UL 183-2004, Standard for Manufactured Wiring Systems.</u>
604.~~6~~<u>7</u> Construction. <u>Manufactured wiring systems that are not listed manufactured wiring systems shall be constructed in accordance with (A) through (E).</u>
(A) Wiring Methods. ~~Manufactured wiring systems shall be listed as manufactured wiring systems assemblies or shall be constructed in accordance with (1), (2), or (3).~~
~~FPN: One method of determining applicable requirements for listing of manufactured wiring systems is to refer to ANSI/UL 182-2004, Standard for Manufactured Wiring Systems.~~

Substantiation: The title of 604.6(A) has been revised to "Wiring Methods" in the ROP draft, but this section deals with the listing of the entire manufactured wiring system as well as wiring methods.

This section should be changed to "Listing Requirements" and remaining sections reidentified. The final result of this comment is that the listing requirements for manufactured wiring systems are covered by 604.6 and the construction requirements for manufactured wiring systems that are not listed are covered by 604.7.

Panel Meeting Action: Reject

Panel Statement: See the panel action on Proposal 19-295.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-290 Log #23 NEC-P19 **Final Action: Accept in Principle**
(604.6(A))

NOTE: This proposal appeared as Comment 19-51 on Proposal 19-131 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 19-131 was:

Revise text to read as follows:

604.6(A) Cable or Conduit Types. <u>Manufactured wiring systems shall be listed as manufactured wiring systems assemblies or shall be constructed in accordance with (1), (2) or (3). FPN: One method of determining applicable requirements for listing of manufactured wiring systems is to refer to ANSI/UL 183-2004, the Standard for Manufactured Wiring Systems.</u> Remainder of section unchanged.

Submitter: Gregory J. Steinman, Thomas & Betts Corporation

Recommendation: Change the panel action to Reject.

Substantiation: The comments accompanying Mr. Bernson's and Mr. McNeive's negative votes should be considered by the CMP and the CMP's action reconsidered.

Panel Meeting Action: Accept in Principle

See panel action on Proposal 19-295.

Panel Statement: The panel action on Proposal 19-295 meets the submitter's intent.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-291 Log #24 NEC-P19 **Final Action: Accept in Principle**
(604.6(A))

NOTE: This proposal appeared as Comment 19-52 on Proposal 19-131 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 19-131 was:

Revise text to read as follows:

604.6(A) Cable or Conduit Types. <u>Manufactured wiring systems shall be listed as manufactured wiring systems assemblies or shall be constructed in accordance with (1), (2) or (3). FPN: One method of determining applicable requirements for listing of manufactured wiring systems is to refer to ANSI/UL 183-2004, the Standard for Manufactured Wiring Systems.</u> Remainder of section unchanged.

Submitter: Linda J. Little, St. Louis, MO

Recommendation: This proposal should have been Accept in Principle and in Part.

Substantiation: The FPN product standard reference should be accepted and it should be moved to Annex A as per the NEC Style Manual. The remainder of the proposal should have been Rejected.

If this proposal is allowed to be Accepted, there are two major issues of concern. First, is the appropriateness of allowing manufactured wiring systems assemblies to be constructed of component parts that are not individually listed for use or allowed by the NEC. If listing laboratories have inconsistent interpretations of the standards, competitive manufacturers can possibly use substandard components for listed assemblies. The Standard for Manufactured Wiring Systems ANSI/UL 183 permits metal conduit that may not be listed. This alone should not be a reason for the NEC to reduce its standards to allow non-listed components.

The second concern is that by accepting this proposal, Code-Making Panel 19 is setting a dangerous precedent. The substantiation for this change states that some manufactured wiring systems have been constructed with flexible metal conduit that is not listed, in violation of the requirement in 604.6(A)(2). It is inappropriate to make a change based upon the fact that the current rule is being violated. If some manufactured wiring systems are being constructed with component parts that are listed, those are the ones we should be using. If we change the code because someone is violating the requirements, we are undermining the issue of safety. Rather than compromising the minimum standards set forth by the code, we should require the manufactured wiring systems assemblies to be constructed of listed components.

Panel Meeting Action: Accept in Principle

See panel action on Proposal 19-295.

Panel Statement: The action on Proposal 19-295 meets the submitter's intent.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-292 Log #25 NEC-P19 **Final Action: Accept in Principle**
(604.6(A))

NOTE: This proposal appeared as Comment 19-53 on Proposal 19-131 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 19-131 was:

Revise text to read as follows:

604.6(A) Cable or Conduit Types. <u>Manufactured wiring systems shall be listed as manufactured wiring systems assemblies or shall be constructed in accordance with (1), (2) or (3). FPN: One method of determining applicable requirements for listing of manufactured wiring systems is to refer to ANSI/UL 183-2004, the Standard for Manufactured Wiring Systems.</u> Remainder of section unchanged.

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: The Proposal should be Rejected.

Substantiation: I concur with the Explanation of Negatives by Mr. McNeive and Mr. Bernson. They both have provided valid reasons for the Proposal to be Rejected.

Panel Meeting Action: Accept in Principle

See panel action on Proposal 19-295.

Panel Statement: The action on Proposal 19-295 meets the submitter's intent.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-293 Log #1296 NEC-P19 **Final Action: Accept in Principle in Part**
(604.6(A)(3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete first sentence and substitute:

Flexible cords and cables identified for extra-hard usage or hard usage and the application, with minimum No. 12 conductors and an equipment grounding conductor, shall be permitted...(remainder unchanged).

Revise last sentence:

The flexible cord or cable shall be visible for its entire length <u>and shall be provided with identified strain relief devices where likely to be subject to strain on the terminals</u> ~~and shall not be subject to strain or physical damage~~.

Substantiation: "Suitable" is subjective and a term to be avoided per the Style Manual. All hard usage cords may not be suitable for the use, such as sunlight resistance, exposed to oil or liquids, or where indicated as electric vehicle cable. An EGC should be specified. Physical damage is covered by 400.8(7).

Panel Meeting Action: Accept in Principle in Part

Accept in principle the need for strain relief. Reject the remainder of the proposal.

Revise the last sentence in 604.6(A)(3) to read as follows:

"The cord shall be visible for the entire length, shall not be subject to physical damage, and shall be provided with identified strain relief."

Panel Statement: Flexible cord is only permitted to be used as part of a "listed factory-made assembly…," therefore its "suitability" for the intended application will be determined as part of its listing. The acceptability of "extra hard usage" cord is sufficiently implied by the requirement for "hard usage" cord. It is not always practical to install manufactured wiring systems where they are not subject to strain on the electrical connections.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-294 Log #155 NEC-P19 **Final Action: Reject**
(604.6(A)(2) Exception No. 2)

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Change "communication" to "communications".

Substantiation: Section 3.3.3 of the NEC Style Manual States: "**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all* components or parts of a given type or class." Changing "communication" to "communications" will correlate with the title of Chapter 8, "Communications Systems"**.**

Panel Meeting Action: Reject

Panel Statement: "Circuits" at the end of the sentence modifies "communication" and makes it plural.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

19-295 Log #1170 NEC-P19 **Final Action: Accept**
(604.6(A)(2) Exception No. 3 to (2) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal regarding 4.1.1 of the NEC Style Manual to not reference an entire article.
This action will be considered by the panel as a public comment.
Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: 604.6(A)(2) Add new Exception No. 3 as follows:
Exception No. 3 to (2) : Listed manufactured wiring systems containing unlisted flexible metal conduit of non-circular cross section and/or trade sizes smaller than permitted in Article 348 when supplied with fittings and conductors.
Substantiation: This proposal is intended to address the following held comments from the 2008 NEC cycle: ROC 19-49, 19-51, 19-52 and 19-53 to Proposal 19-131.
An Ad Hoc Task Group consisting of members of NEC Code-making Panel 19 and other interested parties met by teleconference to discuss the original proposal, the held comments and concerns on the subject expressed during the 2008 NEC cycle. This proposal represents the consensus of the Task Group.
This proposal directly addresses the situation of listed manufactured wiring systems that use trade sizes and oval shaped flexible metal conduit not included in the scope of Article 348 or in the listing standard for flexible metal conduit, UL 1. The 2008 Proposal ROP 19-131 is seen as too broad and unsubstantiated. A representative of the organization of the original submitter of ROP 19-131 was a member of the Ad Hoc Task Group and has agreed that this proposal meets the immediate intent and subject of the original Proposal, ROP 19-131. Note also that NEC Section 348.20(A)(3) already recognizes such an option of other sizes when specifically addressed in Article 604.
The text of UL Certification Requirements Decision (CRD) to UL 183 is provided as supporting material. It was published to contain the requirements for fittings and conductor fill for unlisted flexible metal conduit used in manufactured wiring systems.
Panel Meeting Action: Accept
Panel Statement: The following is the supporting information that was provided to NFPA:
UL 183 CRD published June 12, 2008
7.4 Flexible metal conduit, liquid-tight flexible metal conduit, or liquid-tight flexible nonmetallic conduit shall comply with the Standard for Flexible Metal Conduit, UL 1, the Standard for Liquid-Tight Flexible Steel Conduit, UL 360, or the Standard for Liquid-Tight Flexible Nonmetallic Conduit, UL 1660.
Exception: Flexible metal conduit is not required to comply with all specified construction dimensions under the following conditions:
a) Trade sizes of 9/16-inch and 5/8-inch oval shaped and flexible metal conduit shall comply with the 1/2-inch trade size performance requirements in UL 1, and trade size of 3/8-inch reduced wall flexible conduit shall be provided with internal and external diameters as specified in Table 7.1. All other construction and performance requirements shall be in accordance with UL 1;
b) All mating fittings and connector assemblies used with conduit specified in (a) shall be factory installed;
c) The field installation end of a fitting or connector intended for field assembly to the building electrical system shall comply with the construction requirements of the Standard For Safety For Conduit, Tubing, and Cable Fittings, UL 514B;
d) All conduit specified in (a) shall be provided with factory installed conductors;
c) e) The flexible metal conduit in (a) shall be subjected to follow up evaluation on performance testing in accordance with UL 1 on the indicated trade sizes.
13.11 The free length of a lead inside an outlet box, wiring compartment or at the end of a length of conduit shall be a minimum of 6 in (150 mm) long if the lead is intended for field connection.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-296 Log #1169 NEC-P19 **Final Action: Accept**
(604.6(A)(4))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise text to read as follows:
604.6(A)(4) Busways. Busways shall be listed plug-in or continuous plug-in type containing factory mounted, bare or insulated conductors, which shall be copper or aluminum bars, rods, or tubes. The busway shall be ~~grounded and~~ provided with an equipment ground ~~busbar equivalent in size to the ungrounded busbar~~. The busway shall be rated nominal 600 volts, 20, 30, or 40 amperes. Busways shall be installed in accordance with 368.12, 368.17(D), and 368.30.
Substantiation: Plug-in busway, like continuous plug-in busway, is a wiring method that has no exposed bus bars. Both types are intended for general use, including installation within the reach of persons. Both types are factory assembled wiring methods that readily support reconfiguration of electrical distribution systems. The 2008 NEC was modified to include continuous plug-in busway in this section. However, as worded, the text seems to exclude traditional constructions of plug-in busway. Adding the text indicated would clarify that either type of construction is acceptable provided the remaining requirements are met. The terminology "busbar equivalent in size to the ungrounded busbar" is not necessary because busways are listed to a standard which includes requirements for the ground conductor sizing and performance. In some constructions, the busway ground conductor is a different configuration or material. For instance, the equipment ground may be the housing of the busway and not a busbar per se.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 7 Negative: 1
Explanation of Negative:
LICHTENSTEIN, T.: This is a safety issue. It was the Code Panels intent in the 2008 cycle to include only "continuous plug in busway" because this type of busway is required to be evaluated for accessibility of live parts even when plugging into the busway. The traditional "plug-in" busway that the submitter wants to include, requires the removal of a cover to make a plug in connection to the busway. When the cover is removed there is full access of the unisulated live bus bars by users. This was not the intent of the Code Panel. The intent was to require "continuous plug in busway" because the requirements in UL 857, The Standard for Safety for Busways require that even during plugging in to the busway, live parts are not accessible to the user. The majority of Manufactured wiring systems are modular connector type systems, in many applications they are installed within reach of the general public (e.g. in office furniture, under library tables, big box store displays, grocery stores to power freezers, etc.) not 30 feet in the air above an factory assembly line accessible only to trained personnel, that is why it is critical that accessibility of live parts is restricted. Continuous plug in busway is the only type of busway permitted for use in manufactured Wiring Systems in the Standard for Safety for Manufactured Wiring Systems, UL 183.
The NEC does not define "continuous plug-in busway". Appendix A of the NEC references UL 857, the Standard For Safety For Busways. UL 857 has specific requirements for "continuous plug-in busway". Other busways are not prohibited from having plug in constructions and they are not required to comply with the accessibility requirements for "Continuous plug-in busway". See references below.
For reference, excerpts are provided from the Standard For Safety For Busways, UL 857, Twelfth Edition
Dated January 15, 2001.
Definition of continuos plug in busway
2.3.4.3 Continuous plug-in busway
A continuous plug-in busway is rated at 225 A or less, has no exposed bus bars, and is intended for general use, including installation within the reach of persons.
7.4.5 For a continuous plug-in busway, an uninsulated live part shall be located or shielded so it is not accessible to unintentional contact by persons during intended use.
7.4.5.1 An uninsulated live part is considered not to be accessible if a probe as illustrated in Figure 2 cannot be made to touch any part that involves the risk of electric shock to earth ground or to another uninsulated live part when the system is completely installed as intended. No force is to be used when placing the probe in the opening.
Comment on Affirmative:
MCNEIVE, T.: The Panel should continue to accept Proposal 19-296. Plug-in busway is a well known and accepted wiring method that is comprised of factory assembled components which are field assembled into a system. Article 368 covers uses permitted and not permitted for all busway. As presently worded, one type of busway (plug-in) is excluded, while continuous plug-in is permitted.

19-297 Log #2074 NEC-P19 **Final Action: Accept**
(604.6(A)(5) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal regarding complete sentences to comply with 3.3.1 of the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Michael Everhart, Steelcase Inc.
Recommendation: Add new text to read as follows:
(5) Raceway. Prewired, modular, surface mount raceways shall be listed for the use. Rated nominal 600 Volt, 20 Amp and installed in accordance with 386.12, 386.30, 386.60, and 386.100.
Substantiation: The NEC does not recognize "factory built, prewired, modular" surface raceways. This proposal would allow a factory built, modular, surface raceway to be listed as a Manufactured Wiring System using a construction type other than the currently identified "AC, MC, FMC, Flexible Cord or Busway" construction. Requiring that factory built, modular, surface raceways be "Listed for the use" will ensure that all construction and performance concerns, as they relate to safety, have been addressed.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

ARTICLE 605 — OFFICE FURNISHINGS (CONSISTING OF LIGHTING ACCESSORIES AND WIRED PARTITIONS)

18-255 Log #2804 NEC-P18 **Final Action: Accept**
(605.2(B) and (C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and re-identify existing 605.2(C) as 605.2(B).
~~(B) Other Articles. Except as modified by the requirements of this article, all other articles of this Code shall apply.~~
~~(C)~~(B) Hazardous (Classified) Locations. Where used in hazardous (classified) locations, these assemblies shall comply with Articles 500 through 517 in addition to this article.
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 605.2(B) repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-256 Log #1458 NEC-P18 **Final Action: Accept in Part**
(605.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Lighting Accessories. Lighting equipment shall be listed and identified for use with wired partitions and shall comply with 605.5(A), (B), and (C).
(A) Support. ~~a~~ An identified means for secure attachment and ~~or~~ support shall be provided.
(B) Connection. Where cord-and plug connection is provided, the cord length shall ~~be suitable for the intended application but~~ shall not exceed 2.7 m (9 ft) in length. The cord shall not be smaller than 18 AWG, shall contain an equipment grounding conductor, and shall be of the extra-hard usage or hard usage type identified for the use. Connection by other means shall be identified as suitable for the use.
In (C) delete "convenience".
Substantiation: Edit. Attachment and support should be identified as suitable for the use. Extra-hard usage types should also be suitable. All types should be identified for the use; some are not, (e.g., EVJT, EVJ, EVJE, and those not identified for wet or oil or direct sunlight conditions). "convenience" is superfluous and not defined.
Panel Meeting Action: Accept in Part
605.5 to read as follows:
Lighting Accessories. Lighting equipment shall be listed and identified for use with wired partitions and shall comply with 605.5(A), (B), and (C).
(A) Support. A means for secure attachment or support shall be provided.
(B) Connection. Where cord-and-plug connection is provided, the cord length shall be suitable for the intended application but shall not exceed 2.7 m (9 ft) in length. The cord shall not be smaller than 18 AWG, shall contain an equipment grounding conductor, and shall be of the hard usage type. Connection by other means shall be identified as suitable for the condition of use.
(C) Receptacle Outlet. Receptacles shall not be permitted in lighting accessories.
Panel Statement: CMP-18 accepts the changes in the first sentence as shown in the proposal.
CMP-18 reject the changes in (A) and (B) as there is no definitive substantiation provided to show a problem exists with the present text.
CMP-18 accepts the change in (C), removing the word "convenience".
The panel notes that the proposed revisions are not considered editorial.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-257 Log #550 NEC-P18 **Final Action: Accept**
(605.6)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete the second sentence.
605.6 Fixed-Type Partitions.
Wired partitions that are fixed (secured to building surfaces) shall be permanently connected to the building electrical system by one of the wiring methods of Chapter 3. ~~Multiwire branch circuits supplying power to the partition shall be provided with a means to disconnect simultaneously all ungrounded conductors at the panelboard where the branch circuit originates.~~
Substantiation: To conform to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors on multiwire branch circuit and applies per 90.3
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-258 Log #1295 NEC-P18 **Final Action: Reject**
(605.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Change "panelboard" to "distribution equipment".
Substantiation: Edit. All branch circuits do not originate in panelboards, e.g., individual fused switches or circuit breakers.
Panel Meeting Action: Reject
Panel Statement: All multiwire circuits relating to the scope of Article 605 originate in panelboards or similar equipment.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
The panel notes that the proposed revisions are not considered editorial.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-259 Log #2189 NEC-P18 **Final Action: Accept in Principle**
(605.6)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
605.6 Fixed-Type Partitions.
Wired partitions that are fixed (secured to building surfaces) shall be permanently connected to the building electrical system by one of the wiring methods of Chapter 3. ~~Multiwire branch circuits supplying power to the partition shall be provided with a means to disconnect simultaneously all ungrounded conductors at the panelboard where the branch circuit originates.~~
Substantiation: The second sentence is no longer needed, now that all multiwire branch circuits require simultaneous disconnect [210.4(B)].
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-257.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-260 Log #3020 NEC-P18 **Final Action: Accept in Principle**
(605.6)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
605.6 Fixed-Type Partitions.
Wired partitions that are fixed (secured to building surfaces) shall be permanently connected to the building electrical system by one of the wiring methods of Chapter 3. ~~Multiwire branch circuits supplying power to the partition shall be provided with a means to disconnect simultaneously all ungrounded conductors at the panelboard where the branch circuit originates.~~
Substantiation: The second sentence is no longer needed, now that all multiwire branch circuits require simultaneous disconnect [210.4(B)].
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-257.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-261 Log #3876 NEC-P18 **Final Action: Reject**
(605.6, FPN (New))

Submitter: Michael J. Farrell, III, Lucas County Building Regulations
Recommendation: Add new Fine Print Note (FPN) following text of 605.6 Fixed-Type Partitions
FPN: See 240.15 for use of single pole circuit breakers as the disconnect means required by this section.
Substantiation: Placement of a FPN will direct the code reader to all of the requirements for proper application of this article. It would prevent some of the confusion in applying the disconnect requirements for multiwire branch circuits.
Panel Meeting Action: Reject
Panel Statement: No definitive substantiation was provided to identify a problem with the existing text. No examples of confusion or safety-related problems as a result of confusion were provided.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
See panel action on Proposal 18-257.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-262 Log #551 NEC-P18 **Final Action: Accept**
(605.7)

Submitter: Margarito Aragon, Jr., Aragon's Electrical Consulting
Recommendation: Delete the second sentence.
605.7 Freestanding-Type Partitions.
Partitions of the freestanding type (not fixed) shall be permitted to be connected to the building electrical system by one of the wiring methods of Chapter 3. ~~Multiwire branch circuits supplying power to permanently connected freestanding partitions shall be provided with a means to disconnect simultaneously all ungrounded conductors at the panelboard where the branch circuit originates.~~
Substantiation: To conform to the Style Manual. Section 210.4(B) already requires the disconnecting simultaneously of all ungrounded conductors or multiwire branch circuit and applies per 90.3.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-263 Log #1473 NEC-P18 **Final Action: Accept in Principle**
(605.7)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Partitions of the freestanding type (not fixed) shall be ~~permitted to be~~ connected to the building wiring system by ~~one of~~ an identified wiring method of Chapter 3. Multiwire branch circuits supplying power to permanently connected freestanding partitions shall be provided with a disconnecting means to simultaneously disconnect all ungrounded conductors of the circuit it controls at the ~~panelboard~~ source where the branch circuit originates.
Substantiation: The wiring method should be identified for the use; all methods of Chapter 3 may not be suitable. Present wording may be deemed to modify "not permitted" uses. Circuits may originate at other than panelboards, such as individual fused switches or circuit breakers. "Permitted" per 90.5(B) does not impose a requirement.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-262.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-264 Log #2190 NEC-P18 **Final Action: Accept in Principle**
(605.7)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
605.7 Freestanding-Type Partitions.
Partitions of the freestanding type (not fixed) shall be permitted to be connected to the building electrical system by one of the wiring methods of Chapter 3. ~~Multiwire branch circuits supplying power to permanently connected freestanding partitions shall be provided with a means to disconnect simultaneously all ungrounded conductors at the panelboard where the branch circuit originates.~~
Substantiation: The second sentence is no longer needed, now that all multiwire branch circuits require simultaneous disconnect [210.4(B)].
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-262.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

(Note: Sequence 18-265 was not used)

18-266 Log #3021 NEC-P18 **Final Action: Accept in Principle**
(605.7)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
605.7 Freestanding-Type Partitions.
Partitions of the freestanding type (not fixed) shall be permitted to be connected to the building electrical system by one of the wiring methods of Chapter 3. ~~Multiwire branch circuits supplying power to permanently connected freestanding partitions shall be provided with a means to disconnect simultaneously all ungrounded conductors at the panelboard where the branch circuit originates.~~
Substantiation: The second sentence is no longer needed, now that all multiwire branch circuits require simultaneous disconnect [210.4(B)].
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 18-262.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-267 Log #3875 NEC-P18 **Final Action: Reject**
(605.7, FPN (New))

Submitter: Michael J. Farrell, III, Lucas County Building Regulations
Recommendation: Add new Fine Print Note (FPN) following text of 605.7 Freestanding-Type Partitions
FPN: See 240.15(B) for use of single pole circuit breakers as the disconnect means required by this section.
Substantiation: Placement of a FPN will direct the code reader to all of the requirements for proper application of this article. It would prevent some of the confusion in applying the disconnect requirements for multiwire branch circuits.
Panel Meeting Action: Reject
Panel Statement: No definitive substantiation is provided to identify a problem with the existing text. No examples of confusion or safety-related problems as a result of confusion are provided.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
See panel action on Proposal 18-262.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

18-268 Log #134 NEC-P18 **Final Action: Reject**
(605.12)

Submitter: Thomas Lopez, Los Alamos National Laboratory
Recommendation: Insert wording:
"605.12 Uses Not permitted. Office furnishings shall not be permitted to be installed causing permanent wiring methods that are mentioned elsewhere in the code to be made inaccessible.
Exception No. 1: Office Furnishings (partitions) shall be of the wired type as described in 605.6 and 605.7 if permanent receptacle outlets are made inaccessible by installation of Office Furnishings (Partitions)."
Substantiation: Office furnishings are being installed in front of permanently installed wiring methods. This leads to unsafe practices in order to access permanent methods which could lead to fire or shock or arch flash injury.
Panel Meeting Action: Reject
Panel Statement: No definitive substantiation provided to identify an existing problem.
The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects because the substantiation does not contain a statement of the problem.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 606 — PREFABRICATED (WIRING) ASSEMBLIES

19-298 Log #3554 NEC-P19 **Final Action: Accept in Principle in Part**
(606 (New))

TCC Action: The Technical Correlating Committee requests that the panel clarify the need for the Article, since it appears the installation requirements of the product are already covered in the Code. The remaining requirements are prescriptive and are better suited for a product standard.
The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Rejects the panel action related to the Scope. As written, the Scope more clearly defines what a prefabricated wiring assembly is not, rather than what it is.
The Technical Correlating Committee notes that the proposed Scope will appear in the NEC ROP Draft so that it is available for public comment.
This action will be considered by the panel as a public comment.
Submitter: Timothy P. McNeive, Thomas & Betts Corporation
Recommendation: Add new text to read as follows:
Article 606 (New) Prefabricated (Wiring) Assemblies
606.1 Scope.
The provisions of this article apply to assemblies, partial systems of components, or unassembled kits of components, produced at a factory or assembled in areas not directly subject to inspection by the authority having jurisdiction.
This Article does not pertain to:
a) Manufactured Wiring Systems covered in Article 604;
b) Nonmetallic Underground Conduit with Conductors (NUCC) covered in Article 354;
c) Listed manufactured prewired assemblies covered in Articles 356 and 362;
d) Assemblies consisting only of outlet boxes, junction boxes, conduit bodies of fittings supplied with a cover, whether or not it is assembled;
e) Box support brackets attached by factory welding or other permanent means;

f) Assemblies consisting only of outlet boxes, device boxes or junction boxes provided with a ground screw, grounding pigtail or similar device intended to comply with section 250.148 (C), whether or not it is assembled;
g) Floor boxes; or
h) Poke through floor fittings.

606.2 Definition.

Prefabricated (Wiring) Assembly. Assemblies of system components that are able to be inspected at the building site without damage or destruction to the assembly. Each component of an assembly is suitable for separate installation in accordance with this Code. Assemblies include factory made subassemblies, combinations of subassemblies and separate system components in a single kit.

Listed Prefabricated (Wiring) Assembly. A factory made prefabricated (wiring) assembly carrying the certification mark of a nationally recognized testing laboratory.

606.3 Other Articles.

Except as modified by the requirements of this article, all other applicable articles of this Code shall apply.

606.4 Uses Permitted.

Prefabricated (wiring) assemblies shall be permitted in accordance with the other applicable articles of this Code for the wiring method used in its construction.

606.5 Uses Not Permitted.

Prefabricated (wiring) assemblies shall not be permitted where limited by the applicable article in Chapter 3 for the wiring method used in its construction.

606.6 Construction.

(A) General.

(1) Prefabricated (wiring) assemblies include subassemblies, combinations of subassemblies and separate system components, or separate system components in a kit form. Components consist of combinations of outlet boxes; junction boxes; device boxes; box extensions; extension rings; wiring devices; box support brackets; conduit, tubing or cable fittings; conductors; slicing or terminal connectors; cables; raceways and other similar products.

(2) Each component of a prefabricated (wiring) assembly shall be suitable for separate installation in accordance with this Code.

(3) Listed prefabricated (wiring) assemblies shall be entirely constructed from separately listed components.

Exception: A component of a listed prefabricated (wiring) assembly is not required to comply with a specific requirement that involves a feature or characteristic not required in the specific application for which the assembly is identified and marked. Such component(s) shall be factory assembled.

(4) Assemblies shall be able to be inspected at the building site without damage or destruction of the assembly or any component even when partial disassembly is deemed necessary.

(5) Prefabricated (wiring) assemblies shall include the required means for bonding that will ensure a continuous electrical bonding connection between metallic components included in the assembly.

(B) Assembly.

The following applies to pre-assemblies. This does not apply to unassembled kits of components.

(1) Unless otherwise specified, assembly of a prefabricated (wiring) assembly shall be strictly in accordance the applicable Articles of this Code.

(2) A prefabricated (wiring) assembly shall only be assembled to the extent that when installed at the building site, wiring devices or conductors when included in the assembly do not need to be disconnected or disassembled to install the assembly.

(3) Assemblies of permanently connected components shall be listed. Examples of permanent connections include factory applied rivets, or specialty tool applied fasteners.

(C) Protection of Wiring Devices and Conductors

A prefabricated (wiring) assembly that includes an outlet box, device box or junction box or other enclosure intended for flush mounting, that contains conductors or wiring devices shall be provided with a protective cover that will prevent damage to the conductors and wiring devices during preparation and installation of the finished wall or ceiling surface. The protective cover if metallic, need not be electrically bonded or fixed by screws to the box but shall remain in place. The protective cover shall provide mechanical protection equivalent to the enclosure to which it is attached and shall be able to be easily removed without damage to the box or enclosure, the enclosed conductors or wiring devices.

(D) Terminals and Splices.

(1) Outlet boxes, junction boxes and device boxes, or other compartments for containing a wire terminal or spice shall be complete and shall enclose all field wiring and connections. They shall be sized in accordance with Section 314.16.

(2) A terminal or splice compartment for power supply connections shall be so located that the connections are accessible for inspection after the installation of the wiring system.

(3) The compartment shall be located so that when making conduit connections, internal wiring and enclosed components are not exposed to mechanical abuse or strain.

(4) A terminal compartment intended for assembly of a supply raceway shall have a provision to prevent turning with respect to the raceway and to the support surface.

(5) Terminals and splices shall comply with the requirements in Section 110.14 and shall be prevented from turning or shifting in position by means other than friction between the surfaces. A terminal intended solely for connection of an equipment grounding conductor shall comply with Section 250.8 and shall be capable of securing the intended grounding conductor size.

(6) The length of free conductors located inside a box or wiring compartment for spices or the connection of luminaries or devices shall be in accordance with Section 300.14.

606.7 Installation.

(A) Securing and Supporting

Prefabricated (wiring) assemblies shall be secured and supported in accordance with the applicable requirements in this Code.

(B) Secureness of Connections.

The secureness of all pre-assembled mechanical and electrical connections shall be verified at installation.

Substantiation: This is a NEW Article for the 2011 National Electrical Code for Prefabricated (Wiring) Assembles. Realizing that only the Technical Correlating Committee can assign an Article number and define the scope, it seems appropriate that this Article is placed in Chapter 6 and under the scope of Code-making panel 19 as the subject is quite complementary to Article 604.

Considering that NEC Article 604, *Manufactured Wiring Systems*, has worked closely in concert with UL 183, *Manufactured Wiring Systems*, for many years to provide flexibility and safety to the installed environment, it is appropriate that the NEC contain an Article for other *Prefabricated (Wiring) Assemblies*, that gives guidance to industry product standards such as the outline of investigation, UL 2453, *Prefabricated Wiring Assemblies.* These assemblies differ from a Manufactured Wiring System in that they can be inspected at the point of installation without damage or destruction of the assembly.

Prior to initiating development of the present outline of investigation, UL 2453, UL reportedly listed prefabricated wiring assemblies (UL CCN QQYZ) in accordance with the prevailing edition of the National Electrical Code. This outline of investigation continues fundamentally to adhere to this practice but because of its attempt to repeat specific NEC requirements, it risks lagging behind the revisions to the NEC. Importantly, the UL Guide Information states "Acceptability of the field assembly is to be determined by the Authority Having Jurisdiction". Development of UL 2453 began as the result of calls from the inspection community through UL's Electrical Council. Unfortunately, the more prescriptions included in UL 2453, the more likely becomes lack of correlation with the prevailing edition of the NEC over time. And, in my opinion, the present language of the outline of investigation leaves open the option for UL or any NRTL, with or without access to the UL 2453 outline, to list such assemblies using components that do not adhere to all of the requirements for the separately listed component or relegates the NRTL to judge suitability for use where the Code does not strictly require a component to be listed. Development and publication of UL 2453 has stalled in recent times and there are now many such assemblies, listed and unlisted being provided to the market. Providing fundamental guidance in the NEC will help provide uniformity among the various NRTLs for listed assemblies and will hopefully create a renewed interest in completing and publishing UL 2453.

1) I believe that inspectors want to have confirmation from the NRTL of the component makeup of the assembly, especially where some components such as conductors may be sufficiently concealed so that inspection at the point of final installation of the assembly is difficult without disassembly.

2) I believe that inspectors do not wish to delegate to the NRTL their responsibility for approval of unlisted components in such assemblies even where the Code permits their use, other than perhaps permanent or specialty securement means.

3) And finally, I do not believe that the NRTL is capable in most cases of ensuring the final securement of attachments, for either mechanical or electrical purposes, prior to final installation of the assembly. This responsibility needs to be retained at the point of installation.

Panel Meeting Action: Accept in Principle in Part

Accept the proposal as modified as follows:

Article 606 (New) Prefabricated (Wiring) Assemblies

606.1 Scope.

The provisions of this article apply to assemblies, partial systems of components, or unassembled kits of components, produced at a factory or assembled in areas not directly subject to inspection by the authority having jurisdiction.

This article does not pertain to the following:

(1) Manufactured wiring systems covered in Article 604
(2) Nonmetallic underground conduit with conductors (NUCC) covered in Article 354
(3) Listed manufactured prewired assemblies covered in Articles 356 and 362
(4) Assemblies consisting only of outlet boxes, junction boxes, conduit bodies of fittings supplied with a cover, whether or not it is assembled
(5) Box support brackets attached by factory welding or other permanent means
(6)Assemblies consisting only of outlet boxes, device boxes, or junction boxes provided with a ground screw, grounding pigtail or similar device intended to comply with section 250.148 (C), whether or not it is assembled
(7) Floor boxes
(8) Poke through floor fittings
(9) Multioutlet assemblies covered in Article 380

606.2 Definition.

Prefabricated (Wiring) Assembly. Assemblies of system components that are able to be inspected at the building site without damage or destruction to the assembly. Each component of an assembly is suitable for separate installation in accordance with this *Code*. Assemblies include factory made subassemblies, combinations of subassemblies, and separate system components in a single kit.

~~Listed Prefabricated (Wiring) Assembly. A factory made prefabricated (wiring) assembly carrying the certification mark of a nationally recognized testing laboratory.~~

~~606.3 Other Articles.~~

~~Except as modified by the requirements of this article, all other applicable articles of this Code shall apply.~~

~~606.4~~ **606.3 Uses Permitted.**

Prefabricated (wiring) assemblies shall be permitted in accordance with the other applicable articles of this *Code* for the wiring method used in its construction.

~~606.5~~ **606.4 Uses Not Permitted.**

Prefabricated (wiring) assemblies shall not be permitted where limited by the applicable article in Chapter 3 for the wiring method used in its construction.

~~606.6~~ **606.5 Construction.**

(A) General.

(1) Prefabricated (wiring) assemblies include subassemblies, combinations of subassemblies and separate system components, or separate system components in a kit form. Components consist of combinations of outlet boxes; junction boxes; device boxes; box extensions; extension rings; wiring devices; box support brackets; conduit, tubing or cable fittings; conductors; slicing or terminal connectors; cables; raceways and other similar products.

(2) Each component of a prefabricated (wiring) assembly shall be suitable for separate installation in accordance with this *Code*.

(3) Listed prefabricated (wiring) assemblies shall be entirely constructed from separately listed components.

Exception: A component of a listed prefabricated (wiring) assembly is not required to comply with a specific requirement that involves a feature or characteristic not required in the specific application for which the assembly is identified and marked. Such component(s) shall be factory assembled.

(4) Assemblies shall be able to be inspected at the building site without damage or destruction of the assembly or any component even when partial disassembly is deemed necessary.

(5) Prefabricated (wiring) assemblies shall include the required means for bonding that will ensure a continuous electrical bonding connection between metallic components included in the assembly.

(B) Assembly.

The following applies to pre-assemblies. This does not apply to unassembled kits of components.

(1) Unless otherwise specified, assembly of a prefabricated (wiring) assembly shall be strictly in accordance the applicable articles of this *Code*.

(2) A prefabricated (wiring) assembly shall only be assembled to the extent that when installed at the building site, wiring devices or conductors when included in the assembly do not need to be disconnected or disassembled to install the assembly.

(3) Assemblies of permanently connected components shall be listed. Examples of permanent connections include factory applied rivets, or specialty tool applied fasteners.

~~(C) Protection of Wiring Devices and Conductors~~

~~A prefabricated (wiring) assembly that includes an outlet box, device box or junction box or other enclosure intended for flush mounting, that contains conductors or wiring devices shall be provided with a protective cover that will prevent damage to the conductors and wiring devices during preparation and installation of the finished wall or ceiling surface. The protective cover if metallic, need not be electrically bonded or fixed by screws to the box but shall remain in place. The protective cover shall provide mechanical protection equivalent to the enclosure to which it is attached and shall be able to be easily removed without damage to the box or enclosure, the enclosed conductors or wiring devices.~~

(~~D~~C) Terminals and Splices.

(1) Outlet boxes, junction boxes and device boxes, or other compartments for containing a wire terminal or spice shall be complete and shall enclose all field wiring and connections. They shall be sized in accordance with Section 314.16.

(2) A terminal or splice compartment for power supply connections shall be so located that the connections are accessible for inspection after the installation of the wiring system.

(3) The compartment shall be located so that when making conduit connections, internal wiring and enclosed components are not exposed to mechanical abuse or strain.

(4) A terminal compartment intended for assembly of a supply raceway shall have a provision to prevent turning with respect to the raceway and to the support surface.

(5) Terminals and splices shall comply with the requirements in 110.14 and shall be prevented from turning or shifting in position by means other than friction between the surfaces. A terminal intended solely for connection of an equipment grounding conductor shall comply with 250.8 and shall be capable of securing the intended grounding conductor size.

(6) The length of free conductors located inside a box or wiring compartment for spices or the connection of luminaries or devices shall be in accordance with 300.14.

~~606.7~~ **606.6 Installation.**

(A) Securing and Supporting.

Prefabricated (wiring) assemblies shall be secured and supported in accordance with the applicable requirements in this *Code*.

(B) Secureness of Connections.

The secureness of all pre-assembled mechanical and electrical connections shall be verified at installation.

606.7 Marking.

(1) Wiring assemblies shall be marked with the conduit, tubing or cable type, and the conductor size and type to permit determination of their suitability for a specific application and ampacity in accordance with the NEC.

(2) A parts list shall be provided with each assembly to identify the extent of the product.

Panel Statement: The addition of 606.1(i) is appropriate. The definition of listed prefabricated wiring assemblies was determined to be unnecessary. The requirement for a protective cover for prefabricated assemblies implies that a protective cover is needed for all outlet and device boxes during the construction process. A proposal was made during the 2008 NEC cycle and was ultimately held by CMP-3 (ROP 3-32, ROC 3-8). A task group has submitted a new proposal, 9-74, for consideration by CMP-9. Article 606 will be covered according to 90.3, by the resulting general decision by CMP-9. Section 606.8 Marking was added to assist the AHJ in the inspection of these prefabricated (wiring) assemblies.

Number Eligible to Vote: 8

Ballot Results: Affirmative: 8

Comment on Affirmative:

MCNEIVE, T.: NEMA does not believe that the addition of the very prescriptive requirement in Section 606.8 is appropriate in the Code. NEC Section 110.3 provides necessary enforcement for what is intended by the proposed text. Deliberation during development of a consensus standard for Prefabricated (Wiring) Assemblies is a better forum for determining the degree of prescriptive marking requirements that are necessary according to 110.3(B).

ARTICLE 610 — CRANES AND HOISTS

12-4 Log #2261 NEC-P12 **Final Action: Accept in Principle**
(610.2 (New), 610.11(E), and 610.13(C))

TCC Action: The Technical Correlating Committee directs that the last two sentences in proposed 610.2 be deleted from the definition to comply with 2.2.2 of the NEC Style Manual.

This action will be considered by the panel as a public comment.

Submitter: Susan L. Stene, Underwriters Laboratories

Recommendation: Revise text to read as follows:

610.2 (NEW) Definitions.

Festoon Cable - Single- and multiple-conductor cable intended for use and installation in accordance with Article 610 where flexibility is required. The cable consists of one or more insulated conductors cabled together with an overall jacket. The cable is rated 60°C, 75°C, 90°C or 105°C and 600 V.

610.11 (E) Flexibility to Moving Parts. Where flexibility is required for power or control to moving parts, listed festoon cable or a cord suitable for the purpose shall be permitted, provided the following shall apply:

(1) Suitable strain relief and protection from physical damage is provided.

(2) In Class I, Division 2 locations, the cord is approved for extra-hard usage.

610.13 (C) Flexibility. Where flexibility is required, listed flexible cord or cable, or listed festoon cable shall be permitted to be used and, where necessary, cable reels or take-up devices shall be used.

Substantiation: There are festoon cables and flexible cords on the market that are not listed and therefore, may not be suitable for the particular application. Adding the word 'listed' will provide assurance that the cable has been evaluated for its' ratings and use.

Festoon cable is specifically intended for use and installation in Crane and Hoist Electrification Systems in
accordance with Article 610 the National Electrical Code. It has long been an accepted wiring method under Article 610 where flexibility is required. However, there is no mention of this type of cable in the Article. Festoon cable is listed by UL under the product category CCN, "ZIPF." The basic requirements used to investigate products in this category are contained in UL Subject 2273, ''Outline of Investigation for Festoon Cables.''

There are festoon cables and flexible cords on the market that may not be listed or appropriate for this use.

Panel Meeting Action: Accept in Principle

Add a new definition to 610.2 in alphabetical order to read as follows:

Festoon Cable. Single- and multiple-conductor cable intended for use and installation in accordance with Article 610 where flexibility is required. The cable consists of one or more insulated conductors cabled together with an overall jacket. The cable is rated (140°F) 60°C, (167°F) 75°C, (194°F) 90°C or (221°F) 105°C and 600 V.

Panel Statement: CMP-12 accepts the submitter's recommendation and adds the required Fahrenheit equivalents for the temperature ratings.

CMP-12 accepts the remainder of the submitter's recommendations without change.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-5 Log #1231 NEC-P12 **Final Action: Reject**
(610.3(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Insert "identified" between "listed" and "luminaire".
Substantiation: Edit. Present wording may be deemed to modify pertinent provisions of Article 410.
Panel Meeting Action: Reject
Panel Statement: The referenced words in the proposal are not found in Section 610.3(B) of the 2008 NEC. The proposal appears to reference the wrong section.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-6 Log #4199 NEC-P12 **Final Action: Reject**
(610.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
610.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Through January 1, 2017, evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation of that equipment. The delayed implementation allows local enforcement agencies the flexibility to utilize any methods currently in place such as; product evaluation by a local professional engineer or review of manufacturers test data; as the basis for approval of equipment. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, evaluation of all equipment covered by this Article would be required by a qualified testing laboratory or inspection agency concerned with product evaluation.
Panel Meeting Action: Reject
Panel Statement: Section 110.2 already states that electrical equipment or conductors required or permitted by the NEC must be approved so repeating this text in 610.5 is unnecessary. Section 90.4, as well as 90.7, provides a method for the AHJ to use "listing" as a means of accepting electrical equipment, especially where the AHJ does not have access to the listing standards, does not have the qualifications, or does not have the time for evaluation of the electrical equipment. Where electrical equipment is one of a kind or not listed at the time of installation, Sections 90.4 and 90.7 permit field equipment evaluation so this text is unnecessary.
Item No. 3 of the proposed text permitting manufacturer's self-evaluation or an owner's engineering judgment, may permit equipment to be installed as unevaluated, untested, and uninspected since many states only have electrical inspection in the major metropolitan areas, not counties or unincorporated areas.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-7 Log #4200 NEC-P12 **Final Action: Reject**
(610.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
610.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-6.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-8 Log #4201 NEC-P12 **Final Action: Reject**
(610.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
610.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if approved. The basis for that approval shall include listing where required by other NEC provisions. Where listing is not required by other NEC provisions, the basis for approval shall be determined by one of the following methods:
(1) Equipment listing or labeling
(2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
(3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. The proposed text allows for three options as the basis for equipment approval. Item 1 recognizes listed equipment, the preferred method of many enforcement departments as a basis for approval. Item 2 recognizes field evaluations by testing labs or other locally approved agencies concerned with product evaluation of unlisted equipment. While very few enforcement agencies have internal equipment evaluation departments, this option would recognize evaluations by those departments as an acceptable basis for approval. This item would also allow certification of manufactured homes, RV's, and manufactured buildings that are typically evaluated by state agencies that evaluate those facilities to a combination of standards including the HUD Standards. Item 3 recognizes other possible methods as a basis for approval of unlisted equipment. Enforcement agencies across the country currently have a variety of "other" options used for their basis of approval for unlisted equipment including product evaluation by a local professional engineer or review of manufacturers test data. The procedures and parameters used by those enforcement agencies vary from jurisdiction to jurisdiction. Some require the non-test-lab certifiers to include the standard used to evaluate the equipment and an explanation of the process used to determine compliance. Some require peer review of the local evaluation. Some require the evaluation report to be sealed by a State Registered professional Engineer. Item 3 the evidence to be acceptable to the authority having jurisdiction which gives the local authority the ability to determine what type of evaluation and documentation is acceptable. While item 3 is very similar to simply requiring the equipment to be "approved", it does give the AHJ the NEC text that requires evaluation of the equipment by someone other than the local inspector. Local inspectors generally do not have access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-6.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-9 Log #4202 NEC-P12 **Final Action: Reject**
(610.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
610.5 Equipment Approval. The equipment required or permitted by this Article after December 31, 2016 shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval and while listing is the preferred basis for approval, listing is not available or has not been provided for some equipment. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. At the end of the two code cycles, the proposed text requires listing of all equipment covered by this Article by a qualified testing agency as defined in Article 100. The proposed text provides time (two code cycles) for equipment manufacturers with unlisted equipment to submit the equipment and time for third party certification agencies to complete the evaluation and listing of that equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-6.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-10 Log #4203 NEC-P12 **Final Action: Reject**
(610.5)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Add new text as follows:
610.5 Equipment Approval. The equipment required or permitted by this Article shall be acceptable only if listed.
Substantiation: NEC 110.2 currently indicates all conductors and equipment shall be acceptable only if approved (acceptable to the authority having jurisdiction). Authorities must have a basis for that approval. While some equipment historically has not been listed, a basis for approval of this equipment is needed. Very few enforcement agencies have internal equipment evaluation departments with access to product standards, test equipment, required training, nor time for evaluation of equipment construction and internal wiring. The proposed text requires an outside party to provide the equipment evaluation.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-6.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-11 Log #1213 NEC-P12 **Final Action: Reject**
(610.11(C)(D)(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence. Conductors shall be enclosed in identified raceways or be...(remainder unchanged).
Delete text of (C), (D), and (E) and substitute: (C) FLEXIBLE CONNECTIONS. Where flexible connections are necessary, flexible stranded conductors shall be used. Conductors shall be identified flexible raceways except as permitted in 610.11(E).
(D) Where multiconductor flexible cord or cable is used with a suspended pushbutton or other type control station the control station shall be supported by identified means that prevents strain on the conductors.
(E) Where flexibility is required to movable or moving parts a flexible cord or cable identified for the purpose shall be permitted provided the following apply:
(1) Identified strain relief devices are provided to prevent tension on terminations
(2) The flexible cord or cable is not likely to be subject to physical damage
(3) The flexible cord or cable contains an equipment grounding conductor
(4) The current does not exceed the ampacity of the flexible cord or cable
(5) In Class I Division 2 locations the flexible cord or cable is identified for extra-hard usage.
Substantiation: All raceways should be identified for the use. "Identified flexible raceways" eliminates the need for specific types, and includes flexible metallic tubing and electrical nonmetallic tubing. The requirement for moving parts to be "power or control" is superfluous. Strain relief should be provided by devices suitable for the use, not taping or tieing to supports; "suitable" is subjective and a term to be avoided per the Style Manual. "Approved for extra-hard usage" is whatever is acceptable to the AHJ; "identified for the purpose" includes, where necessary, water, oil, sunlight resistance.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects. The substantiation does not contain a statement of the problem.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-12 Log #2661 NEC-P12 **Final Action: Reject**
(610.22)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part:
"...where operated in rooms or areas used for storage or handling of ~~easily~~ combustible fibers and materials they shall comply with 503.135.
Substantiation: Edit. Material handling and areas which are not "rooms" should be included. "Easily" is subjective and not defined, and may be difficult to determine, such as damp or dry, loosely or densely packed.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects. The substantiation does not contain a statement of the problem.
The submitter did not correctly extract existing text.
The proposed change is not editorial in nature.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-13 Log #1571 NEC-P12 **Final Action: Reject**
(610.31(2))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
610.31 Runway Conductor Disconnecting Means.
A disconnecting means that has a continuous ampere rating not less than that calculated in 610.14(E) and (F) shall be provided between the runway contact conductors and the power supply. Such disconnecting means shall consist of a motor-circuit switch, circuit breaker, or molded-case switch. This disconnecting means shall be as follows:
(1) Readily accessible and operable from the ground or floor level.
(2) **A lockable disconnecting means.** ~~Capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: CMP-12 does not agree with the removal of detailed requirements for the disconnect lockout means. In addition, CMP-12 does not agree with establishing one set definition for the term "disconnecting means, lockable" as each individual chapter and article has special considerations that need to be considered. A global definition will not be able to cover all these considerations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-14 Log #1572 NEC-P12 **Final Action: Reject**
(610.32)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
610.32 Disconnecting Means for Cranes and Monorail Hoists.
A motor-circuit switch, molded-case switch, or circuit breaker shall be provided in the leads from the runway contact conductors or other power supply on all cranes and monorail hoists. The disconnecting means shall be **lockable.** ~~capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-13.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-15 Log #3342 NEC-P12 **Final Action: Reject**
(610.51(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Where two or more motors operate simultaneously to drive a single house, carriage, or bridge, they shall be permitted to be controlled by a single controller that complies with applicable provisions of Part VII of Article 430.
Substantiation: Edit. To clarify that provisions of Article 430 are not modified by lack of specific requirements.
Panel Meeting Action: Reject
Panel Statement: This change is unnecessary. Chapter 4 is always applicable unless specifically excluded or modified.
The requirements in 90.3 cover the concern voiced in the substantiation for this proposal. CMP-12 does not agree that requirements for controllers are limited to Part VII of Article 430 as there are requirements in other sections of the National Electrical Code that relate to the proper use of controllers such as 110.10.
The submitter did not correctly extract existing text.
The proposed change is not editorial in nature.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-16 Log #4649 NEC-P12 **Final Action: Reject**
(610.61)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise the last two sentences of the second paragraph to read as follows:
The trolley frame and bridge frame shall ~~not~~ be considered as electrically grounded through the bridge and trolley wheels and ~~its~~ their respective tracks unless local conditions, such as paint or other insulating material, prevent reliable metal-to-metal contact. In this case,. a separate bonding conductor shall be provided.
Substantiation: This proposal, which restores the 2002 NEC wording, is intended to force a reconsideration of the action in the 2005 NEC cycle to disqualify a trolley-to-bridge rolling connection as an equipment grounding return path. The wording change only covered the trolley frame, and not the bridge girder as its wheels turn on the runway, even though the contact surfaces seem identical. There was no substantiation to distinguish one from the other, nor was there any loss experience presented to suggest that the prior allowance, unchanged since the 1962 NEC, was deficient.
Panel Meeting Action: Reject
Panel Statement: The requirement for a separate bonding conductor eliminates the effects of ambient conditions, such as paint, dirt, and unreliable electrical continuity of wheels, bearings, and rail systems.
CMP-12 expresses safety concerns due to the uncertainty of continuous wheel to metal contact.
CMP-12 considered this in the 2005 cycle to add a separate conductor, and the submitter's proposal does not justify reverting back to prior text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 620 — ELEVATORS, DUMBWAITERS, ESCALATORS, MOVING WALKS, WHEELCHAIR LIFTS, AND STAIRWAY CHAIR LIFTS

12-16a Log #CP1201 NEC-P12 **Final Action: Accept**
(620.1)

Submitter: Code-Making Panel 12,
Recommendation: Revise FPNs in 620.1 to read as follows:
FPN No. 1: For further information, see ~~ASME A17.1-2004~~ ASME A17.1-2007/CSA B44-07, Safety Code for Elevators and Escalators.
FPN No. 3: The term wheelchair lift has been changed to platform lift. For further information, see ~~ASME A18.1–2003~~ ASME A18.1-2008, Safety Standard for Platform Lifts and Stairway Lifts.
Revise FPN in 620.23 to read as follows:
FPN: See ~~ASME A17.1-2004~~ ASME A17.1-2007/CSA B44-07, Safety Code for Elevators and Escalators, for illumination levels.
Revise FPN in 620.24 to read as follows:
FPN: See ~~ASME A17.1-2004~~ ASME A17.1-2007/CSA B44-07, Safety Code for Elevators and Escalators, for illumination levels.
Revise FPN in 620.51 to read as follows:
FPN: For additional information, see ~~ASME A17.1-2004~~ ASME A17.1-2007/CSA B44-07, Safety Code for Elevators and Escalators.
Revise FPN in 620.91 to read as follows:
FPN: See ~~ASME A17.1-2004~~ ASME A17.1-2007/CSA B44-07, Safety Code for Elevators and Escalators, ~~and CSA B44-04, Elevator and Escalator Electrical Equipment Certification Standard~~ 2.27.2, for additional information.
Substantiation: The latest Edition of the A17.1 Safety Code for Elevators and Escalators is now a fully bi-national standard for the US and Canada thereby necessitating the new designation. A18.1 now has a new Edition as well.
The FPN notes in the above referenced articles should reflect the latest Edition of the referenced standards.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-17 Log #2449 NEC-P12 **Final Action: Reject**
(620.2.Power Safe Protector (PSP))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:
Article 100
DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.
Substantiation: If 620.85 for PSP is accepted,a definition may be required. A proposal is also being sent to Article 100.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided definitive substantiation that changes are necessary.
There are no product requirements for power safe protector (PSP) protection. A thorough study of wiring device failure mechanisms and the ability of this technology to mitigate these hazards is warranted before such devices should be mandated in the code. The NEC does not currently prohibit installation of these devices.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MARCOVICI, S.: The design of the PSP which incorporates the functions of the GFCI and of the AFCI, appears to be acceptable. However, the new paradigm being introduced, of having the receptacles energized only at the time of plug-insertion, requires further evaluation. The main concern about this product is it's unproven reliability and the fact that it is not listed yet.

12-18 Log #716 NEC-P12 **Final Action: Reject**
(620.3(A))

Submitter: Joe Tedesco, Boston, MA
Recommendation: Insert new FPN: NFPA 70E-2009, Standard for Electrical Safety in the Workplace, covers arc flash hazard analysis, 130.3.
Substantiation: NFPA 70E does not require signs reading: "DANGER HIGH VOLTAGE KEEP OUT".
Panel Meeting Action: Reject
Panel Statement: The necessity of the FPN in the proposal is not understood, and the substantiation does not clarify the need for it.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-19 Log #257 NEC-P12 **Final Action: Reject**
(620.11(A))

Submitter: Keith Bunish, Next Level Services Inc.
Recommendation: Revise text to read as follows:
620.11(A) Elevator Hoistway Door Interlock Wiring. The conductors to the hoistway door interlocks from the hoistway riser shall be flame retardant and suitable for a temperature of not less than 200°C (392°F). Conductors shall be Type SF or equivalent.
Exception No. 1: Freight Elevators not for general public use with mechanical door interlocks whereby the lift must be physically present to allow the door to be opened.
Substantiation: The use of type SF wiring for a dumbwaiter door interlock which cannot carry people, emergency personnel, or present a hazard whereby the door is opened and someone walks into the hoistway without the lift being present should not be required to have type SF wiring. Hence, the new text specifies "Elevator" specifically to exclude dumbwaiters. Additionally, the Exception suggested is for freight elevators that are not for public use and only those elevators with mechanical interlocks that unlocked the door only when the lift is present, thus, eliminating any concern of walking into an open hoistway. This type of interlock still contains a control circuit switch that verifies the doors are closed before the lift is allowed to move, but this control circuit is no less disabling of lift movement than i.e., the lift position limit switches in the hoistway. Hence, I question the logic of this requirement for interlocks while excluding other control circuits and believe an additional Exception should be created where "smart" controls automatically react to fire/smoke detection and bypass these circuits.
Panel Meeting Action: Reject

Panel Statement: The submitter assumes that the reason for type SF or equivalent wiring is to protect against someone walking through open doors into a hoistway without the elevator being there. In fact, the requirement for this type of wiring is to assure that the elevator, dumbwaiter, etc. will not inadvertently run with doors open due to shorting of the interlock wiring due to a fire or after a fire situation. Dumbwaiters and freight elevators are loaded and unloaded and if they were to move during such work, the freight handler or operator of the dumbwaiter would be at great risk.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-20 Log #1259 NEC-P12 **Final Action: Accept**
(620.21(A)(1))

Submitter: Andy Juhasz, Kone, Inc. / Rep. NEII (National Elevator Industry Inc.)
Recommendation: Revise text to read as follows:

620.21 Wiring Methods.

Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C).

(A) Elevators.

(1) Hoistways.

~~(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit shall be permitted in hoistways between risers and limit switches, interlocks, operating buttons, and similar devices.~~

(~~b~~a) Cables used in Class 2 power-limited circuits shall be permitted to be installed between risers and signal equipment and operating devices, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(~~c~~b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted in lengths not to exceed 1.8 m (6 ft), provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(~~d~~c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit
(2) Liquidtight flexible metal conduit
(3) Liquidtight flexible nonmetallic conduit
(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of the following:

a. Listed equipment
b. A driving machine, or
c. A driving machine brake

Exception 620.21(A)(1)(c)(1), (2) and (3): the length is not limited between risers and limit switches, interlocks, operating buttons and similar devices.

(~~e~~d) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage.

Substantiation: 620.21(A)(1)(d) was revised for clarification in the 2008 Edition and inadvertently affected the wiring methods permitted in 620.21(A)(1)(a).

Since at least the 1951 Edition of the National Electrical Code [see 6206a], flexible metal conduit has been permitted by the NEC as an approved wiring method in hoistways between riser and limit switches, interlocks, push buttons or similar devices. The length of these wiring methods has never been limited between the riser and the specified devices and indeed has been used for the full length between the riser and these devices. These provisions have evolved to the current requirements in 620.21(A)(1)(a) to include liquidtight flexible metal conduit, and liquidtight flexible nonmetallic conduit.

The provisions of 620.21(A)(1)(d) first appeared in the 2002 Edition of the NEC, and the substantiation for their inclusion indicated that the same wiring methods for equipment located on the car or the counterweight [see Articles 620-21(a)(2)(d) and 620-21(a)(4)] should be afforded to the same type of equipment or driving machines located in the hoistway itself. The substantiation for the clarification of 620.21(A)(1)(d) in the 2008 Edition stated that "The current wording is not grammatically correct and leads to misinterpretation. It is only the flexible cords and cables or conductors grouped together and taped or corded that are not required to be installed in a raceway. The other methods listed are raceways themselves. For clarity revise the wording as shown in the proposal."

This proposal clarifies that this important and long used wiring method can be used for the full length from the riser to the specified devices.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MARCOVICI, S.: The proposed Exception replaces 620.21(A)(1)(a). For clarity reasons, the text of the Exception should be changed to read: "Exception: The length of flexible metal conduit, liquidtight flexible metal conduit or liquidtight flexible nonmetallic conduit shall not be limited when used between risers and limit switches, interlocks, operating buttons and similar devices.

12-21 Log #1391 NEC-P12 **Final Action: Accept in Principle**
(620.21(A)(1))

Submitter: Geraldine Burdeshaw, American Society of Mechanical Engineers (ASME)
Recommendation: Revise text to read as follows:

620.21 Wiring Methods.

Conductors and optical fibers located in hoistways, in escalator and moving walk wellways, in platform lifts, stairway chairlift runways, machinery spaces, control spaces, in or on cars, in machine rooms and control rooms, not including the traveling cables connecting the car or counterweight and hoistway wiring, shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, rigid nonmetallic conduit, or wireways, or shall be Type MC, MI, or AC cable unless otherwise permitted in 620.21(A) through (C).

(A) Elevators.

(1) Hoistways.

~~(a) Flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit shall be permitted in hoistways between risers and limit switches, interlocks, operating buttons, and similar devices.~~

(~~b~~a) Cables used in Class 2 power-limited circuits shall be permitted to be installed between risers and signal equipment and operating devices, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(~~c~~b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted in lengths not to exceed 1.8 m (6 ft), provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.

(~~d~~c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft):

(1) Flexible metal conduit
(2) Liquidtight flexible metal conduit
(3) Liquidtight flexible nonmetallic conduit
(4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from physical damage and shall be of a flame-retardant type and shall be part of the following:

a. Listed equipment
b. A driving machine, or
c. A driving machine brake

Exception 620.21(A)(1)(c)(1), (2) and (3): the length is not limited between risers and limit switches, interlocks, operating buttons and similar devices.

(~~e~~d) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage.

Substantiation: 620.21(A)(1)(d) was revised for clarification in the 2008 Edition and inadvertently affected the wiring methods permitted in 620.21(A)(1)(a).

Since at least the 1951 Edition of the National Electrical Code [see 6206a], flexible metal conduit has been permitted by the NEC as an approved wiring method in hoistways between riser and limit switches, interlocks, push buttons or similar devices. The length of these wiring methods has never been limited between the riser and the specified devices and indeed has been used for the full length between the riser and these devices. These provisions have evolved to the current requirements in 620.21(A)(1)(a) to include liquidtight flexible metal conduit, and liquidtight flexible nonmetallic conduit.

The provisions of 620.21(A)(1)(d) first appeared in the 2002 Edition of the NEC, and the substantiation for their inclusion indicated that the same wiring methods for equipment located on the car or the counterweight [see Articles 620-21(a)(2)(d) and 620-21(a)(4)] should be afforded to the same type of equipment or driving machines located in the hoistway itself. The substantiation for the clarification of 620.21(A)(1)(d) in the 2008 Edition stated that "The current wording is not grammatically correct and leads to misinterpretation. It is only the flexible cords and cables or conductors grouped together and taped or corded that are not required to be installed in a raceway. The other methods listed are raceways themselves. For clarity revise the wording as shown in the proposal."

This proposal clarifies that this important and long used wiring method can be used for the full length from the riser to the specified devices.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 12-20.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MARCOVICI, S.: See My Affirmative With Comment on 12-20.

12-22 Log #1858 NEC-P12 **Final Action: Reject**
(620.21(A)(1)(b))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (b): Cables used in Class 2 power-limited circuits shall be permitted to be installed between risers and signal equipment and operating devices, provided the cables are supported by identified means and where likely to be subject to physical damage, protected by approved means, and the cables are of a jacketed and flame retardant type.
Substantiation: Edit. Support means should be identified for the use. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided definitive substantiation that the changes are necessary. These same provisions are required in other articles of the code and have withstood the test of time.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-23 Log #507 NEC-P12 **Final Action: Reject**
(620.22(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" to comply with the NEC Style Manual.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter".
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MARCOVICI, S.: In any industry standard, a definition determines the spelling of a certain term. In Article 100 of the NEC, GFCI is spelled without a hyphen, while in section 210.8 there is one. The Correlating Committee should reconcile and provide consistency.

12-24 Log #508 NEC-P12 **Final Action: Reject**
(620.23(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" to comply with the NEC Style Manual.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter".
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MARCOVICI, S.: See My Affirmative With Comment on 12-23.

12-25 Log #509 NEC-P12 **Final Action: Reject**
(620.24(A))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" to comply with the NEC Style Manual.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter".
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MARCOVICI, S.: See My Affirmative With Comment on 12-23.

12-26 Log #1172 NEC-P12 **Final Action: Reject**
(620.37(D))

TCC Action: It was the action of the Technical Correlating Committee that the NEC Technical Correlating Committee Task Group on Broader Issues be expanded to include members from Code-Making Panel 12, members of the NFPA 72 Technical Committee, and ASME A17.1, Safety Code for Elevators and Escalators, to study and resolve this issue.
Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 620.37(D) to read as follows:
"(D) Fire Alarm System Interface. Elevator control wiring used to effect elevator recall shall not extend beyond the room or space containing the elevator controls."
Substantiation: NFPA 72 no longer permits the use of auxiliary contacts on smoke detectors to actuate elevator recall, which in essence requires the use of control modules located at the elevator controls. However, some jurisdictions do not widely adopt NFPA 72, National Fire Alarm Code. This proposed change is necessary in those jurisdictions that do not adopt NFPA 72, in order to ensure that auxiliary contacts are not used. The primary reason for this requirement is because the wiring must be monitored for integrity. The use of auxiliary contacts on smoke detectors does not result in monitored circuits, and is inherently less reliable.
Acceptance of this proposal will enhance the correlation between the NEC, ASME A17.1, Safety Code for Elevators and Escalators and NFPA 72, National Fire Alarm Code.
This proposal is the work of the NEC TCC Task Group on Broader Fire Alarm Issues. Task Group Members include: Mark Ode, Ron Janikowski, Tom Norton, and Wayne Moore.
Panel Meeting Action: Reject
Panel Statement: This is yet another attempt to extend adoption of NFPA 72 "requirements". NFPA 70 is for the practical safeguarding of persons and property from hazards arising from the use of electricity, not one for the supervision of wiring or extending the adoption of NFPA 72. The submitter's proposal to require the outputs to be kept within the room, or space containing the elevator controls goes beyond what is required in NFPA 72, Article 6.15.2.2, which only requires the interface to be within 1 m (3 ft) of the controlled circuit or appliance.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
CROUSHORE, T.: It is understood that this proposal was created by a technical group dealing with broader fire alarm issues in an attempt to unify requirements between The Fire Alarm Code (NFPA 72) and The National Electrical Code (NFPA 70). It is also noted that this proposal is not the first proposal that CMP-12 has seen on this topic as noted in the strong words of the panel statement.
In my opinion as Panel Chair, the Fire Alarm folks are trying to put a requirement on the elevator folks that the elevator folks do not want nor do they believe is necessary. In short, the fire alarm folks want this specific requirement and elevator folks do not. Therefore, until the Fire Alarm folks work out a compromise with the elevator folks for a requirement in this section, this proposal will continue to be rejected. As panel chair, I have attempted to facilitate such discussion between the interested parties. I am optimistic that the issues can be understood and resolved if both groups work together.
MARCOVICI, S.: It would be helpful to verify the correlation between NFPA 72 and ASME A17.1.

12-27 Log #1847 NEC-P12 **Final Action: Reject**
(620.43)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: Traveling cables shall be located so as to ~~reduce to a minimum~~ minimize the likelihood of damage due to the cables coming into contact with the hoistway construction or equipment in the hoistway.
Substantiation: Edit. "Minimum" is subjective, difficult to ascertain. "Likelihood" describes a nature or circumstance as to make something probable. "Likely" is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided definitive substantiation that the changes are necessary. The current wording is well understood and has withstood the test of time.
The proposed change is not editorial in nature.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-28 Log #1576 NEC-P12 **Final Action: Reject**
(620.51 Exception No. 1)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
Exception No. 1: Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means **shall be lockable and** shall be listed**.** ~~and shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-29 Log #1573 NEC-P12 **Final Action: Reject**
(620.51(A))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(A) Type. The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker**.** ~~capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~
The disconnecting means **shall be lockable and** shall be ~~a~~ listed**.** ~~device.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-30 Log #1574 NEC-P12 **Final Action: Reject**
(620.51(B))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(B) Operation. No provision shall be made to open or close this **lockable** disconnecting means from any other part of the premises.
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-31 Log #1575 NEC-P12 **Final Action: Reject**
(620.51(C)(1))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(1) On Elevators Without Generator Field Control. On elevators without generator field control, the **lockable** disconnecting means shall be located within sight of the motor controller. Where the motor controller is located in the elevator hoistway, the **lockable** disconnecting means required by 620.51(A) shall be located in a machinery space, machine room, control space or control room outside the hoistway; and an additional, ~~non-fused~~ enclosed externally operable **non-fused lockable disconnecting means** ~~motor circuit switch capable of being locked in the open position~~ to disconnect all ungrounded main **motor circuit** power-supply conductors shall be located within sight of the motor controller. The additional switch shall be a listed device and shall comply with 620.91(C).
~~The provision for locking or adding a lock to the disconnecting means, required by this section, shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
In addition, the submitter has not provided substantiation for the addition of the term "motor circuit" power-supply conductors.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-32 Log #1577 NEC-P12 **Final Action: Reject**
(620.53)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
620.53 Car Light, Receptacle(s), and Ventilation Disconnecting Means. Elevators shall have a single **lockable disconnecting** means for disconnecting all ungrounded car light, receptacle(s), and ventilation power-supply conductors for that elevator car.
The **lockable** disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker capable of being locked in the open position and shall be located in the machine room or control room for that elevator car. ~~The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~ Where there is no machine room or control room, the **lockable** disconnecting means shall be located in a machinery space or control space outside the hoistway that is readily accessible to only qualified persons.
All disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose light source they control.
All ~~The~~ disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-33 Log #3951 NEC-P12 **Final Action: Accept in Principle**
(620.53 Exception No. 1 (New))

Submitter: Daniel Winslow, CNY Elevator Consultants
Recommendation: Add new text as follows:
Exception No. 1: Where an individual branch circuit supplies car lighting, receptacle(s), and a ventilation motor not exceeding 2-hp, the disconnecting means required by 620.53 shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at the disconnecting means and shall remain with the equipment.
Substantiation: The proposed exception duplicates the exception to use a general-use switch as a disconnecting means in *"Part 620.51 Disconnecting Means"* Exception 1, when that switch conforms *to Part 430 Disconnecting means 430.109(C)* for stationary motors 2 horsepower or less. In a case where the disconnect services only a car light and/or car receptacle(s), a fused-motor circuit switch in the machine space is completely unnecessary. Additionally, in the overwhelming number of cases where the same circuit also supplies ventilation, a standard car ventilation fan motor is 1/2 HP or less (most commonly 1/4 HP or less). Where larger elevator cab ventilation systems with heating or air conditioning are used, they are covered already in 620.54. See also 620.55 which also recognizes that fused motor circuit is not required for

"Other Utilization Equipment" recognizing that a fused motor circuit is not necessary for all uses. ASME A17.1 does not require a fused motor circuit leaving it up to NFPA to define. This proposal will lower the cost of construction without any reduction in safety.

Panel Meeting Action: Accept in Principle

Add new text as follows:

Exception: Where an individual branch circuit supplies car lighting, receptacle(s), and a ventilation motor not exceeding 2-hp, the disconnecting means required by 620.53 shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at the disconnecting means and shall remain with the equipment.

Panel Statement: CMP-12 removes the submitter's reference to No. 1 as there is only one exception.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-34 Log #1578 NEC-P12 **Final Action: Reject**
(620.54)

Submitter: Stanley J. Folz, Henderson, NV

Recommendation: Revise text to read as follows:

620.54 Heating and Air-Conditioning Disconnecting Means.

Elevators shall have a single **lockable disconnecting** means for disconnecting all ungrounded car heating and air-conditioning power-supply conductors for that elevator car.

The **lockable** disconnecting means shall be ~~an enclosed externally operable fused motor circuit switch or circuit breaker~~**,** ~~capable of being locked in the open position and shall be~~ located in the machine room or control room for that elevator car~~. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~ Where there is no machine room or control room, the **lockable** disconnecting means shall be located in a machinery space or control space outside the hoistway that is readily accessible to only qualified persons.

Where there is equipment for more than one elevator car in the machine room, ~~the~~ **all** disconnecting means shall be numbered to correspond to the identifying number of the elevator car whose heating and air-conditioning source they control.

All ~~The~~ disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 12-13.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-35 Log #1579 NEC-P12 **Final Action: Reject**
(620.55)

Submitter: Stanley J. Folz, Henderson, NV

Recommendation: Revise text to read as follows:

620.55 Utilization Equipment Disconnecting Means.

Each branch circuit for other utilization equipment shall have a single **locking disconnecting** means for disconnecting all ungrounded conductors. The **lockable** disconnecting means shall ~~be capable of being locked in the open position and shall~~ be located in the machine room or control room/machine space or control space. ~~The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~

Where there is more than one branch circuit for other utilization equipment, ~~the~~ **all** disconnecting means shall be numbered to correspond to the identifying number of the equipment served. ~~The~~ **All** disconnecting means shall be provided with a sign to identify the location of the supply side overcurrent protective device.

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 12-13.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-36 Log #3689 NEC-P12 **Final Action: Reject**
(620.62)

Submitter: Christopher G. Walker, Eaton Corp.

Recommendation: Add new text to read as follows:

<u>Where ground-fault protection has been provided for the operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, and has been provided per 620.61(C) or 620.61(D), then an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load.</u>

<u>Where ground-fault protection has been provided, these means shall be selectively coordinated such that the feeder level device, but not the service level device, shall open on ground faults on the load side of the feeder level device.</u>

<u>A 6 cycle minimum separation time between the service and feeder ground fault trip response bands shall be provided.</u>

Substantiation: Ground faults are typically believed to be the most common type of fault experienced in operating energized electrical systems, per ANSI/IEEE Std 242-1986 Buff book, chapter 7. Professional design engineers tell stories of ballast or small motor failures that have caused main or feeder devices to open. Why is this so? In some instances, a ground fault condition existed that went undetected and precipitated the protective device to open. In other cases, ground fault protective devices were improperly set, or not set at all. In others, a selective coordination study may not have been done, or may have been done improperly.

Therefore, with the goal of using selective coordination as the process by which electrical systems may achieve maximum uptime, it is important that all the key areas of impact are addressed in the design of these electrical systems.

The NEC has for many years required ground fault protection of equipment, but only at the service disconnect level (with noted special exceptions), per 230.95. The relatively recent 2005 and 2008 NEC versions, requires selective coordination in applications related to life safety, public safety, and/or national security applications where reliable electrical power systems are required.

These relatively new requirements for selective coordination in these types of applications are needed throughout the entire service level, feeder and branch levels of the electrical system.

With the goal in mind of maximizing the reliability and uptime of electrical systems, and giving consideration that the most common types of faults are ground fault related, it becomes a reasonable approach that whenever selective coordination is required by the Code, that the requirements for ground fault protection of equipment be extended to all appropriate areas in the electrical system beyond just the service level.

This proposal, therefore, seeks to clarify that the selective coordination requirements of Article 620.62 applies to both phase faults and ground faults, and that where ground fault protection of equipment is provided, that the ground fault protective devices shall be selectively coordinated in all applicable levels of the system.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided definitive substantiation that the changes are necessary for elevator feeders.

The intent of this proposal is to make sure that the system remains selectively coordinated for all fault conditions, including ground faults. But, the selective coordination required by 620.62 already includes all types of overcurrents, including, but not limited to, phase-to-phase and three-phase faults, and phase-to-ground, double phase-to-ground, and three phase-to-ground faults. As such, the intent of this proposal is already met, because total selective coordination is already required for all types of overcurrents, including ground faults.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-37 Log #4378 NEC-P12 **Final Action: Reject**
(620.62)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Alan Manche, Square D Company/Schneider Electric
Recommendation: Add a new sentence to the end of the main paragraph of 620.62:
A means to intentionally defeat selectivity shall not be permitted.
Substantiation: Although selectivity was placed in the NEC based on the lack of identification between the location of the feeder serving the branch circuit device, the panel continues to support the requirement for selective coordination, even after that identification was addressed in the following code development cycle. The panel clearly is taking a position that selectivity is included for life safety reasons for egress purposes or getting emergency personnel to an upper floor to address the situation. Establishing selectively coordinated systems can increase the arc-flash hazard when maintenance is performed on the system depending upon the design of the system. The concern of increased arc-flash hazard was presented to the panel in past cycles and the panel accepted those risks in favor of the benefit of selectivity on these systems. Some system designers are now including a means to defeat selectivity by installing systems that can turn the selectivity off by temporarily changing breaker settings via a switch or sensor in order to protect the electrical worker. There is no prohibition established in the NEC to restrict defeating selectivity, or the life safety aspect for which it was installed, in order to protect the electrical worker.

Unfortunately the enhanced protection for the electrical worker can be a trade-off by defeating the life safety function of the selectively coordinated system in the egress system or means to access the emergency situation provided by the elevator. The most likely time for an incident to happen that would require the system to be selective is when a working is doing maintenance on the system. If the selectivity is defeated, an arc event small or large could initiate a fire hazard or take down lighting, ventilation, or egress / access provisions that are critical to serve the structure in the event of an emergency which places the life safety of others in a dangerous position.

There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 2 Negative: 10
Explanation of Negative:

ANDERSON, W.: The NEC should not prohibit any measures to increase personnel safety.

Primary direction of NFPA 70E is to De-Energize electrical equipment for worker safety.

A hazard risk analysis is required to consider protective device selectivity to optimize protection for personnel.

If any work needs to be performed on energized equipment a hazard risk analysis must be conducted justifying why the system can not be de-energized. A similar requirement for first de-energizing electrical equipment unless it is infeasible to do so exists in OSHA subpart S.

CROUSHORE, T.: There are reasons to defeat selective coordination when qualified personnel are working upon energized equipment to prevent higher incident energy release when an arc-flash is accidentally created. This proposal should have been rejected.

HEDGES, T.: The proposed text will eliminate the use of, adjustable trip circuit breakers, zone selective interlocking and energy reduction maintenance switches. These methods have been successfully employed in electrical systems, including selectively coordinated systems for many years. A review of the submitters' substantiation clearly reveals a desire to eliminate manual energy reduction maintenance switches. The last sentence of the substantiation states "There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety." Selective coordination is required in 620.62 to provide the highest degree of reliability possible. It is imperative to note that when a building owner decides to perform energized work, the system reliability is severely compromised. If a fault is created during the course of energized work, there will be an outage, a loss of power will occur.
There is no practical reason to prohibit the continued use of adjustable trip circuit breakers, zone selective interlocking and energy reduction maintenance switches in selectively coordinated systems. The preferred method of a single manufacturer is not adequate substantiation to eliminate other proven methods.

KOVACIK, J.: Due to the nature of the comments, and the fact that most were not introduced during the discussions on the proposal at the ROP meeting, we believe the original proposal needs further discussion by the entire panel during the next stage of this revision cycle.

LOTTMANN, T.: A system that is selectively coordinated can be designed to additionally limit the amount of energy produced in an arc flash event. Where a system is selectively coordinated using circuit breakers without instantaneous trips the inclusion of an energy reducing maintenance switch for the protection of persons maintaining the system may be required. Selectively coordinated systems as required in Articles 620, 700, 701, and 708 represent electrical systems in venues that are likely to meet the justification requirements of NFPA 70E for energized work. It is not desirable to prohibit a means to reduce the amount of let-through energy in these systems while energized work is being performed.

MARCOVICI, S.: The added sentence is basically a clarification to the requirement of this section. Accordingly, this clarification is redundant and unnecessary. The section is very clear about the requirement for selectivity.

MCCLINTOCK, T.: The submitter has raised some very valid points in regard to electrical worker safety. While we must strike a balance between maintaining the integrity of the means of egress and ensuring fire department access, it is equally important to protect worker safety. The substantiation states there are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety; however none of "these solutions" have been included in the proposal. Furthermore, have there been any documented incidents wherein the selective coordination was bypassed and resulted in injury? This proposal should provide more direction to the code user as to what should be provided to accomplish both selectivity and reduce the incident energy to protect from arc-flash hazards.

QUAVE, D.: The proposed text will eliminate the use of, adjustable trip circuit breakers, zone selective interlocking and energy reduction maintenance switches. These methods have been successfully employed in electrical systems, including selectively coordinated systems for many years. A review of the submitters' substantiation clearly reveals a desire to eliminate manual energy reduction maintenance switches. The last sentence of the substantiation states "There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety." The submitter is referring to the preferred method of the manufacturer he represents. This preferred method is the use of zone selective interlocking. This manufacturer states that their "preferred method" does … "not involve compromises to selective coordination." It is an opinion not shared by other manufacturers or the electrical industry in general. See the preferred method of this manufacturer at:
http://www.powerlogic com/downloads/3000DB0810R608_ArcFlash.pdf

Selective coordination is required in 620.62 to provide the highest degree of reliability possible. It is imperative to note that when a building owner decides to perform energized work, the system reliability is severely compromised. If a fault is created during the course of energized work, there will be an outage, a loss of power will occur.
There is no practical reason to prohibit the continued use of adjustable trip circuit breakers, zone selective interlocking and energy reduction maintenance switches in selectively coordinated systems. The preferred method of a single manufacturer is not adequate substantiation to eliminate other proven methods.
SCHAMEL, D.: Reject this proposal. For electrical worker safety, it is not appropriate to prohibit a system that reduces incident energy levels while performing energized work.

WHITE, K.: By eliminating the use of a maintenance bypass switch you have removed additional protection, that could be provided to the electrician who is being exposed to the electrical hazard. This switch reduces the trip values for the associated equipment and this will reduce the arc flash hazard. The logic behind the proposal was that you could strand other folks who are using the elevator. The only time that this switch would be used is if there is a problem with the elevator. So it should be taken out of service for use anyways, because there is a problem. Also by using this logic you are sacrificing the electrician for the rest of the folks who might be inconvenienced by using another elevator or using the stairs.

12-38 Log #4650 NEC-P12 **Final Action: Reject**
(620.62 Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following exception and fine print note:
Exception: Where the elevator system electrical design is under the control of a licensed professional engineer engaged in the design or maintenance of electrical installations, the selection of overcurrent protective devices shall be permitted to coordinate to the extent practicable. The design shall be documented, stamped by the professional engineer, and made available for review by the authority having jurisdiction.
FPN: Overcurrent protective devices used for elevator circuit protection, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system.
Substantiation: The current NEC rule is being improperly used to drive the market share of a particular species of overcurrent protective device, often frustrating legitimate design objectives of the engineering community, and without any documented loss experience to justify such a consequence. The submitter has attended meetings where compelling testimony was received from engineers that have been subjected to extraordinary hardship resulting from the lack of flexibility in the current NEC provisions. This proposal is consistent with NFPA 110 (which language underlies the fine print note) and provides the necessary flexibility to allow competent engineering work that maintains selective coordination as an important element in the electrical design process, but not to the exclusion of all other issues.
Panel Meeting Action: Reject

Panel Statement: The proposed language will be unenforceable and reduces the safety of elevator systems by limiting the selectivity of overcurrent devices without providing any technical substantiation to support the request for the reduction in safety for these elevator circuits. Selectively coordinated overcurrent protective devices provide the desired level of system reliability necessary for elevator circuits.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-39 Log #2450 NEC-P12 **Final Action: Reject**
(620.85)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:

620.85 ~~Ground-Fault Circuit-Interrupter~~ Power Safe Protector Protection for Personnel. Each 125-volt, single-phase, 15- and 20-ampere receptacle installed in pits, in hoistways, on elevator car tops, and in escalator and moving walk wellways shall be of the ~~ground-fault circuit-interrupter~~ power safe protector type.

All 125-volt, single-phase, 15- and 20-ampere receptacles installed in machine rooms and machinery spaces shall have ~~ground-fault circuit-interrupter~~ power safe protector protection for personnel.

A single receptacle supplying a permanently installed sump pump shall not require ~~ground-fault circuit-interrupter~~ power safe protector protection.

Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:

1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.

2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.

3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-17.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-40 Log #1260 NEC-P12 **Final Action: Accept**
(620.91(C))

Submitter: Andy Juhasz, Kone, Inc. / Rep. NEII (National Elevator Industry Inc.)
Recommendation: Revise text to read as follows:

620.91 Emergency and Standby Power Systems.

(C) Disconnecting Means. The disconnecting means required by 620.51 shall disconnect the elevator from both the emergency or standby power system and the normal power system.

Where an additional power source is connected to the load side of the disconnecting means, <u>which allows automatic movement of the car to permit evacuation of passengers,</u> the disconnecting means required in 620.51 shall be provided with an auxiliary contact that is positively opened mechanically, and the opening shall not be solely dependent on springs. This contact shall cause the additional power source to be disconnected from its load when the disconnecting means is in the open position.

Substantiation: The requirement for this additional contact on this disconnecting means first appeared in the 1996 Edition of the NEC as a result of NFPA 70 A95 ROP Proposal 12-32 and 12-85. The substantiation for adding 620.91(c) stated "to harmonize with the Canadian Electrical Code requirements in Section 38-036(3). The auxiliary contact prevents the operation of the elevator when the disconnecting means is open." At that time equipment was appearing in the marketplace that provided an additional power source that when normal and emergency or standby power was all lost or unavailable on hydraulic elevators, the additional power source would permit the elevator to be automatically recalled to the bottom landing and doors were automatically opened to allow passengers to evacuate from the elevator. Unfortunately the loss of power or the opening of the disconnecting means is rather indistinguishable to the elevator control and automatic movement of the elevator with the disconnecting means open posed a hazard to elevator personnel working on the equipment. Thus the contact on the disconnecting means is used to prevent the automatic operation of the elevator when the disconnect contact is open. These power sources' capacities were limited and generally allowed only the recall to the bottom landing.

In the 1999 Edition, 620.91(C) was revised as a result of NFPA 70 A98 ROP Proposal 12-76. That proposal stated: "Revise opening sentence of second paragraph to read as follows:

"…the disconnecting means required in Section 620-51 shall ~~include~~ <u>be provided with</u> an auxiliary contact <u>that is positively opened mechanically and the opening shall not be solely dependent on springs</u>. This contact shall … in the open position." The substantiation stated: "To harmonize with CEC C22.1-1994, Rule 38-026." The Panel Action was to accept with 13 out of 13 panel members eligible to vote, voting affirmative. No additional action was taken regarding this proposal or section in the ROC.

Inexplicably the second paragraph was published with the following changes: "Where an additional power source is connected to the load side of the disconnecting means~~, which allows movement of the car to permit evacuation of passengers~~, the disconnecting means required in Section 620-51 shall ~~include~~ <u>be provided with</u> an auxiliary contact <u>that is positively opened mechanically and the opening shall not be solely dependent on springs.</u>. This contact shall …in the open position."

620.91(C) has remained like this since then and it was never recognized that the additional wording "which allows movement of the car to permit evacuation of passengers" was deleted. This is clearly an Editorial error. The wording "which allows movement of the car to permit evacuation of passengers" was never intended or voted to be removed.

Today with the advent of machineroom-less elevators and high efficiency machine designs these additional power sources are now also being used on traction elevators making it even more important that 620.91(C) be correct and clarified. Additionally the elevator code has changed in recent years to require some elevators to have manual movement capabilities when normal and emergency and standby power may not be available. The Code allows the use of additional power sources to perform this function, thereby necessitating the addition of the wording "automatic", which as has been described earlier was always the intention.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MARCOVICI, S.: It would be helpful to verify the correlation with ASME A17.1.

12-41 Log #1390 NEC-P12 **Final Action: Accept in Principle**
(620.91(C))

Submitter: Geraldine Burdeshaw, American Society of Mechanical Engineers (ASME)
Recommendation: Revise text to read as follows:

620.91 Emergency and Standby Power Systems.

(C) Disconnecting Means. The disconnecting means required by 620.51 shall disconnect the elevator from both the emergency or standby power system and the normal power system.

Where an additional power source is connected to the load side of the disconnecting means, <u>which allows automatic movement of the car to permit evacuation of passengers,</u> the disconnecting means required in 620.51 shall be provided with an auxiliary contact that is positively opened mechanically, and the opening shall not be solely dependent on springs. This contact shall cause the additional power source to be disconnected from its load when the disconnecting means is in the open position.

Substantiation: The requirement for this additional contact on this disconnecting means first appeared in the 1996 Edition of the NEC as a result of NFPA 70 A95 ROP Proposal 12-32 and 12-85. The substantiation for adding 620.91(c) stated "to harmonize with the Canadian Electrical Code requirements in Section 38-036(3). The auxiliary contact prevents the operation of the elevator when the disconnecting means is open." At that time equipment was appearing in the marketplace that provided an additional power source that when normal and emergency or standby power was all lost or unavailable on hydraulic elevators, the additional power source would permit the elevator to be automatically recalled to the bottom landing and doors were automatically opened to allow passengers to evacuate from the elevator. Unfortunately the loss of power or the opening of the disconnecting means is rather indistinguishable to the elevator control and automatic movement of the elevator with the disconnecting means open posed a hazard to elevator personnel working on the equipment. Thus the contact on the disconnecting means is used to prevent the automatic operation of the elevator when the disconnect contact is open. These power sources' capacities were limited and generally allowed only the recall to the bottom landing.

In the 1999 Edition, 620.91(C) was revised as a result of NFPA 70 A98 ROP Proposal 12-76. That proposal stated: "Revise opening sentence of second paragraph to read as follows:

"…, the disconnecting means required in Section 620-51 shall ~~include~~ <u>be provided with</u> an auxiliary contact <u>that is positively opened mechanically and the opening shall not be solely dependent on springs</u>. This contact shall … in the open position." The substantiation stated: "To harmonize with CEC C22.1-1994, Rule 38-026." The Panel Action was to accept with 13 out of 13 panel members eligible to vote, voting affirmative. No additional action was taken regarding this proposal or section in the ROC.

Inexplicably the second paragraph was published with the following changes:

"Where an additional power source is connected to the load side of the disconnecting means~~, which allows movement of the car to permit evacuation of passengers~~, the disconnecting means required in Section 620-51 shall ~~include~~ be provided with an auxiliary contact that is positively opened mechanically and the opening shall not be solely dependent on springs. This contact shall …in the open position."

620.91(C) has remained like this since then and it was never recognized that the additional wording "which allows movement of the car to permit evacuation of passengers" was deleted. This is clearly an Editorial error. The wording "which allows movement of the car to permit evacuation of passengers" was never intended or voted to be removed.

Today with the advent of machineroom-less elevators and high efficiency machine designs these additional power sources are now also being used on traction elevators making it even more important that 620.91(C) be correct and clarified. Additionally the elevator code has changed in recent years to require some elevators to have manual movement capabilities when normal and emergency and standby power may not be available. The Code allows the use of additional power sources to perform this function, thereby necessitating the addition of the wording "automatic", which as has been described earlier was always the intention.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 12-40.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

MARCOVICI, S.: See My Affirmative With Comment on 12-40.

ARTICLE 625 — ELECTRIC VEHICLE CHARGING SYSTEM EQUIPMENT

12-42 Log #3961 NEC-P12 **Final Action: Accept in Principle**
(625.1)

TCC Action: The Technical Correlating Committee understands that the reference in the panel statement on Proposal 12-43a should be to Proposal 12-42a.

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council

Recommendation: Add new text as follows:

The provisions of this article cover the electrical conductors and equipment external to an electric vehicle that connect an electric vehicle to a supply of electricity by conductive or inductive means, and the installation of equipment and devices related to electric vehicle charging.

Wherever electric vehicle or electric vehicle supply equipment is referred to, it also includes plug-in hybrid electric vehicle or plug-in hybrid electric vehicle supply equipment.

Substantiation: Industry has developed a new type of vehicle with many similarities to electric vehicles with respect to their connection to a supply of electricity for vehicle charging. In the title and throughout the text of Article 625, there are multiple references to "electric vehicle" which could be alternatively modified to include "plug-in hybrid electric vehicle" as well. This particular proposal identifies plug-in hybrid electric vehicle supply equipment as an alternative and equivalent type of supply equipment. See definitions.

Panel Meeting Action: Accept in Principle

Panel Statement: CMP-12 accepts the intent of the submitter to include hybrid electric vehicle supply equipment within the definition of electric vehicle in Article 625. It is not necessary to include the plug-in hybrid electric vehicle in the scope text as it would be covered by the definition of electric vehicle.

See panel Proposal 12-43a and panel action on Proposal 12-43.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-42a Log #CP1200 NEC-P12 **Final Action: Accept**
(625.2)

Submitter: Code-Making Panel 12,

Recommendation: Add definition to 625.2 in alphabetical order to read as follows:

Plug-in Hybrid Electric Vehicle (PHEV): A hybrid vehicle intended for on-road use with the ability to store and use off-vehicle electrical energy in the rechargeable energy storage system. The PHEV also has a second source of motive power.

Substantiation: Industry has developed a new type of vehicle with many similarities to electric vehicles with respect to their connection to a supply of electricity for vehicle charging. In the title and throughout the text of Article 625, there are multiple references to "electric vehicle" which could be alternatively modified to include "plug-in hybrid electric vehicle" as well. This particular proposal identifies plug-in hybrid electric vehicle supply equipment as an alternative and equivalent type of supply equipment.

CMP-12 has worked in a Task Group and proposed this definition to be included in the definition of electric vehicle and in the scope.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

LOTTMANN, T.: This definition is not needed as the term "plug in hybrid electric vehicle" is not used anywhere in the requirements contained in Article 625. The inclusion of this term in the definition for electric vehicle will meet the intent of the submitter of proposal 12-42 which was the basis for the task group that created this panel proposal. NEMA questions whether this meets the NEC Style Manual Rules for definitions. The only place this term would be used is in another definition.

Comment on Affirmative:

MARCOVICI, S.: According to NREL, a plug-in hybrid-electric vehicle (PHEV) is a hybrid-electric vehicle (HEV) with the ability to recharge its electrochemical energy storage with electricity from an off-board source. A hybrid-electric vehicle is a vehicle propelled by an internal combustion engine and an electric motor generally powered by electric batteries.

12-43 Log #3962 NEC-P12 **Final Action: Accept in Principle**
(625.2.Electric Vehicle)

TCC Action: The Technical Correlating Committee understands that the reference in the panel statement to Proposal 12-43a should be to Proposal 12-42a.

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council

Recommendation: Revise text to read as follows:

Electric Vehicle. An automotive-type vehicle, licensable for on-road use, that plugs into a source of electricity to charge an on-board rechargeable energy storage system that powers an electric motor for vehicle propulsion for on-road use. ~~such as~~This includes passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and the like.~~, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current.~~ For the purpose of this article, electric motorcycles and similar type vehicles and off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

Substantiation: Industry has developed a plug-in hybrid electric vehicle with many similarities to electric vehicles with respect to their connection to a supply of electricity for vehicle charging. This particular proposal expands the definition of electric vehicle to include both types of vehicles. The term "licensable" has been added to reinforce the intent that these are vehicles complying with the Federal Motor Vehicle Safety Standards.

Panel Meeting Action: Accept in Principle

Revise the definition of electric vehicle to read as follows:

Electric Vehicle. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. Plug-in hybrid electric vehicles (PHEV) are considered electric vehicles. For the purpose of this article, electric motorcycles and similar type vehicles and off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

Panel Statement: See panel proposal 12-43a that defines plug-in hybrid electric vehicles.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-44 Log #3963 NEC-P12 **Final Action: Reject**
(625.2.Electric Vehicle)

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council

Recommendation: Revise text to read as follows:

Electric Vehicle. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current. For the purpose of this article, ~~electric motorcycles and similar type vehicles and~~ off-road, self-propelled electric vehicles, such as industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, boats, and the like, are not included.

Substantiation: Electric motorcycles have become another means of on-road electric transportation that uses a source of electricity to charge on-board batteries used as part of the propulsion system. These electric motorcycles are licensable and operate at voltages similar to other electric vehicles.

Panel Meeting Action: Reject

Panel Statement: CMP-12 rejects the revision to the definition for electric vehicle to include motorcycles.

Typically, motorcycles are charged from standard 120-volt,15-ampere receptacles due to lower battery capacity and would not be subject to the requirements of this article.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-45 Log #3964 NEC-P12 **Final Action: Accept in Principle**
(625.2.Electric Vehicle Connector)

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Revise text to read as follows:
Electric Vehicle Connector. A device that, by insertion into an electric vehicle inlet, establishes an electrical connection to the electric vehicle for the purpose of ~~charging~~power transfer and information exchange, see 625.26. This device is part of the electric vehicle coupler.
Substantiation: This proposed change acknowledges the bi-direction energy transfer as already permitted by Article 625.26, Interactive Systems.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Electric Vehicle Connector. A device that, by insertion into an electric vehicle inlet, establishes an electrical connection to the electric vehicle for the purpose of ~~charging~~ power transfer and information exchange. This device is part of the electric vehicle coupler.
Add FPN to read as follows:
For further information, see 625.26 for interactive systems.
Panel Statement: CMP-12 relocates the submitter's reference to 625.26 to a FPN.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
CROUSHORE, T.: Changing the term "charging" to "power transfer" in this definition reinforces the option to use a plug-in hybrid vehicle as an optional standby power system or a utility interactive power supply system as per the requirements of 625.26. However, care must be taken when operating a vehicle as a power production source and the issues of vehicle exhaust, fire hazard, and electrical safety must be part of the overall system to prevent fires, injuries, and fatalities. Further work should be investigated by other technical committees such that operation of a plug-in hybrid vehicle does not reduce the overall safety of the user. This additional technical investigation on these safety issues of an automotive vehicle providing power to premises wiring is beyond the scope of CMP-12.

12-46 Log #3965 NEC-P12 **Final Action: Accept in Principle**
(625.2.Electric Vehicle Inlet)

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Revise text to read as follows:
Electric Vehicle Inlet. The device on the electric vehicle into which the electric vehicle connector is inserted for ~~charging~~power transfer and information exchange, see 625.26. This device is part of the electric vehicle coupler. For the purposes of this Code, the electric vehicle inlet is considered to be part of the electric vehicle and not part of the electric vehicle supply equipment.
Substantiation: This proposed change acknowledges the bi-direction energy transfer as already permitted by Article 625.26, Interactive Systems.
Panel Meeting Action: Accept in Principle
Revise text to read as follows**:**
Electric Vehicle Inlet. The device on the electric vehicle into which the electric vehicle connector is inserted for ~~charging~~ power transfer and information exchange. This device is part of the electric vehicle coupler. For the purposes of this code, the electric vehicle inlet is considered to be part of the electric vehicle and not part of the electric vehicle supply equipment.
Add FPN to read as follows:
For further information, see 625.26 for interactive systems.
Panel Statement: CMP-12 relocated the submitter's reference to 625.26 to a FPN.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-47 Log #3967 NEC-P12 **Final Action: Reject**
(625.2.Electric Vehicle Nonvented Storage Battery)

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Delete text as follows:
~~Electric Vehicle Nonvented Storage Battery. A hermetically sealed battery, comprised of one or more rechargeable electrochemical cells, that has no provision for the release of excessive gas pressure, or for the addition of water or electrolyte, or for external measurements of electrolyte specific gravity.~~
Substantiation: Nonvented storage batteries have not been used in electric vehicle applications. The term can also be deleted in Article 625.29(C).
Panel Meeting Action: Reject
Panel Statement: CMP-12 chooses to retain the definition as such a product may be available.
CMP-12 disagrees with the substantiation as such a product was available.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-48 Log #1827 NEC-P12 **Final Action: Reject**
(625.2.Electric Vehicle Supply Equipment)

Submitter: Dan Leaf, Seneca, SC
Recommendation: ELECTRIC VEHICLE SUPPLY EQUIPMENT. Add: "Fixed" after "premises".
Substantiation: Edit. Though the electric vehicle supply cable is premises wiring, the intent appears to apply to fixed premises wiring.
Panel Meeting Action: Reject
Panel Statement: Electric supply vehicle equipment is not required to be fixed.
"Premises wiring" is a defined term.
The proposed change is not editorial in nature.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-49 Log #3966 NEC-P12 **Final Action: Accept in Principle**
(625.2.Electric Vehicle Supply Equipment)

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Revise text to read as follows:
Electric Vehicle Supply Equipment. The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of ~~delivering~~transferring energy between ~~from~~ the premises wiring ~~to~~and the electric vehicle, see 625.26.
Substantiation: This proposed change acknowledges the bi-direction energy transfer as already permitted by Article 625.26, Interactive Systems.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Electric Vehicle Supply Equipment. The conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of ~~delivering~~ transferring energy between ~~from~~ the premises wiring ~~to~~ and the electric vehicle.
Add FPN to read as follows:
For further information, see 625.26 for interactive systems.
Panel Statement: CMP-12 relocated the submitter's reference to 625.26 to a FPN.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-50 Log #3968 NEC-P12 **Final Action: Accept**
(625.2.Rechargeable Energy Storage System)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with 2.2.2 of the NEC Style Manual that states that definitions shall not contain the term being defined.
This action will be considered by the panel as a public comment.
Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Add new text as follows:
Rechargeable Energy Storage System. A rechargeable energy storage system is any energy storage system that has the capability to be charged and discharged. Examples include batteries, capacitors, and electro mechanical flywheels.
Substantiation: This definition updates the definition to include other technologies that could be used for energy storage systems such as capacitors. This definition is consistent with SAE J1715 "Hybrid Electric Vehicle (HEV) & Electric Vehicle (EV) Terminology" (revised February 2008).
Panel Meeting Action: Accept
Panel Statement: Editorial: Correct spelling of the term "electro mechanical" to "electromechanical"
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

LOTTMANN, T.: This definition is not needed as the term "rechargeable energy storage systems" is not used anywhere in the requirements contained in Article 625. The acceptance of this would add a definition for a term that was used in the definition for another term "plug in hybrid electric vehicles" that is used in the definition of electric vehicle. NEMA questions whether this meets the NEC Style Manual Rules for definitions. The only place this term would be used is in another definition.

Comment on Affirmative:

MARCOVICI, S.: Electromechanical flywheels are not commercial yet and should not be added. The code should only reference commercially ready technologies. Also, the type of capacitors used for energy storage are called "supercapacitors" or "ultracapacitors". Use of the term "capacitors" might lead to confusion.

12-51 Log #1826 NEC-P12 **Final Action: Accept in Principle**
(625.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 90.3.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 12-52.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-52 Log #2805 NEC-P12 **Final Action: Accept**
(625.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text

~~625.3 Other Articles.~~

~~Wherever the requirements of other articles of this Code and Article 625 differ, the requirements of Article 625 shall apply.~~

Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 625.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-53 Log #4286 NEC-P12 **Final Action: Accept in Principle**
(625.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.

~~625.3 Other Articles.~~

~~Wherever the requirements of other articles of this Code and Article 625 differ, the requirements of Article 625 shall apply.~~

Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 625.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 12-52.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-54 Log #3696 NEC-P12 **Final Action: Reject**
(625.13)

Submitter: Donald B. Karner, Electric Transportation Engineering Corp.
Recommendation: Revise text to read as follows:

Electric vehicle supply equipment rated at 125 volts, single phase, 15 or 20 amperes ~~or part of a system identified and listed as suitable for the purpose and meeting the requirements of 625.18, 625.19, and 625.29~~ shall be permitted to be cord-and-plug-connected. All other electric vehicle supply equipment shall be permanently connected and fastened in place. This equipment shall have no exposed live parts.

Substantiation: It is vital to the successful deployment of electric vehicles that a common infrastructure, compatible with all grid-connected vehicles, be developed. Automotive manufacturers, through the Society of Automotive Engineers and their J1772 standards committee, are assuring commonality at the vehicle to connector/cord interface with the development of a standard connection to an electric vehicle for Level 1 and Level 2 charging (as defined in 625.14). 625 must provide for similar commonality at the interface between the cord and the facility where connection to the grid is made. Article 625.13 addresses this by requiring that the charge cord be connected to the grid through electric vehicle supply equipment "permanently connected and fastened in place", eliminating any interface issues. It allows an exception for "125 volts, single phase, 15 or 20 amperes" connections to be "cord-and-plug-connected", taking advantage of the universality of the 15 and 20 ampere convenience outlet infrastructure existing in the United States. However, the existing phrase, "or part of a system identified and listed as suitable for the purpose and meeting the requirements of 625.18, 625.19, and 625.29" is being interpreted to allow connections of any voltage and ampacity to be cord and plug connected as long as the requirements of 625.18, 625.19 and 625.29 are met. This will result in a patchwork electric vehicle charging infrastructure consisting of various receptacle based charge stations using incompatible plugs of various voltages and ampacities. The proposed deletion will clarify the need for a universal electric vehicle charging infrastructure.
Panel Meeting Action: Reject
Panel Statement: Cord and plug connected electric vehicles are already permitted. CMP-12 does not accept eliminating equipment that meets the requirements of 625.18, 625.19, and 625.29.

This is outside the scope of the NEC as it deals with the hazards of fire and shock, and the NEC does not regulate product development.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MARCOVICI, S.: The use of a universal charging system connector is not possible yet, due to the existance of 3 levels of charging (Level 1, Level 2 & Level 3). These levels of charging use different voltage levels for achieving different charging times (the higher the voltage, the shorter the charging time. This forces the use of different types/sizes of connectors.

12-55 Log #3969 NEC-P12 **Final Action: Reject**
(625.13)

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Revise text to read as follows:

Electric vehicle supply equipment rated at 125 volts, single phase, 15 or 20 amperes <u>shall be permitted to be cord-and-plug-connected. EVSE rated greater than 20 amperes and not more than 250 volts and</u> ~~or~~<u>a</u> part of a system identified and listed as suitable for the purpose and meeting the requirements of 625.18, 625.19, and 625.29 shall be permitted to be cord-and-plug-connected. All other electric vehicle supply equipment shall be permanently connected and fastened in place. This equipment shall have no exposed live parts.
Substantiation: None given.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects. The submitter has not substantiated the proposal.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-56 Log #3695 NEC-P12 **Final Action: Reject**
(625.14)

Submitter: Donald B. Karner, Electric Transportation Engineering Corp.
Recommendation: Revise text to read as follows:

Level 3. The EV equivalent of a commercial gasoline dispensing station, this high-speed, high-power method charges an EV in about the same time it takes to refuel a conventional vehicle. Because of individual supply requirements and available source voltages, exact voltage and load specifications for Level 3 charging have not been defined as in Level 1 and Level 2. These power requirements are specified by the equipment manufacturer. <u>However, for all voltages above 240 volts or 208 volts and for all load currents greater than 32 amperes, short circuit currents shall be limited through impedance additions or power conversion to direct current.</u>

Substantiation: Appropriately, this Article leaves the specification of Level 3 power requirements to the equipment manufacturer. However, at voltages above 240 volts or 208 volts, and currents above 32 amperes, short circuit currents are too great to be allowed onboard a vehicle for which the integrity of wiring can be compromised due to wear, impacts, and tampering. It is imperative that the short circuit current be limited to protect against large energy releases and potential vehicle fires resulting from failure of vehicle onboard wiring and devices. A requirement to limit short circuit current will ensure that equipment manufacturers do not create a hazard by allowing low impedance circuits to be directly connected to electric vehicles.
Panel Meeting Action: Reject
Panel Statement: The language in 625.14 does not address any "levels;" rather, it simply requires the electrical vehicle supply equipment to have sufficient rating to supply the load served. The submitter appears to have submitted a proposed change to the NEC handbook commentary. CPM-12 does not author the handbook.

Short circuit protection is mandated by 110.10 and applies to 625.23. There is insufficient substantiation to limit short circuit current by using only inserted impedance. Short circuit protection can also be accomplished by the proper selection of overcurrent devices.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MARCOVICI, S.: Charging Levels 1, 2 & 3 need to be first defined in the NEC. These definitions should be proposed by EPRI's National Electric Transportation Infrastructure Working Council (NETIWC). This is the group that wrote Articles 625 and 626.

12-57 Log #3697 NEC-P12 **Final Action: Reject**
(625.14)

Submitter: Donald B. Karner, Electric Transportation Engineering Corp.
Recommendation: Revise text to read as follows:
Level 2. This is the primary and preferred method of EV charging at both private and public facilities. It requires special equipment and connection to an electric power supply dedicated to EV charging. The voltage of this connection is either 240 volts or 208 volts. The maximum load is 32 amperes (7.7 kVA at 240 volts or 6.7 kVA at 208 volts). ~~The minimum circuit and overcurrent rating for this connection is 40 amperes (32_1.25_ 40 amperes).~~ Electric vehicles are treated as continuous loads. See 625.21 for sizing overcurrent devices.
Substantiation: The phrase "The minimum circuit and overcurrent rating for this connection is 40 amperes (32_1.25=40 amperes)" is redundant to the phrase that follows it referring to 625.21 for sizing overcurrent protection devices. This phrase proposed for deletion has been interpreted to allow load currents greater than 32 amperes for Level 2 charging. This interpretation, and future changes to this Article allowing load currents greater than 32 amperes, are not appropriate due to the increased short circuit currents and protective devices let through energy available at voltages and currents higher than the allowed 240/208 volts at 32 amperes. As the condition of a vehicle platform cannot be assured (due to wear, impacts, and tampering) it is imperative that the short circuit current and let through energy be limited to protect against large energy releases and potential vehicle fires resulting from failure of vehicle onboard wiring and devices.
Panel Meeting Action: Reject
Panel Statement: The language in 625.14 does not address any "levels;" rather, it simply requires the electrical vehicle supply equipment to have sufficient rating to supply the load served. The submitter appears to have submitted a proposed change to the NEC handbook commentary. CMP-12 does not author the handbook.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
MARCOVICI, S.: See My Affirmative With Comment on 12-56.

12-58 Log #161 NEC-P12 **Final Action: Reject**
(625.17)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
625.17 Cable. The electric vehicle supply equipment cable shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Article 400 and Table 400.4. Ampacities shall be as specified in Table 400.5(A) for 10 AWG and smaller, and in Table 400.5(B) for 8 AWG and larger. The overall length of the cable shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is listed as suitable for the purpose. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid ~~communications~~, signal, and optical fiber cables, shall be permitted.
Substantiation: Section 625.17 has requirements for communications circuits. However, 90.3 states:
"Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8."
Since Article 800 has no reference to Article 625, the requirement for the use of communications cables in 625.17 is not correlated with Article 800 and should be deleted.
Panel Meeting Action: Reject
Panel Statement: Including the term "communications" in the list that describes the cable attributes as suitable for this particular purpose is correct in this section.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-59 Log #162 NEC-P12 **Final Action: Accept in Principle**
(625.17)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
625.17 Cable. The electric vehicle supply equipment cable shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Article 400 and Table 400.4. Ampacities shall be as specified in Table 400.5(A) for 10 AWG and smaller, and in Table 400.5(B) for 8 AWG and larger. The overall length of the cable shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is listed as suitable for the purpose. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and ~~optical fiber~~ cables, shall be permitted.
Substantiation: Article 770 has definitions for optical fiber cables:
"Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering. "
"Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors."
The terminology in Article 770 for a "hybrid" optical fiber cable is a composite optical fiber cable. Section 770.3(A) states:
"(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable."
Since a hybrid (composite) optical fiber cable is classified and installed according to the type of electrical cable the fiber in installed in, there is no need to mention "hybrid" optical fiber cables.
Panel Meeting Action: Accept in Principle
Revise 625.17 to read as follows:
625.17 Cable. The electric vehicle supply equipment cable shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Article 400 and Table 400.4. Ampacities shall be as specified in Table 400.5(A) for 10 AWG and smaller, and in Table 400.5(B) for 8 AWG and larger. The overall length of the cable shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is listed as suitable for the purpose. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and <u>composite</u> optical fiber cables, shall be permitted.
Panel Statement: CMP-12 adds "composite" ahead of "optical fiber" and meets the submitter's intent.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MARCOVICI, S.: A "hybrid cable" is a combination cable comprised of individual communication, signaling and fiber optic cables enclosed by a common jacket. Some hybrid cables include a power component. The change should rather read:
"hybrid (communications, signal and optical fiber) cables."

12-60 Log #4797 NEC-P12 **Final Action: Reject**
(625.22)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
625.22 Personnel Protection System.
The electric vehicle supply equipment shall have a listed system of protection against electric shock of personnel. The personnel protection system shall be composed of listed <u>power safe protector</u> ~~personnel~~ protection devices and constructional features. Where cord-and-plug-connected electric vehicle supply equipment is used, the ~~interrupting~~ <u>power safe protector</u> device of a listed personnel protection system shall be provided and shall be an integral part of the attachment plug or shall be located in the power supply cable not more than 300 mm (12 in.) from the attachment plug.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle is actively supplying power to an appliance, it provides traditional GFCI protection.
2. PSP receptacles monitor the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-17.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-61 Log #1580 NEC-P12 **Final Action: Reject**
(625.23)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
625.23 Disconnecting Means.
A lockable disconnecting means shall be installed to disconnect all ungrounded supply conductors to ~~For~~ electric vehicle supply equipment rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be ~~provided and~~ installed in a readily accessible location. ~~The disconnecting means shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-62 Log #1828 NEC-P12 **Final Action: Reject**
(625.23)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: The disconnecting means for electric vehicle supply equipment shall be readily accessible. The disconnecting means shall be a switch or circuit breaker with identified permanent integral means for locking in the open (off) position.
Substantiation: If safety requires lockable disconnects for over 60 ampere rated supply equipment it should be required for all supply equipment ratings. "Capable" of being locked is subjective, not specific as to means; proposal is specific and doesn't allow for makeshift methods.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects. "Capable" is used consistently throughout the code with the same phraseology. The submitter has not provided proof of a problem related to subjectivity.
CMP-12 does not agree that the requirements should be extended below 60 amps. The submitter has not provided any evidence of a problem.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-63 Log #2584 NEC-P12 **Final Action: Reject**
(625.28)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Section 90.3 indicates Chapters 5, 6, and 7 already apply to special occupancies, equipment, or conditions.
Panel Meeting Action: Reject
Panel Statement: CMP-12 does not accept the submitter's substantiation. The submitter's interpretation of 90.3 is incorrect.
The reference to Article 500 - 516 in 625.28 are appropriate.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-64 Log #3970 NEC-P12 **Final Action: Reject**
(625.29(B))

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Revise text to read as follows:
(B) Height. Unless specifically listed for the purpose and location, the coupling means of the electric vehicle supply equipment shall be stored or located at a height of not less than ~~450~~ 600 mm (~~18~~ 24 in.) and not more than 1.2 m (4 ft) above the floor level.
Substantiation: 625.29(B) should be in compliance with the Americans With Disabilities Act (ADA) requirements. The like requirement in 625.30(B) indicates a minimum height of 24 inches and is in compliance with the ADA requirements. This proposal changes the 18 inch minimum height to 24 inches so that it agrees with 629.30(B) and the ADA minimum requirements.
Panel Meeting Action: Reject
Panel Statement: The requirements falling under the purview of 625.30 pertain to outdoor installations. The 24 inch minimum height is similar to the 24 inch minimum height for mobile homes per 550.32(F). This minimum height requirement is for physical protection as well as protection from vegetation. In addition, ADA Accessibility Guidelines, Section 4.27.3, requires the highest operable part of controls, dispensers, receptacles, and other operable equipment to be placed within at least one of the reach ranges specified in 4.2.5 and 4.2.6. Electrical and communications system receptacles on walls are to be mounted no less than 15 in above the floor. Therefore, the 18 inch minimum meets the requirements of the ADA Guidelines.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-65 Log #3971 NEC-P12 **Final Action: Reject**
(625.29(C))

Submitter: Frank C. Lambert, Georgia Tech/NEETRAC / Rep. Chairman, Plug-in Hybrid & Electric Vehicle Working Group, EPRI National Electric Transportation Infrastructure Working Council
Recommendation: Revise text to read as follows:
(C) Ventilation Not Required. ~~Where electric vehicle nonvented storage batteries are used or w~~Where the electric vehicle supply equipment is listed or labeled as suitable for charging electric vehicles indoors without ventilation and marked in accordance with 625.15(B), mechanical ventilation shall not be required.
Substantiation: Nonvented storage batteries have not been used in electric vehicle applications. The term "nonvented storage batteries" and its definition in 625.2, Definitions, have been proposed to be deleted.
Panel Meeting Action: Reject
Panel Statement: CMP-12 chooses to retain the text as such a product may be available.
CMP-12 disagrees with the substantiation as such a product was available.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-66 Log #439 NEC-P12 **Final Action: Accept**
(Table 625.29(D)(1))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change title as follows:
"Minimum Ventilation Required in Cubic Meters/Minute ~~Meters per Minute~~ (m^3/min)…".
Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-67 Log #395 NEC-P12 **Final Action: Accept**
(625.29(D)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "cubic meters per minute" to "cubic meters/minute" and "cubic feet per minute" to "cubic feet/minute".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-68 Log #440 NEC-P12 **Final Action: Accept**
(Table 625.29(D)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change title as follows:
"Minimum Ventilation Required in Cubic Feet/Minute ~~Feet per Minute~~ (cfm) …".
Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-69 Log #396 NEC-P12 **Final Action: Accept**
(625.29(D)(3))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “in accordance with”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 626 — ELECTRIFIED TRUCK PARKING SPACES

12-70 Log #1863 NEC-P12 **Final Action: Reject**
(626.2.Separable Power Supply Cable Assembly)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: SEPARABLE POWER SUPPLY ~~CABLE~~ CORD ASSEMBLY. A flexible cord ~~including ungrounded, grounded, and equipment grounding conductors~~ containing an equipment grounding conductor, provided with a grounding type cord connector, a grounding type attachment plug and all other...(remainder unchanged).
Substantiation: Edit. For consistency with 626.25(B)(4)(a) and (B)(5).
Panel Meeting Action: Reject
Panel Statement: The proposal limits application and does not represent existing application requirements which may be either cables or cords depending upon the parking space design.
The proposed change is not editorial in nature.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-71 Log #3287 NEC-P12 **Final Action: Reject**
(626.4(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
The provisions of this article do not apply to that portion of equipment ~~in residential, commercial, or industrial facilities~~ that requires electric power ~~for devices~~ to load or unload cargo and equipment, operate conveyors, hoists and other ~~devices~~ equipment used on the site or truck.
Substantiation: Edit. “Residential, commercial, and industrial facilities” is superfluous and does not cover agricultural facilities which are not commercial. “Devices” per definition do not require power (watts or volt-amperes).
Panel Meeting Action: Reject
Panel Statement: These requirements were found to be necessary to avoid misapplication to equipment often in proximity to the truck parking space.
The proposal does not provide adequate substantiation in accordance with 4.3.3(d) of the Regulations Governing Committee Projects. Model building codes characterize structures based on use and occupancy. Accordingly, anything that does not fall under the purview of residential or industrial, would be characterized as commercial.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-72 Log #397 NEC-P12 **Final Action: Accept**
(626.11(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “for each” in the second sentence.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-73 Log #272 NEC-P12 **Final Action: Accept**
(626.11(C))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “computed” to “calculated.”
Substantiation: The term “calculated” more accurately describes the mathematical operation. It is not necessary to have a computer to do the calculations, they can also be done manually.
The term “computed” is only used 3 times in the code while the term “calculated” is used more than 175 times. This is one of a series of proposals to provide consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
SCHAMEL, D.: Reject this proposal. Definition of compute is “to determine by calculation”.

12-74 Log #4750 NEC-P12 **Final Action: Accept in Principle**
(626.11(D))

Submitter: Charles M. Trout, Maron Electric Company
Recommendation: Revised text to read as follows:
(D) Conductor Rating. Truck space branch-circuit ~~conductors shall have an ampacity not less than the loads supplied~~ loads shall be considered to be continuous.
Substantiation: In all probability these loads will be required to continue for 3 hours or more. The continued operation of truck heating and refrigeration equipment while the truck is parked for extended periods is of paramount importance.
Panel Meeting Action: Accept in Principle
Revise 626.11(D) to read as follows:
(D) Conductor Rating. Truck space branch-circuit supplied loads shall be considered to be continuous.
Panel Statement: CMP-12 retained “supplied” for clarity.
CMP-12 agrees with the submitter to require the branch-circuit loads to be considered as continuous.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
SCHAMEL, D.: Accept in Principal:
Revised text to read as follows:
(D) Conductor Rating. Truck space branch-circuit conductors shall have an ampacity not less than the loads supplied and shall be considered to be continuous.

12-75 Log #2030 NEC-P12 **Final Action: Reject**
(626.20)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: The provisions of this section are already covered in Article 250, which applies unless amended. Additionally (A)(1) does not include equipment that is not “fixed”; apparently does not permit connections or splices in an equipment grounding conductor (continuous); requires bonding (not the same as grounding) by an equipment grounding conductor which is defined as performing a different function.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3 of the Regulations Governing Committee Projects as it does not provide the proper reference to the section under revision.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-76 Log #2029 NEC-P12 **Final Action: Reject**
(626.21)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: The provisions of this section already apply per 90.3 and as stated by many panels such provisions do not need repeating.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with section 4.3.3 of the Regulations Governing Committee Projects as it does not provide the proper reference to the section under revision.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-77 Log #3289 NEC-P12 **Final Action: Reject**
(626.22(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
All electrical truck parking space supply equipment (disconnecting means, receptacles, overcurrent devices) shall be readily accessible by an unobstructed entrance or passageway not less than 600 mm (2 ft) wide and not ~~more~~ less than 2.0 m (6 ft 6 in.) high and provided with working space in accordance with 110.34.
Substantiation: The heading implies the working space is covered by the dimensions indicated which may modify 110.34. There is no safety reason to limit the height to 6 ft. Access and working space would be readily accessible. “supply equipment” without modification includes all conductors and equipment including feeders and services.
Panel Meeting Action: Reject
Panel Statement: The proposed change does not reflect the actual allowable truck parking space equipment configuration.

Section 626.4(B) specifies the voltages falling under the purview of this article which does not include over 600 volts. The submitter suggests current language that may modify 110.34, which applies to over 600 volt applications.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-78 Log #1581 NEC-P12 **Final Action: Reject**
(626.22(D))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(D) Disconnecting Means. A **lockable** disconnecting **means** ~~switch or circuit breaker~~ shall be provided to disconnect one or more electrified truck parking space supply equipment sites from a remote location. The disconnecting means shall be ~~provided and~~ installed in a readily accessible location ~~and shall be capable of being locked in the open position. Portable means for adding a lock to the switch or circuit breaker shall not be permitted as the means required to be installed at and remain with the equipment.~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-13.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-79 Log #2028 NEC-P12 **Final Action: Reject**
(626.22(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of text: The disconnecting means shall be ~~provided and~~ installed in a readily accessible location and shall be ~~capable of being locked~~ provided with identified permanent integral means for locking in the open (off) position. ~~Portable means for adding a lock to the circuit breaker or switch shall not be permitted as the means required to be installed at and remain with the equipment.~~
Substantiation: "Capable of being locked" does not specifically require a locking means. Proposal is specific and doesn't allow for makeshift methods.
Panel Meeting Action: Reject
Panel Statement: The proposal does not represent the allowed equipment driven configuration of the installation.
See panel action and statement on proposal 12-13.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-80 Log #163 NEC-P12 **Final Action: Reject**
(626.23(A))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
(A) Cable Management. Electrified truck parking space equipment provided from either overhead gantry or cable management systems shall utilize a permanently attached power supply cable in electrified truck parking space supply equipment. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid ~~communications~~, signal, and optical fiber cables, shall be permitted.
Substantiation: Section 626.23(A) has requirements for communications circuits. However, 90.3 states:
"Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8."
Since Article 800 has no reference to Article 626, the requirement for the use of communications cables in 626.23(A) is not correlated with Article 800 and should be deleted.
Panel Meeting Action: Reject
Panel Statement: Article 800 has provisions for wire and cables in buildings and for wires and cables entering buildings. It has no provision for the installations covered by Article 626.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-81 Log #164 NEC-P12 **Final Action: Accept in Principle**
(626.23(A))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
(A) Cable Management. Electrified truck parking space equipment provided from either overhead gantry or cable management systems shall utilize a permanently attached power supply cable in electrified truck parking space supply equipment. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and ~~optical fiber~~ cables, shall be permitted.
Substantiation: Article 770 has definitions for optical fiber cables:
"Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering. "
"Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors."
The terminology in Article 770 for a "hybrid" optical fiber cable is a composite optical fiber cable. Section 770.3(A) states:
"(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable."
Since a hybrid (composite) optical fiber cable is classified and installed according to the type of electrical cable the fiber in installed in, there is no need to mention "hybrid" optical fiber cables.
Panel Meeting Action: Accept in Principle
Revise 626.23(A) to read as follows:
(A) Cable Management. Electrified truck parking space equipment provided from either overhead gantry or cable management systems shall utilize a permanently attached power supply cable in electrified truck parking space supply equipment. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted.
Panel Statement: CMP-12 adds "composite" ahead of "optical fiber" and meets the submitter's intent.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-59.

12-82 Log #4099 NEC-P12 **Final Action: Reject**
(626.24(B))

Submitter: Gregory C. Nieminski, Gregory C. Nieminski, LLC / Rep. Chairman, EPRI IWC Transportation Electrification Committee/Code Task Group
Recommendation: Revise text to read as follows:
(B) Receptacle. All receptacles shall be listed and of the non-locking and grounding type. Every truck parking space with electrical supply shall be equipped with (B)(1) and (B)(2).
Substantiation: During the development of the code article, the intent was to require a non-locking and grounding type. This is reflected in the fact that the non-locking type was identified in the Fine Print Note. However, during preparation, the identification of a non-locking type was left out of 626.24(B). This proposal addresses that omission.
Panel Meeting Action: Reject
Panel Statement: The article does not require non-locking types for situations and systems which choose to use the locking types, even though the locking types would have to provide a non-locking type extension cable; this was the purpose for the FPN.
The submitter is encouraged to provide additional substantiation as to the need for a non-locking requirement.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: The purpose of specifying the non-locking type receptacles is part of the "break-away" concept that is used at gas stations for connecting eh dispensing hoses.

12-83 Log #4727 NEC-P12 **Final Action: Reject**
(626.24(B))

Submitter: Gregory C. Nieminski, Gregory C. Nieminski, LLC / Rep. EPRI IWC Transportation Electrification Committee/Code Task Force
Recommendation: Revise text as follows:
(B) Receptacle. All receptacles shall be listed and of the non-locking and grounding type. Every truck parking space with electrical supply shall be equipped with (B)(1) and (B)(2).
Substantiation: During the development of the code article, the intent was to require a non-locking and grounding type. This is reflected in the fact that the non-locking type was identified in the Fine Print Note. However, during preparation, the identification of a non-locking type was left out of 626.24(B), this proposal addresses that omission.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-82.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-82.

12-84 Log #4651 NEC-P12 **Final Action: Accept**
(626.24(B)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows:
Two duplex receptacles, each 2-pole, 3-wire grounding type and rated 20 amperes,125 volts, and each connected to a separate branch circuit that shall have no other outlets.
(FPN unchanged)
Substantiation: This rewording makes it possible for a conventional GFCI receptacle to be used, since GFCI protection is required in (D), this is only practical. As written, the individual branch-circuit requirement disallows duplex receptacles, and since no single-GFCI receptacles are now in production, the consequence of this wording is to place the GFCI protection in a remote panel as part of a circuit breaker. It is difficult to understand why a single receptacle is being mandated. In addition, a widely circulated color photo of one of these umbilical assemblies clearly shows GFCI duplex receptacles. The submitter believes that this wording is therefore in the NEC in the mistaken belief that a branch circuit that supplies a duplex receptacle and not other outlets is an individual branch circuit. It is not, and this wording is intended to achieve the intended outcome.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: The intention of the authors of Article 626, EPRI's National Electric Transportation Infrastructure Working Council, was to have 2 separate 20A, 125 V receptacles. This is due to the size and shape (round) of the industrial type plug, NEMA 5-20, used for this application. Two of these plugs would be too close to each other when plugged into a duplex receptacle.

12-85 Log #1928 NEC-P12 **Final Action: Reject**
(626.24(B)(1) and (2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (1) Two single receptacles, each <u>a</u> 2-pole 3-wire grounding type, rated 20-amperes 125 volts, and <u>each</u> connected to an individual <u>20-ampere</u> branch circuit.
(2) One single receptacle, a 3-pole 4-wire grounding type, single-phase rated either 30-amperes 208y/120 volts or 125/250 volts <u>connected to an individual 30-ampere branch circuit.</u>
Substantiation: Circuit rating should be specified. 210.21(B) does not prohibit a single receptacle on an individual branch circuit from having a higher rating than the branch circuit.
Panel Meeting Action: Reject
Panel Statement: By virtue of 210.21(B), the receptacle must at least meet the rating of the branch circuit, therefore, meeting the minimum branch circuit ratings for 626.24.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-86 Log #4652 NEC-P12 **Final Action: Reject**
(626.24(B)(2))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows:
One single receptacle, 3-pole, 4-wire grounding-type, of an appropriate configuration for a 30-ampere single-phase circuit originating in a 208Y/120-volt distribution and having no other outlets
FPN: For configurations of straight-blade receptacles, see ANSI/NEMA WD6-2002, *Standard for Dimensions of Attachment Plugs and Receptacles*, Figure 14-30. For various configurations of 30-ampere pin and sleeve receptacles, see ANSI/UL 1686, *Standard for Pin and Sleeve Configurations*, Figure C2.9 or Part C3.
Substantiation: Since there is no NEMA configuration for a 208Y/120 single phase receptacle at any amperage, the current language is confusing at best. The fine print note following describes a standard for pin-and-sleeve devices. However, that is not a requirement, and 30 ampere 125/250V NEMA 14-30 plugs and receptacles are used by the million on identical distributions as these. The majority of multifamily housing is supplied through 208Y/120-V three-phase services, and almost without exception, the feeder to each apartment consists of two-phase conductors and a neutral. Every conventional dryer receptacle outlet will have one of these devices providing the same sort of connectivity on the identical distribution system. It appears the reference to 208 V may have been an attempt by a proprietary interest to game the process.
This proposal leaves the NEC absolutely neutral as to which configuration will win out, with both configurations presented on an equal footing. It correctly addresses the essential safety objectives. It also mandates an individual branch circuit, which had apparently been overlooked in drafting the 2008 wording.
Panel Meeting Action: Reject
Panel Statement: Dual configurations were included in this section to allow for different types of supply systems to be used as per 626.10.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-87 Log #1498 NEC-P12 **Final Action: Accept**
(626.24(B)(2) Exception (New))

Submitter: Greg Ward, IdleAire, Inc.
Recommendation: Revise text as follows:
Exception: Where electrified truck parking space supply equipment provides the <u>heating,</u> air-conditioning and comfort cooling function without requiring a direct electrical connection at the truck, only the two receptacles identified in 626.24(B)(1) shall be required.
Substantiation: 626.24(B) requires every truck parking space to be provided with the receptacles indicated in (B)(1) and (B)(2). This exception allows the receptacle identified in (B)(2) to be omitted if the electrified truck parking space supply equipment provides the air-conditioning and comfort cooling function from an external source without requiring a direct electrical connection to the truck.
Reference to the heating function was inadvertently omitted and should be added as the heating load is the largest single load (5 kW) in the system. A system providing only the air-conditioning and comfort cooling function would still require connections capable of delivering this 5 kW load which cannot be accomplished using the two receptacles identified in (B)(1).
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-88 Log #2027 NEC-P12 **Final Action: Reject**
(626.24(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of text: The disconnecting means shall be provided and installed in a readily accessible location and shall be ~~capable of being locked~~ <u>provided with identified permanent integral means for locking in the open (off) position</u>. ~~Portable means for adding a lock to the circuit breaker or switch shall not be permitted as the means required to be installed at and remain with the equipment.~~
Substantiation: "Capable of being locked" does not specifically require a locking means. Proposal is specific and doesn't allow for makeshift methods.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-13.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-89 Log #1788 NEC-P12 **Final Action: Reject**
(626.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: SEPARABLE POWER SUPPLY CORD ASSEMBLIES.
(A) RATINGS.
(1) TWENTY-AMPERE POWER-SUPPLY CORD ASSEMBLY. Each power supply cord assembly supplied by a receptacle specified in 626.24(B)(1) shall be rated 20 amperes.
(2) THIRTY AMPERE POWER SUPPLY CORD ASSEMBLY. Each power supply cord assembly supplied by a receptacle specified in 626.24(B)(2) shall be rated 30 amperes.
(B) POWER SUPPLY CORD. The power supply assembly cord shall be Type G, G-GC, PPE, SOW, SOOW, STW, STOW, or STOOW. Where subject to direct rays of the sun cords shall be identified as sunlight-resistant. The overlength of each cord shall not exceed 7.5 m (25 ft) unless part of a cord management system or cord take-up system.
(2) ATTACHMENT PLUG. The attachment plug and cord connector shall be molded to or securely attached to the cord outer jacket. If a right-angle attachment plug is used the receptacle shall be installed vertically so that the cord hangs freely downward to avoid undue strain in the conductors. A 125/250 volt attachment plug shall be permitted to be used with a 208Y/120 volt single-phase receptacle.
Substantiation: Article 400 does not require listing. The first paragraph is akin to a definition, which is covered in 626.2. Specific types of cords are proposed as all extra hard types may not be suitable such as EV, EVE, EVT, SE, SEO, SEOO, SO, SOO, ST, which are not indicated for wet locations, gasoline, oil, acid, or chemical resistance. The proposed types of cords are rated 600 volts and contain an EGC, and are oil-resistant. The exceptions involve cords used under the same conditions as cords for other uses and should be covered by provisions for those cords. A 15-ampere rated cord used with a 20-ampere receptacle of 626.24(B) on a 20-ampere circuit violates 240.5(A).
Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to justify the removal of the existing requirements in 626.25 and provide the reduced requirements recommended in this proposal.
Existing requirements are intended to coordinate with SAE and other truck cab manufacturer's standards.
The first sentence of 626.25 contains a requirement and is not akin to a definition.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-90 Log #3315 NEC-P12 **Final Action: Reject**
(626.25)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: SEPARATE POWER SUPPLY CORD ASSEMBLY. A separable power supply cord assembly shall be identified and consist of a power supply cord, a single cord connector body, attachment plug, and shall comply with 626.25(A) and (B). The cord shall be one continuous length and adapters and pigtail ends shall not be used.

(A) RATINGS.

(1) TWENTY-AMPERE POWER-SUPPLY CORD ASSEMBLIES. Equipment supplied from a 20-ampere 125-volt receptacle in accordance with 626.24(B)(1) shall use a 20-ampere power-supply cord assembly.

(2) THIRTY-AMPERE POWER SUPPLY CORD ASSEMBLY. Equipment supplied from a 30-ampere 208Y/120 volt or 125/250 volt receptacle in accordance with 626.24(B)(2) shall be a 30-ampere power supply cord assembly.

(B) ENGINE BLOCK HEATER. A separate power supply cord assembly in accordance with applicable provisions of this section and used solely for connection to an engine block heater shall be permitted to have an ampacity not less than 15-amperes and an attachment plug and cord connector body rated not less than 15-amperes.

(C) POWER SUPPLY CORD.

(1) CONDUCTORS. The cord shall contain three or four conductors, as required, one of which shall be an equipment grounding conductor.

(2) CORD LENGTH. The length of the power supply cord shall not exceed 7.5 m (25 ft) unless the cord is provided with an identified cord take-up and support equipment.

(3) ATTACHMENT PLUG and CORD CONNECTOR BODY. The attachment plug and cord connector body shall be molded to the cord or otherwise securely attached to the cord jacket. If a right-angle attachment plug is used the grounding member of the receptacle for the attachment plug shall be oriented so the power supply cord hangs downward without a bend at the receptacle.

Substantiation: “Identified” removes the need for “intended for connection to a flanged surface inlet”. Article 400 does not specify listing.

The exception for (A)(1) Requires hard service or extra hard service cords, whereas the first paragraph merely requires the assembly to be identified. (suitable for use). Hard service cords are rated for 600 volts not 125 volts and are not marked 15 amperes, but have an ampacity that may require adjustment. The exception for 15-ampere cords should specify a sole use. “Existing” vehicle is not defined; any vehicle in being is existing. The equipment of (A)(1)(2) is not wired with a 20- or 30-ampere receptacle but is supplied by it. The phrase “for single-phase connection” in (B)(1) implies cords are marked or designated for single-phase three-phase, or dc use. The current (B)(2) is unnecessary and covered by the proposed word “identified” in the first paragraph. Attachment plugs are already required to be listed.” The present (C) defining the length of the exposed cord is unnecessary since the overall length is specified. The requirement for attachment plugs in (B)(4) should include cord connector bodies; listing is covered by “identified” Present Article 406 does not specify listing for cord connectors. “Where a flexible cord is provided” is superfluous since that is covered by the heading for 625.25. The present (B)(4) and exception are superfluous and covered by the proposed word “identified” and proposed (A)(1) and (A)(2). There was no substantiation for a nonlocking attachment plug for a 20-ampere receptacle and no similar requirement for a 30-ampere cord assembly connectors.

Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to justify the removal of existing requirements in 626.25 and provide the reduced requirements recommended in this proposal.

Existing requirements are intended to coordinate with SAE and other truck cab manufacturer’s standards.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-91 Log #2026 NEC-P12 **Final Action: Accept**
(626.25(A)(1) Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete “for existing vehicles”.
Substantiation: Edit. It is not clear what is intended by “existing vehicles”; any vehicle is existing.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:

MARCOVICI, S.: The use of the term “existing vehicles” was intended to refer to older models vehicles.

12-92 Log #3270 NEC-P12 **Final Action: Reject**
(626.25(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise as follows:

(B) POWER SUPPLY CORD. The cord shall ~~be a listed type with~~ and contain three or four conductors, as required, ~~for single phase connection~~ one of which shall be an equipment grounding conductor. Identified in accordance with ~~40.23~~ Flexible cords used as part of a power cord assembly or permanently connected in accordance with 626.23(A) shall be one of the following types indicated in Table 400.4: S, SE, SEW, SEO, SEOW, SEOO, SEOOW, ST, STW, STO, STOO, STOW, STOOW. Where applicable, cords shall be identified for wet locations and sunlight resistance.

Delete exception for (B)(1).

Delete text of (B)(2) and the exception and substitute: (2) CORD OVERALL LENGTH The length of the cord shall not exceed 7.5 m (25 ft) unless provided with an identified cord management system.

~~(4)~~ (3) ATTACHMENTS PLUG. The attachment plug(s) ~~shall be listed by itself or part of a cord set for the purpose~~ and cord connector shall be molded to, or securely attached to the cord jacket ~~at the point where the cord enters the attachment plug. If a right angle cap is used the configuration shall be oriented so that the grounding member is farther from the cord.~~ Orientation of the receptacle shall be such that the cord extends downward without a bend at the cap. ~~Where a flexible cord is provided the attachment plug shall comply with 250.138(A).~~

(a) CONNECTION TO A 20-AMPERE RECEPTACLE. A 20-ampere power supply ~~cable~~ cord assembly ~~for connection to a truck flanged surface rated at 20 amperes~~ shall have ~~a nonlocking type~~ an attachment plug and cord connector body that shall be 2-pole, 3-wire, grounding type rated 20-amperes, 125 volts. ~~And intended for use with a 20 ampere 125 volt~~ receptacle.

Delete exception for (a)

FPN: No change.

(b) CONNECTION to a 30-AMPERE RECEPTACLE. A 30-ampere separable power supply ~~cable~~ cord assembly ~~for connection to a truck flanged surface rated at 30 amperes~~ shall have an attachment plug and cord connector body that shall be 3-pole 4 wire grounding type rated 30-amperes 208Y/120 volts or 125/250 volts ~~and intended for use with the receptacle in accordance with 626.24(B).~~ The 125/250-volt attachment plug and cord connector body shall be permitted to be used on 208Y/120 volt single-phase circuit. Delete (5) and the exception. FPN: No change.

Substantiation: Cords are required to comply with 400.3 and 400.4. Article 400 does not require cords to be listed, nor is there any reference for single-phase connection use or 3-phase or dc use. Designations are specific and helpful to Code users, and types that are rated for 600 volts, and for damp or wet locations, as may be required. The present exception for (B)(1) re: number of conductors and equipment grounding conductor does not except any provision of (B)(1) and the rating is already covered in the exception for (A)(1). Present (B)(2) is replaced by specifying cord types, and “shall be permitted where flexibility is necessary” is superfluous since flexible cords are required for supply assemblies. Cords are not resistant to temperature extremes (extreme is not defined) but can only be suitable or rated within temperature limits. All truck parking spaces may not be wet locations or subject to direct sunlight where enclosed or under a canopy. Table 400.4 does not indicate sunlight resistant types; 400.4 indicates that type shall be subject to special investigation (not defined). Cord length not equipped with a cord management system should be a specified fixed length, not modified to permit a longer unspecified length entering a truck. Cord management systems such as tag lines, take-up devices, etc., and should be identified but not necessarily listed. Attachment plugs are already required to be listed by 406.2(A). Present requirements of (B)(5) are incorporated in the proposal and “nonlocking type” is a somewhat unique requirement and may be deemed to violate 90.1 (C). There is no similar requirement for a 30-ampere attachment plug or supply receptacles. If the intent is to provide disconnection of the plug in the event of a truck moving while connected, there is no provision for the receptacle to face in a direct line with the direction of travel of the truck, and even if that were the scenario it would not disconnect a right-angle cap without damage.

Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to justify the removal of existing requirements in 626.25(B) and provide the reduced requirements recommended in this proposal. The revised wording adds no clarity to the rule.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-93 Log #1840 NEC-P12 **Final Action: Reject**
(626.25(B)(4)(a))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A separable power supply ~~cable~~ cord assembly ~~for connection to a truck flanged surface inlet~~ shall have ~~a nonlocking type~~ an attachment plug that shall be 2-pole 3-wire grounding type, rated 20 amperes 125 volts ~~and intended for use with the 20-ampere 125-volt receptacle~~.
Delete exception.
Substantiation: "Cord" is the word used in the heading of (B) and is the wiring method compatible with attachment plugs, cord connectors, and flanged surface inlets. Describing the use of the separable power supply assembly is superfluous; already covered in the definition of the assembly. The intended use of a 20-ampere 125-volt attachment plug is also obvious and need not be specified. The requirement for a nonlocking type plug is not substantiated. If a truck drives away with cord attached, a nonlocking type plug does not assure it will be pulled out without damage.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-94.
The submitter has provided a different set of requirements for the same section as requested in proposal 12-94. The submitter has not provided any evidence of a problem existing in the field or with this requirement.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-94 Log #1859 NEC-P12 **Final Action: Reject**
(626.25(B)(4)(a))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A separable power supply cable assembly for connection to a truck 20-ampere rated flanged surface inlet shall have a nonlocking type attachment plug and cord connector that shall be 2-pole 3-wire grounding type rated 20 amperes 125 volts. ~~and intended for use with the 125-volt receptacle~~.
Exception: A separable power supply cable assembly provided for the connection of an engine block heater only, shall be permitted to be rated 15 amperes. ~~Shall have an attachment plug that shall be 2-pole 3-wire grounding type rated 15 amperes. 125 volts.~~
Substantiation: "Rated at 20 amperes" is not clear whether referring to the flanged surface inlet or the power supply cable assembly. The cord connector should be included in the grounding and rating requirements. Present exception does not specifically permit the use of a 15 ampere rated assembly to modify the 20 ampere requirement of (A).
Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to justify the removal of the existing requirements in 626.25(B)(4)(a) and provide the reduced requirements recommended in this proposal. The revised wording adds no clarity to the rule.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-95 Log #4100 NEC-P12 **Final Action: Reject**
(626.25(B)(4)(b))

Submitter: Gregory C. Nieminski, Gregory C. Nieminski, LLC / Rep. Chairman, EPRI IWC Transportation Electrification Committee/Code Task Group
Recommendation: Revise text to read as follows:
(b) Connection to a 30-Ampere Receptacle. A separable power supply cable assembly for connection to a truck flanged surface inlet, rated at 30 amperes, shall have an attachment plug that shall be 3-pole, 4-wire, non-locking and grounding type, rated 30-amperes, 208Y/120-volts or 125/250-volts, and intended for use with the receptacle in accordance with 626.24(B)(2). The 125/250-volt attachment plug shall be permitted to be used on a 208Y/120-volt, single-phase circuit.
Substantiation: During the development of the code article, the intent was to require a non-locking and grounding type. This is reflected in the fact that the non-locking type was identified in the Fine Print Note. However, during preparation, the identification of a non-locking type was left out of 626.25(B)(4)(b) but retained in the preceding 626.25(B)(4)(a). This proposal addresses that omission.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-82.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-82.

12-96 Log #4726 NEC-P12 **Final Action: Reject**
(626.25(B)(4)(b))

Submitter: Gregory C. Nieminski, Gregory C. Nieminski, LLC / Rep. EPRI IWC Transportation Electrification Committee/Code Task Force
Recommendation: Revise text as follows:
(b) Connection to a 30-Ampere Receptacle. A separable power supply cable assembly for connection to a truck flanged surface inlet, rated at 30 amperes, shall have an attachment plug that shall be 3-pole, 4-wire, non-locking and grounding type, rated 30-amperes, 208Y/120-volts or 125/250-volts, and intended for use with the receptacle in accordance with 626.24(B)(2). The 125/250-volt attachment plug shall be permitted to be used on a 208Y/120-volt, single-phase circuit.
Substantiation: During the development of the code article, the intent was to require a non-locking and grounding type. This is reflected in the fact that the non-locking type was identified in the Fine Print Note. However, during preparation, the identification of a non-locking type was left out of 626.25(B)(4)(b) but retained in the preceding 626.25(B)(4)(a). This proposal addresses that omission.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-82.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-82.

12-97 Log #4101 NEC-P12 **Final Action: Reject**
(626.25(B)(5))

Submitter: Gregory C. Nieminski, Gregory C. Nieminski, LLC / Rep. Chairman, EPRI IWC Transportation Electrification Committee/Code Task Group
Recommendation: Revise text to read as follows:
(5) Cord Connector. The cord connector for a separable power-supply cable assembly, as specified in 626.25(A)(1), shall be a 2-pole, 3-wire non-locking and grounding type rated 20 amperes, 125 volts. The cord connector for a separable power supply cable assembly, as specified in 626.25(A)(2), shall be a 3-pole, 4-wire non-locking and grounding type rated 30-amperes, 208Y/120 volts or 125/250 volts. The 125/250-volt cord connector shall be permitted to be used on a 208Y/120-volt, single-phase circuit.
Substantiation: During the development of the code article, the intent was to require a non-locking and grounding type. This is reflected in the fact that the non-locking type was identified in 626.25(B)(4)(a). However, during preparation, the identification of a non-locking type was left out of 626.25(B)(5). This proposal addresses that omission.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-82.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-82.

12-98 Log #4725 NEC-P12 **Final Action: Reject**
(626.25(B)(5))

Submitter: Gregory C. Nieminski, Gregory C. Nieminski, LLC / Rep. EPRI IWC Transportation Electrification Committee/Code Task Force
Recommendation: Revise text as follows:
(5) Cord Connector. the cord connector for a separable power-supply cable assembly, as specified in 626.25(A)(1), shall be a 2-pole, 3-wire non-locking and grounding type rated 20 amperes, 125 volts. The cord connector for a separable power supply cable assembly, as specified in 626.25(A)(2), shall be a 3-pole, 4-wire non-locking and grounding type rated 30-amperes, 208Y/120 volts or 125/250 volts. The 125/250-volt cord connection shall be permitted to be used ona 208Y/120 volt, single-phase circuit.
Substantiation: During the development of the code article, the intent was to require a non-locking and grounding type. This is reflected in the fact that the non-locking type was identified in 626.25(B)(4)(a). However, during preparation, the identification of a non-locking type was left out of 626.25(B)(5). This proposal addresses that omission.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on proposal 12-82.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-82.

12-99 Log #3302 NEC-P12 **Final Action: Accept**
(626.26)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be reported as "Accept".
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Identified means shall be provided... (remainder unchanged).
Substantiation: Edit. The means should be suitable for the use. Disconnection by means of a plug/receptacle at the truck parking space supply equipment can be an unacceptable means to comply with this section.
Panel Meeting Action: Accept in Principle
Panel Statement: CMP-12 accepts the submitter's recommendation to insert "identified" ahead of "means" but does not accept the substantiation. Since "identified" is a defined term, it provides proper description for the means to prevent energy backfeed from the truck supply equipment.
The proposed change is not editorial in nature.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
CROUSHORE, T.: This revision looks harmless, but by inserting the word identified makes the equipment specifically require a specific identification for this purpose. The term "identified" is a specific term defined in Article 100 meaning a specific set of requirements. The original work of the task group on electrified truck parking spaces reviewed this information placed in this section and did not choose in a previous cycle to place the word identified as a requirement of this section. This proposal should have been rejected.

12-100 Log #1500 NEC-P12 **Final Action: Reject**
(626.28 (New))

Submitter: Cedric Daniels, Alabama Power/Southern Company / Rep. Acting Chairman, Infracture Steering Committee, EPRI National Electric Transportation Infracture Working Council
Recommendation: Add new text to read as follows:
626.28 Means to Prevent Connection or Disconnection Under Load. Each 30 ampere receptacle required by 626.24(B)(2) shall meet one of the following requirements:
(A) Include an interlocked receptacle with an associated switching device of an interlocking type,
(B) Be provided with a switch rated receptacle-plug combination, or
(C) Be provided with a comparable means identified and listed for the purpose to prevent connection or disconnection under load.
The means to prevent connection or disconnection under load shall prevent user access to live parts.
Substantiation: This proposal introduces the use of interlocked or switch-rated wiring devices for the 208Y/120 volt or 125/250 volt, 30 ampere connection as a part of the electrified truck parking space equipment. It also permits the use of a comparable means to prevent connection or disconnection under load.
Experience has shown that the truck operators do not always shut off power at the electrified parking space equipment before disconnecting either the attachment plug or connector. Moreover, truck drivers are not trained specifically to handle connection and disconnection of energized power supply cords under load and during adverse weather conditions, unlike port facilities where transport refrigerated units are connected daily by employees of the facilities who have been properly trained.
At the container staging areas in ports, similar connection equipment that employs suitable interlocks and switch-rated devices prevents connections and disconnections to be made under load. Since the same type of electrical connection and disconnection hazards exists at the electrified truck parking spaces, the same level of safety should be provided for the untrained truck operator.
The use of an interlock mechanism, a switch-rated receptacle or other means that provide a comparable function will prevent an arc-over or electrical damage to the connection devices, and ensure that no live parts are exposed to contact during connection or disconnection.
These features provide an additional level of safety to protect the users, both in normal operation and in overload situations. They also extend the life of the devices used to connect or disconnect the truck to and from the equipment. Given that the connectors used in travel center (truck stop) applications will be used hundreds of times per year in adverse environmental conditions, the operating life of the device must also be an important consideration.
Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to justify the limitation to inter-locking type, switch-rated receptacles or with a comparable means identified and listed for the purpose to prevent connection or disconnection under load.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
KOVACIK, J.: For Proposal 12-100, the Panel Action should have been Accept in Principle.
The Submitter, representing the EPRI National Electric Transportation Infrastructure Working Council, proposed to add to Article 626 an additional safeguard that likely would reduce potential hazards involved with electrical loads and associated components being disconnected under load (potentially up to 30 amps). The Submitter provided realistic and likely scenarios that substantiate such an additional safeguard. Also, generally, electrical components should be designed/rated for the intended application, including typical use and foreseeable misuse, and the options proposed by the Submitter for demonstrating compliance are compatible with this principle. Finally, since Electrified Truck Parking Spaces covered by Article 626 are a relatively new form of construction, it should not be expected that the Submitter would have to provide specific field incidents as principal technical substantiation.
We support an Accept in Principle committee action since we agree with the intent of the Submitter, but believe relocation of the proposed requirement in 626.24(B) and slightly modified wording is more appropriate. The revised wording in part (A) more accurately describes the type of devices on the market, and the phrase "for the purpose" in part (C) is not needed since the purpose of the comparable means is stated.
Recommendation:
Place the following wording directly after the FPN for 626.24(B)(2):
~~626.28 Means to Prevent Connection or Disconnection Under Load~~.
~~Each~~ The 30 ampere receptacle required by 626.24(B) shall ~~meet~~ be one of the following ~~requirements~~ constructions:
(A) ~~Include a~~ An interlock~~ed~~ receptacle with disconnect ~~an associated switching device of an interlocking type~~.
(B) ~~Be provided with a~~ A switch rated receptacle-plug combination, or
(C) ~~Be provided with a~~ A comparable means identified and listed ~~for the purpose~~ to prevent connection or disconnection under load.
The means to prevent connection or disconnection under load shall prevent user access to live parts.

12-101 Log #1812 NEC-P12 **Final Action: Accept**
(626.30(A))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on the proposal as it relates to "or 480-volt, 3-phase" in 626.30(A).
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: TRU spaces shall be supplied from 208-volt 3-phase branch circuits and with an equipment grounding conductor ~~in accordance with 250.118~~.
Substantiation: Edit. Since no specifics are indicated, the provisions of 250.118 already apply.
Panel Meeting Action: Accept
Panel Statement: The proposed change is not editorial in nature.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MARCOVICI, S.: Despite the appearance of redundancy, the reference to 250.18 provides a useful reminder and clarification. Such a reminder has proven useful in many jurisdictions.

12-102 Log #1813 NEC-P12 **Final Action: Reject**
(626.31(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text: of (A) and substitute: An identified switch or circuit breaker shall be provided to simultaneously disconnect all ungrounded conductors of each branch circuit supplying a refrigerated unit. The disconnecting means shall be readily accessible and provided with identified integral and permanent provisions for locking in the open (off) position.
Revise text of (B): The disconnecting means shall be readily accessible, located not more than 762 mm (30 in.) from the receptacle it controls or the point of connection of a permanently connected power supply cord specified in 626.23(A).
Substantiation: Present text implies the disconnecting means is a switch or circuit breaker. It should be identified (suitable for the use.) and the standard requirement for simultaneous disconnection should be noted. The proposal for locking is specific, applies to the disconnect position not the cover and prohibits makeshift methods. The requirement for (B) should also apply to permanently connected power supply cords of 526.23(A). If a disconnecting means controls a receptacle, it will inherently be in the supply circuit ahead of the receptacle.
Panel Meeting Action: Reject

Panel Statement: The proposed text in (A) does not add clarity to the rule. Insufficient substantiation was provided for the removal of the detailed requirements for having a permanently attached locking means.

For (B), there is no standard connection for transport refrigerated units (TRU). It is anticipated that with respect to transport refrigerated units, the electrified truck parking space will have receptacles and supply a cable assembly (if trucker does not supply a separable power supply cable assembly) to match the TRU's mobile receptacle. The permanently connected power supply cord specified in 626.23(A) is feeding the electrified truck parking space connecting equipment mounted receptacles that are used to then feed power to the truck and not directly connect to a truck or a refrigerated unit.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

12-103 Log #1811 NEC-P12 **Final Action: Reject**

(626.31(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: ~~All receptacles shall be listed and of the grounding type.~~ Every electrified truck parking space supply equipment intended to provide an electrical supply for transport refrigerated units shall be equipped with one or both of the following: (remainder no change).

Substantiation: Receptacles are already required to be listed by 406.2(A) 3-pole 4-wire receptacles of (1) and (2) are grounding type. The receptacle should be indicated as required at the supply equipment, not the parking space.

Panel Meeting Action: Reject

Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

12-104 Log #1784 NEC-P12 **Final Action: Reject**

(626.32)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise: SEPARABLE POWER SUPPLY ~~CABLE~~ CORD ASSEMBLY. A separable power supply cable cord assembly ~~consisting of a cord with an attachment plug and cord connector~~ shall be one of the types and ratings specified in 626.32(A), (B), and (C). ~~Cords with adapters and pigtail ends, extension cords and similar items shall not be used~~.

(A) RATINGS. The power supply cord ~~cable~~ assembly shall be ~~listed~~ rated in accordance with (1) or (2):

(1) 30-ampere 480 volts 3-phase.

(2) 60-ampere, 208-volts 3-phase.

Delete present (B) and substitute: CORD The cord shall contain four conductors, one of which shall be an equipment grounding conductor. Cords shall be extra-hard usage types SEOOW, SOW, SOOW, STOW, or STOOW, and where subject to direct rays of the sun shall be sunlight-resistant.

Substantiation: The proposal is specific and eliminates confusion since all extra-hard usage cords are not indicated in Table 400.4 as suitable for wet locations or oil resistance. None are indicated as resistant to gasoline, ozone, aids, or chemicals nor do they have temperature ratings. Flexibility is generally always required. Present wording "shall be permitted" per 90.5(B) identifies provisions allowed, but not required, therefore, the provisions of this section re: extra-hard usage cords are not mandatory. Temperature extremes are not quantified or identified. All locations (roofed or enclosed) may not be subject to direct sunlight. The power supply assembly is already defined as a cord with plug and cord connector and doesn't include adapters, pigtails, etc.

Panel Meeting Action: Reject

Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

12-105 Log #1499 NEC-P12 **Final Action: Reject**

(626.33 (New))

Submitter: Cedric Daniels, Alabama Power/Southern Company / Rep. Acting Chairman, Infracture Steering Committee, EPRI National Electric Transportation Infracture Working Council

Recommendation: Add new text to read as follows:

626.33 Means to Prevent Connection or Disconnection Under Load. Each receptacle provided by the electrified truck parking space supply equipment shall meet one of the following requirements:

(A) Include an interlocked receptacle with an associated switching device of an interlocking type,

(B) Be provided with a switch rated receptacle-plug combination, or

(C) Be provided with a comparable means identified and listed for the purpose to prevent connection or disconnection under load.

The means to prevent connection or disconnection under load shall prevent user access to live parts.

Substantiation: This proposal introduces the use of interlocked or switch-rated wiring devices similar to those already being used at port facilities to connect transport refrigerated units. It also permits the use of a comparable means to prevent connection or disconnection under load.

Transport refrigerated units (TRU) are connected and disconnected in all weather conditions. At port facilities, these connections to the supply equipment, as shown in Figures 1 and 2 that I have provided, are made on a daily basis by trained personnel specifically tasked to handle, operate and connect the refrigerated containers using equipment provided with interlocking mechanisms or a comparable means.

For these TRUs, a similar connection is made at electrified truck parking spaces. Many of the truck operators, however, are not trained specifically to handle, operate and connect the refrigerated containers. They will not always shut off power at the electrified parking space equipment before disconnecting either the attachment plug or connector. Therefore, the use of interlocked or switch-rated wiring devices or a comparable means at the electrified truck parking spaces would provide a level of protection comparable to that existing at the port facilities today.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: There is insufficient technical substantiation to justify the limitation to inter-locking type, switch-rated receptacles or with a comparable means identified and listed for the purpose to prevent connection or disconnection under load.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

ARTICLE 630 — ELECTRIC WELDERS

12-106 Log #281 NEC-P12 **Final Action: Accept**

(630.12(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "formula" to "equation".

Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression which follows the section.

This is one of a series of proposals to have consistent terminology throughout the code.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

SCHAMEL, D.: Reject this proposal. "Equation" is not currently in the text of the code. The submitter used only one of many definitions of "formula" in his proposal.

12-107 Log #1836 NEC-P12 **Final Action: Accept in Principle**

(630.13)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise second paragraph: The disconnecting means shall be a switch or circuit breaker identified for the use and its current rating shall not be less than the required ampacity of the supply conductors and that necessary to accommodate overcurrent protection as specified under 620.12.

Substantiation: Edit. The rating should also be not less than the conductor ampacity.

Panel Meeting Action: Accept in Principle

Revise 630.13 to read as follows:

An identified disconnecting means shall be provided in the supply circuit for each arc welder that is not equipped with a disconnect mounted as an integral part of the welder.

The disconnecting means shall be a switch or circuit breaker and its rating shall be not less than that necessary to accommodate overcurrent protection as specified under 630.12.

Panel Statement: CMP-12 accepts the submitter's concept to insert "identified."

CMP-12 does not accept the submitter's text.

See panel action and statement on Proposal 12-99.

The proposed change is not editorial in nature.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

CROUSHORE, T.: This revision looks harmless, but by inserting the word identified makes the equipment specifically require a specific identification for this purpose. The term "identified" is a specific term defined in Article 100 meaning a specific set of requirements. This proposal should have been rejected.

12-108 Log #398 NEC-P12 **Final Action: Accept**
(630.31(B)(3))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "(216,000 cycles per hour)" to "(216,000 cycles/hour)".
Change "15-cycle welds per hour" to "15-cycle welds/hour".
Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-109 Log #1851 NEC-P12 **Final Action: Reject**
(630.32(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "rating" to "ampacity".
Substantiation: Edit. Ampacity is more specific.
Panel Meeting Action: Reject
Panel Statement: The rating of a conductor differs from the ampacity depending on several conditions. Implementation of this change would change the intent of the code.
The proposed change adds no clarity to the code.
The proposed change is not editorial in nature.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
KOVACIK, J.: The Submitter proposed to replace the existing term conductor "rating" with conductor "ampacity." "Ampacity'" is defined in Article 100. "Rating" is a general term that is not defined. Also, conductors typically are only individually `rated' for Voltage and Temperature. The text of 630.32(B) applies to conductor ampacity, not conductor voltage or temperature While the term "rating" is correct in the context of 630.32 (Overcurrent Protection), it is not in 630.22(B) (For Conductors), and the term "rating" should be changed to "ampacity."
It is noted that for most other uses of the term "conductor rating" in the NEC (e.g., 400.5(A), 610.14(B)), the term is used in conjunction with supplementary information that clarifies the context of the use of the term. The use of the term `conductor rating' in 630.32(B) does not provide this supplementary context.

ARTICLE 640 — AUDIO SIGNAL PROCESSING, AMPLIFICATION, AND REPRODUCTION EQUIPMENT

Minute Item Note: The Technical Correlating Committee directs that the second sentence of 640.25, FPN, be deleted as the referenced NFPA Standard no longer exists.

12-110 Log #741 NEC-P12 **Final Action: Reject**
(640.2.Abandoned Audio Distribution Cable)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Delete text to read as follows:
640.2 Definitions.
For purposes of this article, the following definitions apply.
~~**Abandoned Audio Distribution Cable.** Installed audio distribution cable that is not terminated at equipment and not identified for future use with a tag.~~
[remainder of 640.2 unchanged by this Proposal]
Substantiation: Companion proposals have been made to add a single generalized definition in Article 100 and to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
NEC® Manual of Style 2.2.2.1. Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2. Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discreet definitions can be broadly consolidated into a single definition in Article 100.
The specific method by which identification for future use is achieved ("… with a tag") is conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 violates *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …") and is omitted in the generalized definition for "Abandoned" being added in Article 100. This identification-with-a-tag requirement in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 is redundant to the actual requirement statements in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Also, words regarding the possibility of ceasing connection to an electric supply have been added in the generalized definition for "Abandoned" to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC directed task group including representation from CMP-3, CMP-12, and CMP-16 determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
CMP-12 disagrees with the deletion of this definition.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-111 Log #809 NEC-P12 **Final Action: Reject**
(640.2.Abandoned Audio Distribution Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Audio Distribution Cable. Installed audio distribution cable that is not terminated at equipment and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-110.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-112 Log #3456 NEC-P12 **Final Action: Accept**
(640.3(M))

Submitter: Arthur E. Schlueter, Jr., A. E. Schlueter Pipe Organ Company / Rep. American Institute of Organ Builders & American Pipe Builders Association
Recommendation: Add: (M) Additions of pipe organ pipes to an electronic organ shall be in accordance with Article 650.
Substantiation: Electronic organ installations are in some instances, installing wind blown pipes which are controlled by low voltage signal and power circuits covered under Article 650. The installation of pipe organ pipes and their associated electrical circuits should be per Article 650.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
MARCOVICI, S.: The cross reference already exists in 650.3 and it is not necessary to repeat it here.

12-113 Log #2685 NEC-P12 **Final Action: Reject**
(640.6(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
The accessible (as applied to wiring methods) portions of audio distribution cables (including) (not including) cables in raceways shall be removed. (Alternate choices in parentheses).
Substantiation: Proposal is intended to allow panel to clarify this requirement.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with section 4.3.3 of the Regulations Governing Committee Projects as it does not provide a clear recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-114 Log #4547 NEC-P12 **Final Action: Reject**
(640.6(C))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
640.6 Mechanical Execution of Work.
(A) Neat and Workmanlike Manner. Audio signal processing, amplification, and reproduction equipment, cables, and circuits shall be installed in a neat workmanlike manner.
(B) Installation of Audio Distribution Cables. Cables installed exposed on the surface of ceilings and sidewalls shall be supported in such a manner that the audio distribution cables will not be damaged by normal building use. Such cables shall be secured by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall conform to 300.4 and 300.11(A).
(C) Abandoned Audio Distribution Cables. The accessible portion of abandoned audio distribution cables shall be removed. Removal of abandoned cables shall be performed in a neat and workmanlike manner.
(D) Installed Audio Distribution Cable Identified for Future Use.
(1) Cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.
(2) Cable tags shall have the following information:
(1) Date cable was identified for future use
(2) Date of intended use
(3) Information related to the intended future use of cable

Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 640.6. It is important to point out that similar care must be taken when removing cables.

110.12 Mechanical Execution of Work.

Electrical equipment shall be installed in a neat and workmanlike manner.

FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.

Consistent wording is being proposed for other sections in the code.

For information, see relevant definitions in the NEC.

Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

Panel Meeting Action: Reject

Panel Statement: The requirement is unenforceable. Disposition of removed materials is not a code responsibility.

The remaining installation is required to be in accordance with 110.3, which is enforceable.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-115 Log #268 NEC-P12 **Final Action: Reject**
(640.8)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change the word “bundled” to “installed”.

Substantiation: This change in terminology clarifies the intent without changing any requirements and eliminates the confusion of multiple definitions of “bundled” used in other sections of the Code.

Section 520.2 includes the following definition:

Bundled. Cables or conductors that are tied, wrapped, taped, or otherwise periodically bound together.

There was a proposal for the 2008 code, that was not accepted, to include that definition in Article 100 which would have applied throughout the code.

It does not appear that the intent in 640.8 is to require that the conductors be physically tied, wrapped, taped, or bound together; but merely installed in the same raceway or enclosure.

Panel Meeting Action: Reject

Panel Statement: Within this particular article, as it is in section 520.2, it is the intent in 640.8 to permit conductors be physically tied, wrapped, taped, or bound together (e.g., bundled).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-116 Log #4103 NEC-P12 **Final Action: Accept**
(640.9(B))

Submitter: Ray Stanko, Underwriters Laboratories, Inc.

Recommendation: Revise text to read as follows:

(B) Auxiliary Power Supply Wiring. Equipment that has a separate input for an auxiliary power supply shall be wired in compliance with Article 725. Battery installation shall be in accordance with Article 480. <u>This section shall not apply to the use of uninterruptible power supply (UPS) equipment, or other sources of supply, that are intended to act as a direct replacement for the primary circuit power source and are connected to the primary circuit input.</u>

~~FPN No. 1: This section does not apply to the use of uninterruptible power supply (UPS) equipment, or other sources of supply, that are intended to act as a direct replacement for the primary circuit power source and are connected to the primary circuit input.~~

FPN ~~No. 2~~: Refer to *NFPA 72*-2007, *National Fire Alarm Code*, where equipment is used for a fire alarm system.

Substantiation: This requirement is more than an informative statement and belongs in the body of the Code.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

MARCOVICI, S.: There is no need to incorporate the FPN No. 1 into the text of the section. The offered clarification is sufficient as a FPN.

12-117 Log #510 NEC-P12 **Final Action: Reject**
(640.10(A))

TCC Action: The Technical Correlating Committee directs that the action on this proposal be reported as “Reject”. The existing text is in compliance with the NEC Style Manual (Annex B, Subsection G) where used as a noun.

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Add a hyphen between “circuit” and “interrupter”.

Substantiation: The addition of the hyphen will provide consistency throughout the Code.

Additional proposals are being submitted to make similar corrections throughout the Code.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

MARCOVICI, S.: See My Affirmative with Comment on 12-23.

12-118 Log #160 NEC-P12 **Final Action: Reject**
(640.21(B) and (C))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(B) Between Loudspeakers and Amplifiers or Between Loudspeakers. Cables used to connect loudspeakers to each other or to an amplifier shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid ~~communications~~, signal, and optical fiber cables, shall be permitted.

(C) Between Equipment. Cables used for the distribution of audio signals between equipment shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid ~~communications~~, signal, and optical fiber cables, shall be permitted. Other cable types and assemblies specified by the equipment manufacturer as acceptable for the use shall be permitted in accordance with 110.3(B).

Substantiation: Sections 640.21(B) & (C) have requirements for communications circuits. However, 90.3 states:

“Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8.”

Since Article 800 has no reference to Article 640, the requirements for the uses of communications cables in 640.21(B) & (C) are not correlated with Article 800 and should be deleted.

Panel Meeting Action: Reject

Panel Statement: Communications cables are permitted to substitute for Class 2 and 3 cables.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-119 Log #165 NEC-P12 **Final Action: Accept in Principle**
(640.21(B) and (C))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(B) Between Loudspeakers and Amplifiers or Between Loudspeakers. Cables used to connect loudspeakers to each other or to an amplifier shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and ~~optical fiber~~ cables, shall be permitted.

(C) Between Equipment. Cables used for the distribution of audio signals between equipment shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and ~~optical fiber~~ cables, shall be permitted. Other cable types and assemblies specified by the equipment manufacturer as acceptable for the use shall be permitted in accordance with 110.3(B).

Substantiation: Article 770 has definitions for optical fiber cables:

“Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering. “

“Composite Optical Fiber Cable. These cables contain optical fibers and current-carrying electrical conductors.”

The terminology in Article 770 for a “hybrid” optical fiber cable is a composite optical fiber cable. Section 770.3(A) states:

“(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.”

Since a hybrid (composite) optical fiber cable is classified and installed according to the type of electrical cable the fiber in installed in, there is no need to mention “hybrid” optical fiber cables.

Panel Meeting Action: Accept in Principle

Revise 640.21(B) and (C) to read as follows:

(B) Between Loudspeakers and Amplifiers or Between Loudspeakers. Cables used to connect loudspeakers to each other or to an amplifier shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted.

(C) Between Equipment. Cables used for the distribution of audio signals between equipment shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. Other cable types and assemblies specified by the equipment manufacturer as acceptable for the use shall be permitted in accordance with 110.3(B).

Panel Statement: CMP-12 adds "composite" ahead of "optical fiber."
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-59.

12-120 Log #4653 NEC-P12 **Final Action: Accept in Principle**
(640.45)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following text at the end: "It shall be permitted to bury cables, and the requirements of 300.5 shall not apply in this case.
Substantiation: This proposal incorporates the permission afforded comparable applications at carnivals, as covered in 525.20(G). These uses are similar and the permission for shallow burial is well suited for this wiring.
Panel Meeting Action: Accept in Principle
Add the following text as a last sentence to the end of 640.45:
The cover requirements of 300.5 shall not apply to wiring protected by burial.
Panel Statement: CMP-12 accepts the concept that the submitter has presented and changes the text as shown.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
SCHAMEL, D.: Reject this proposal. If the cable is burred it is not accessible to the public.
Comment on Affirmative:
MARCOVICI, S.: The Panel's proposed text should be re-phrased to read as follows:
"For buried cables and cords, the cover requirements of 300.5 shall not apply."

ARTICLE 645 — INFORMATION TECHNOLOGY EQUIPMENT

12-121 Log #2060 NEC-P12 **Final Action: Accept**
(645.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.1 Scope. This article covers equipment, power-supply wiring, equipment interconnecting wiring, and grounding of information technology equipment and systems ~~including terminal units,~~ in an information technology equipment room.
Substantiation: There is no need to include the phrase "terminal units" from among the many types of IT equipment. It suggests monitors and computer displays should be held to a different standard.
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.
Panel Meeting Action: Accept
Panel Statement: CMP-12 recognizes that scope is under the purview of the TCC. CMP-12 recommends acceptance of this proposal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-122 Log #2061 NEC-P12 **Final Action: Accept**
(645.1, FPN)

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action on this proposal to comply with the 3.1.3 of the NEC Style Manual with respect to mandatory requirements in Fine Print Notes.
This action will be considered by the panel as a public comment.
Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.1 Scope
... FPN: Use of the requirements in Article 645 is based on the assumption that construction of the information technology equipment room complies with NFPA 75. For further information, see NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*
Substantiation:
645.1 Scope: The NEC Handbook is the source of the suggested additional sentence in the FPN. It adds clarity.

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group.

This committee was comprised of the following members:	
Tim McClintock	Wayne County, Ohio
Lori Tennant	Square D Company/Schneider Electric
Christopher P. O'Neil	NSTAR Electric & Gas
Bill Anderson	Procter & Gamble
Tom Hedges	Hedges Electric & Construction Inc.
Robert Johnson	ITE Safety
Tom Burke	Underwriters Laboratories Inc.
David Boston	Site Uptime Network
Steve McCluer	Schneider Critical Power & Cooling Systems
Richard Schlosser	TiePoint Engineering, PC
Tom Wysocki	Guardian Services, Inc.
Stanley Kaufman	CableSafe, Inc.
Jeffrey A. Betz	AT&T Inc
Ralph Transue	The RJA Group, Inc.
Ron Marts	Telcordia Technologies
Walter Schachtschneider	Bell Canada
Roux, Richard	NFPA
Timothy M. Croushore	Allegheny Power
Amos McCormick	AT&T

Proposed changes to Article 645

The action of the committee was to recommend the following proposed changes to article 645. Each is independent of the other and can be approved or changed without significant impact on the other proposals.
645.1
This change to the scope deleting "terminal units" is submitted separately since it is addressed by the coordinating committee.
645.1 FPN
Addition of FPN to improve clarity
645.2 ITE
New definition of ITE equipment
645.2 Room
New definition of equipment room
645.3
Changes of an editorial nature to improve clarity and use of the article
645.4
Changes intended to clarify the application of article 645
645.5
Changes primarily editorial and to clarify rules regarding cabling.
645.5(D)(2)
Proposing that underfloor raceways need not be fastened to the floor.
645.10
Proposing changes to the disconnecting means control.
645.25
Allowing calculation of ampacity for feeder and service loads.

Combined text of proposed changes to Article 645

645.1 Scope. This article covers equipment, power-supply wiring, equipment interconnecting wiring, and grounding of information technology equipment and systems ~~including terminal units,~~ in an information technology equipment room.
FPN: Use of the requirements in Article 645 is based on the assumption that construction of the information technology equipment room complies with NFPA 75. For further information, see NFPA 75-20039, *Standard for the Protection of Information Technology Equipment.*
645.2 Definitions.
Abandoned Supply Circuits and Interconnecting Cables. Installed supply circuits and interconnecting cables that are not terminated at equipment and not identified for future use with a tag.
Critical Operations Data System. An Information Technology Equipment System that requires continuous operation for the reasons of public safety, emergency management, national security, or business continuity.
Information Technology Equipment (ITE).
Equipment, and systems rated 600V or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, which are used for creation, and manipulation of data, voice, video and similar signals.
Information Technology Equipment Room. A room within the information technology equipment area that contains the information technology equipment [**75**:3.3.9].
Remote Disconnect Control - An electric device and circuit that controls a disconnecting means through a relay or equivalent device**.**
Zone. A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room with dedicated power and cooling systems for the information technology equipment or systems.
645.3 Other Articles. Circuits and equipment shall comply with 645.3(A) through (H), as applicable.
(A) Spread of Fire or Products of Combustion. Sections 300.21, 770.26, 800.26, and 820.26 shall apply to penetrations of the fire resistant room boundary

(B) Ceiling Cavity Plenums. Sections 300.22(C)(1), 725.154(A), 760.53(B)(2), 760.154(A), 770.154(A), 800.154(A) and 820.154(A) shall apply to wiring and cabling in ceiling cavity plenums above an information technology equipment room.

(C) Grounding. The non-current-carrying conductive members of optical fiber cables in an information technology equipment room shall be grounded in accordance with 770.101.

(D) Electrical Classification of Data Circuits. Sections 725.121(A)(4) shall apply to the electrical classification of listed information technology equipment signaling circuits. 725.139(D)(1) and 800.133(A)(1)(b) shall apply to the electrical classification of class 2 and class 3 circuits in the same cable with communications circuits.

(E) Critical Operations Power Systems. The definition of Critical Operations Power Systems in Article 708 shall apply.

(F) Fire Alarm Equipment. Article 760 shall apply to fire alarm systems equipment installed in an information technology equipment room.

(G) Communications Equipment. Article 800 shall apply to communications equipment installed in an information technology equipment room. Article 645 shall apply to the powering of communications equipment in an information technology equipment room.

FPN No. 1: See Part I of Article 100, Definitions, for a definition of communications equipment.

FPN No. 2: See 90.3, Code Arrangement.

(H) Community Antenna Television and Radio Distribution Systems Equipment. Article 820 shall apply to community antenna television and radio distribution systems equipment installed in an information technology equipment room. Article 645 shall apply to the powering of community antenna television and radio distribution systems equipment installed in an information technology equipment room.

FPN: See 90.3, Code Arrangement.

645.4 Special Requirements for Information Technology Equipment Room. This article shall be permitted to apply, ~~provided~~ when all of the following conditions are met:

FPN: This article provides alternate wiring methods to the provisions of chapters 1 through 4 for power wiring and Article 725.154(A) for signaling wiring for information technology equipment rooms constructed in compliance with NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*

(1) Disconnecting means complying with 645.10 are provided.

(2) A separate heating/ventilating/ air- conditioning (HVAC) system is provided that is dedicated for information technology equipment use and is separated from other areas of occupancy. Any HVAC system that serves other occupancies shall be permitted to also serve the information technology equipment room if fire/smoke dampers are provided at the point of penetration of the room boundary. Such dampers shall operate on activation of smoke detectors and ~~also~~ by operation of the disconnecting means required by 645.10.

FPN: For further information, see NFPA 75-200~~3~~9 , *Standard for the Protection of Information Technology Equipment*, Chapter 10, 10.1, 10.1.1, 10.1.2, and 10.1.3.

(3) All ~~Listed~~ information technology and communications equipment ~~is~~ installed in the room is listed.

(4) The room is occupied ~~only~~ by, and accessible to, only those personnel needed for the maintenance and functional operation of the installed information technology equipment.

(5) The room is separated from other occupancies by fire-resistant-rated walls, floors, and ceilings with protected openings.

FPN: For further information on room construction requirements, see NFPA 75-200~~3~~9, *Standard for the Protection of Information Technology Equipment*, Chapter 5.

645.5 Supply Circuits and Interconnecting Cables.

(A) Branch-Circuit Conductors. The branch-circuit conductors supplying one or more units of ~~a data processing system~~ information technology equipment shall have an ampacity not less than 125 percent of the total connected load.

(B) Power Cord ~~and Plug~~ Connections. ~~The data processing system~~ Information technology equipment shall be permitted to be connected to a branch circuit by ~~any of the following listed means:~~ cord sets or flexible cord and plug cap assemblies.

(1) Power cords shall not ~~Flexible cord and attachment plug cap not to~~ exceed 4.5 m (15 feet).

~~(2) Cord set assembly, where run on the surface of the floor, shall be protected against physical damage.~~

(2) Power cords shall be listed and suitable for information technology equipment.

FPN: One method of determining cords are suitable for the purpose is found in UL 60950 *Standard for Information Technology Equipment – Safety – Part 1*

(C) Interconnecting Cables. Separate ~~data processing~~ information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies.

FPN: The 4.5 m (15 ft) limitation in (B) does not apply to interconnecting cables.

(D) Physical protection. Where exposed to physical damage, ~~the installation~~ supply circuits and interconnecting cables shall be protected. ~~by approved means~~.

(E~~D~~) Under Raised Floors. Power cables, communications cables, connecting cables, interconnecting cables, cord-and-plug connections, and receptacles associated with the information technology equipment shall be permitted under a raised floor, provided the following conditions are met:

(1) The raised floor is of suitable construction, and the area under the floor is accessible.

(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.

Exception; Compliance with 300.11(A) shall not be required when raceway is supported by the floor of the building under the raised floor.

(3) Supply cords of listed information technology equipment in accordance with 645.5(B).

(4) Ventilation in the underfloor area is used for the information technology equipment room only, except as provided in 645.4(2). The ventilation system shall be so arranged, with approved smoke detection devices, that upon the detection of fire or products of combustion in the underfloor space, the circulation of air will cease.

(5) Openings in raised floors for cords and cables protect cords and cables against abrasion and minimize the entrance of debris beneath the floor.

(6) Cables, other than those covered in (E~~D~~)(2) and (E)(3) and those complying with (E)(6)(a) or (E)(6)(b), ~~(D)(6)(a), (D)(6)(b) or (D)(6)(c)~~, shall be listed as Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room.

a. Interconnecting cables enclosed in a raceway.

b. ~~Interconnecting cables listed with equipment manufactured prior to July 1, 1994, being installed with that equipment.~~

~~c.~~ Cable type designations shown in Table 645.5 shall be permitted. Green, or green with one or more yellow stripes, insulated single-conductor cables, 4 AWG and larger, marked "for use in cable trays" or "for CT use" shall be permitted for equipment grounding.

FPN: One method of defining fire resistance is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.* The smoke measurements in the test method are not applicable. Another method of defining fire resistance is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Table 645.5 Cable Types Permitted Under Raised Floors

Article	Plenum	Riser	General Purpose
336			TC
725	CL2P & CL3P	CL2R & CL3R	CL2, CL3 & PLTC
727			ITC
760	NPLFP & FPLP	NPLFR & FPLR	NPLF & FPL
770	OFNP & OFCP	OFNR & OFCR	OFN & OFC
800	CMP	CMR	CM & CMG
820	CATVP	CATVR	CATV

(~~F~~E) **Securing in Place**. Power cables; communications cables; connecting cables; interconnecting cables; and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, information technology equipment shall not be required to be secured in place.

(~~G~~F) **Abandoned Supply Circuits and Interconnecting Cables.** The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a ~~metal~~ raceway.

(~~H~~G) **Installed Supply Circuits and Interconnecting Cables Identified for Future Use.**

(1) Supply circuits and interconnecting cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.

(2) Supply circuit tags and interconnecting cable tags shall have the following information:

a. Date identified for future use
b. Date of intended use
c. Information relating to the intended future use

645.6 Cables Not in Information Technology Equipment Room. Cables extending beyond the information technology equipment room shall be subject to the applicable requirements of this Code.

FPN: For signaling circuits, refer to Article 725; for optical fiber cables and raceways, refer to Article 770; ~~and~~ for communications circuits, refer to Article 800~~. F~~; for fire alarm systems, refer to Article 760; and for CATV circuits, refer to Article 820.

~~**645.7 Penetrations.** Penetrations of the fire-resistant room boundary shall be in accordance with 300.21~~

645.10 Disconnecting Means. An approved means shall be provided to disconnect power to all electronic equipment in the information technology equipment room or in designated zones within the room. There shall also be a similar approved means to disconnect the power to all dedicated HVAC systems serving the room or designated zones and shall cause all required fire/smoke dampers to close. Disconnecting means shall be implemented by either (A) or (B) below.

~~The control for these disconnecting means shall be grouped and identified and shall be readily accessible at the principal exit doors. A single means to control both the electronic equipment and HVAC systems in the room or in a zone shall be permitted. Where a pushbutton is used as a means to disconnect power, pushing the button in shall disconnect the power. Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.~~

Exception: Installations qualifying under the provisions of Article 685.

(A) Remote Disconnect Controls

(1) Remote Disconnect Controls shall be located at approved locations readily accessible in case of fire to authorized personnel and emergency responders.

(2) The Remote Disconnect Controls for the control of electronic equipment power and HVAC systems shall be grouped and identified. A single means to control both shall be permitted.

(3) Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.

(4) Additional means to prevent unintentional operations of remote disconnect controls shall be permitted.

FPN: *For further information see NFPA 75-2009 Standard for the Protection of Information Technology Equipment.*

(B) Remote disconnecting controls shall not be required for critical operations data systems when all of the following are met:

(1) An approved procedure has been established and maintained for removing power and air movement within the room or zone.

(2) Qualified personnel are continuously available to meet emergency responders and to advise them of disconnecting methods.

(3) A smoke-sensing fire detection system is in place.
FPN - For further information see NFPA 72-2007, National Fire Alarm Code

(4) An approved fire suppression system suitable for the application is in place.

(5) Cables installed under a raised floor, other than branch circuit wiring and power cords installed in compliance with 645.5(D)(2) or (3), are in compliance with 300.22(C) , 725.154(A), 770.154(A), or 800.154(A).

645.11 Uninterruptible Power Supplies (UPSs). Except for installations and constructions covered in 645.11(1) or (2), UPS systems installed within the information technology equipment room, and their supply and output circuits, shall comply with 645.10. The disconnecting means shall also disconnect the battery from its load.

(1) Installations qualifying under the provisions of Article 685.
(2) Power sources limited to 750 volt-amperes or less derived either from UPS equipment or from battery circuits integral to electronic equipment.

645.15 Grounding. All exposed non–current-carrying metal parts of an information technology system shall be bonded to the equipment grounding conductor in accordance with Article 250 or shall be double insulated. Power systems derived within listed information technology equipment that supply information technology systems through receptacles or cable assemblies supplied as part of this equipment shall not be considered separately derived for the purpose of applying 250.20(D). Where signal reference structures are installed, they shall be bonded to the equipment grounding conductor provided for the information technology equipment.

FPN No. 1: The bonding requirements in the product standards governing this listed equipment ensure that it complies with Article 250.

FPN No. 2: Where isolated grounding-type receptacles are used, see 250.146(D) and 406.2(D).

645.16 Marking. Each unit of an information technology system supplied by a branch circuit shall be provided with a manufacturer's nameplate, which shall also include the input power requirements for voltage, frequency, and maximum rated load in amperes.

645.17 Power Distribution Units. Power distribution units that are used for information technology equipment shall be permitted to have multiple panelboards within a single cabinet, provided that ~~each panelboard has no more than 42 overcurrent devices and~~ the power distribution unit is utilization equipment listed for information technology application.

645.25 Engineering Supervision. Feeder and service load calculations for new or existing loads shall be permitted by a licensed and qualified professional engineer. Feeder conductors shall not be required to be of greater ampacity than the service conductors. Service or feeder conductors shall be permitted to have neutral load determined by 220.61.

Proposed final text with task group changes to Article 645

645.1 Scope. This article covers equipment, power-supply wiring, equipment interconnecting wiring, and grounding of information technology equipment and systems in an information technology equipment room.

FPN: Use of the requirements in Article 645 is based on the assumption that construction of the information technology equipment room complies with NFPA 75. For further information, see NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*

645.2 Definitions.

Abandoned Supply Circuits and Interconnecting Cables. Installed supply circuits and interconnecting cables that are not terminated at equipment and not identified for future use with a tag.

Critical Operations Data System. An Information Technology Equipment System that requires continuous operation for the reasons of public safety, emergency management, national security, or business continuity.

Information Technology Equipment (ITE).
Equipment, and systems rated 600V or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, which are used for creation, and manipulation of data, voice, video and similar signals.

Information Technology Equipment Room. A room within the information technology equipment area that contains the information technology equipment [**75**:3.3.9].

Remote Disconnect Control - An electric device and circuit that controls a disconnecting means through a relay or equivalent device**.**

Zone. A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room with dedicated power and cooling systems for the information technology equipment or systems.

645.3 Other Articles. Circuits and equipment shall comply with 645.3(A) through (H), as applicable.

(A) Spread of Fire or Products of Combustion. Sections 300.21, 770.26, 800.26, and 820.26 shall apply to penetrations of the fire resistant room boundary.

(B) Ceiling Cavity Plenums. Sections 300.22(C)(1), 725.154(A), 760.53(B)(2), 760.154(A), 770.154(A), 800.154(A) and 820.154(A) shall apply to wiring and cabling in ceiling cavity plenums above an information technology equipment room.

(C) Grounding. The non-current-carrying conductive members of optical fiber cables in an information technology equipment room shall be grounded in accordance with 770.101.

(D) Electrical Classification of Data Circuits. Sections 725.121(A)(4) shall apply to the electrical classification of listed information technology equipment signaling circuits. 725.139(D)(1) and 800.133(A)(1)(b) shall apply to the electrical classification of class 2 and class 3 circuits in the same cable with communications circuits.

(E) Critical Operations Power Systems. The definition of Critical Operations Power Systems in Article 708 shall apply.

(F) Fire Alarm Equipment. Article 760 shall apply to fire alarm systems equipment installed in an information technology equipment room.

(G) Communications Equipment. Article 800 shall apply to communications equipment installed in an information technology equipment room. Article 645 shall apply to the powering of communications equipment in an information technology equipment room.

FPN No. 1: See Part I of Article 100, Definitions, for a definition of communications equipment.

FPN No. 2: See 90.3, Code Arrangement.

(H) Community Antenna Television and Radio Distribution Systems Equipment. Article 820 shall apply to community antenna television and radio distribution systems equipment installed in an information technology equipment room. Article 645 shall apply to the powering of community antenna television and radio distribution systems equipment installed in an information technology equipment room.

FPN: See 90.3, Code Arrangement.

645.4 Special Requirements for Information Technology Equipment Room. This article shall be permitted to apply, when all of the following conditions are met:

FPN: This article provides alternate wiring methods to the provisions of chapters 1 through 4 for power wiring and Article 725.154(A) for signaling wiring for information technology equipment rooms constructed in compliance with NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*

(1) Disconnecting means complying with 645.10 are provided.

(2) A separate heating/ventilating/ air- conditioning (HVAC) system is provided that is dedicated for information technology equipment use and is separated from other areas of occupancy. Any HVAC system that serves other occupancies shall be permitted to also serve the information technology equipment room if fire/smoke dampers are provided at the point of penetration of the room boundary. Such dampers shall operate on activation of smoke detectors and by operation of the disconnecting means required by 645.10.

FPN: For further information, see NFPA 75-2009 , *Standard for the Protection of Information Technology Equipment,* Chapter 10, 10.1, 10.1.1, 10.1.2, and 10.1.3.

(3) All information technology and communications equipment installed in the room is listed.

(4) The room is occupied by, and accessible to, only those personnel needed for the maintenance and functional operation of the installed information technology equipment.

(5) The room is separated from other occupancies by fire-resistant-rated walls, floors, and ceilings with protected openings.

FPN: For further information on room construction requirements, see NFPA 75-2009, *Standard for the Protection of Information Technology Equipment,* Chapter 5.

645.5 Supply Circuits and Interconnecting Cables.

(A) Branch-Circuit Conductors. The branch-circuit conductors supplying one or more units of information technology equipment shall have an ampacity not less than 125 percent of the total connected load.

(B) Power Cord Connections. Information technology equipment shall be permitted to be connected to a branch circuit by cord sets or flexible cord and plug cap assemblies.

(1) Power cords shall not exceed 4.5 m (15 feet).

(2) Power cords shall be listed and suitable for information technology equipment.

FPN: One method of determining cords are suitable for the purpose is found in UL 60950 *Standard for Information Technology Equipment – Safety – Part 1*

(C) Interconnecting Cables. Separate information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies.

FPN: The 4.5 m (15 ft) limitation in (B) does not apply to interconnecting cables.

(D) Physical protection. Where exposed to physical damage, supply circuits and interconnecting cables shall be protected.

(E) Under Raised Floors. Power cables, communications cables, connecting cables, interconnecting cables, cord-and-plug connections, and receptacles associated with the information technology equipment shall be permitted under a raised floor, provided the following conditions are met:

(1) The raised floor is of suitable construction, and the area under the floor is accessible.

(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.

Exception; Compliance with 300.11(A) shall not be required when raceway is supported by the floor of the building under the raised floor.

(3) Supply cords of listed information technology equipment in accordance with 645.5(B).

(4) Ventilation in the underfloor area is used for the information technology equipment room only, except as provided in 645.4(2). The ventilation system shall be so arranged, with approved smoke detection devices, that upon the detection of fire or products of combustion in the underfloor space, the circulation of air will cease.

(5) Openings in raised floors for cords and cables protect cords and cables against abrasion and minimize the entrance of debris beneath the floor.

(6) Cables, other than those covered in (E)(2) and (E)(3) and those complying with (E)(6)(a) or (E)(6)(b), shall be listed as Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room.

a. Interconnecting cables enclosed in a raceway.

b. Cable type designations shown in Table 645.5 shall be permitted. Green, or green with one or more yellow stripes, insulated single-conductor cables, 4 AWG and larger, marked "for use in cable trays" or "for CT use" shall be permitted for equipment grounding.

FPN: One method of defining fire resistance is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.* The smoke measurements in the test method are not applicable. Another method of defining fire resistance is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Table 645.5 Cable Types Permitted Under Raised Floors

Article	Plenum	Riser	General Purpose
336			TC
725	CL2P & CL3P	CL2R & CL3R	CL2, CL3 & PLTC
727			ITC
760	NPLFP & FPLP	NPLFR & FPLR	NPLF & FPL
770	OFNP & OFCP	OFNR & OFCR	OFN & OFC
800	CMP	CMR	CM & CMG
820	CATVP	CATVR	CATV

(F) Securing in Place. Power cables; communications cables; connecting cables; interconnecting cables; and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, information technology equipment shall not be required to be secured in place.

(G) Abandoned Supply Circuits and Interconnecting Cables. The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a raceway.

(H) Installed Supply Circuits and Interconnecting Cables Identified for Future Use.

(1) Supply circuits and interconnecting cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.

(2) Supply circuit tags and interconnecting cable tags shall have the following information:

a. Date identified for future use

b. Date of intended use

c. Information relating to the intended future use

645.6 Cables Not in Information Technology Equipment Room. Cables extending beyond the information technology equipment room shall be subject to the applicable requirements of this Code.
FPN: For signaling circuits, refer to Article 725; for optical fiber cables and raceways, refer to Article 770; for communications circuits, refer to Article 800; for fire alarm systems, refer to Article 760; and for CATV circuits, refer to Article 820.

645.10 Disconnecting Means. An approved means shall be provided to disconnect power to all electronic equipment in the information technology equipment room or in designated zones within the room. There shall also be a similar approved means to disconnect the power to all dedicated HVAC systems serving the room or designated zones and shall cause all required fire/smoke dampers to close. Disconnecting means shall be implemented by either (A) or (B) below.
Exception: Installations qualifying under the provisions of Article 685.
(A) Remote Disconnect Controls
(1) Remote Disconnect Controls shall be located at approved locations readily accessible in case of fire to authorized personnel and emergency responders.
(2) The Remote Disconnect Controls for the control of electronic equipment power and HVAC systems shall be grouped and identified. A single means to control both shall be permitted.
(3) Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.
(4) Additional means to prevent unintentional operations of remote disconnect controls shall be permitted.
FPN: *For further information see NFPA 75-2009 Standard for the Protection of Information Technology Equipment.*

(B) Remote disconnecting controls shall not be required for critical operations data systems when all of the following are met:
(1) An approved procedure has been established and maintained for removing power and air movement within the room or zone.
(2) Qualified personnel are continuously available to meet emergency responders and to advise them of disconnecting methods.
(3) A smoke-sensing fire detection system is in place.
FPN - For further information see NFPA 72-2007, National Fire Alarm Code

(4) An approved fire suppression system suitable for the application is in place.
(5) Cables installed under a raised floor, other than branch circuit wiring and power cords installed in compliance with 645.5(D)(2) or (3), are in compliance with 300.22© , 725.154(A), 770.154(A), or 800.154(A).

645.11 Uninterruptible Power Supplies (UPSs). Except for installations and constructions covered in 645.11(1) or (2), UPS systems installed within the information technology equipment room, and their supply and output circuits, shall comply with 645.10. The disconnecting means shall also disconnect the battery from its load.
(1) Installations qualifying under the provisions of Article 685.
(2) Power sources limited to 750 volt-amperes or less derived either from UPS equipment or from battery circuits integral to electronic equipment.

645.15 Grounding. All exposed non–current-carrying metal parts of an information technology system shall be bonded to the equipment grounding conductor in accordance with Article 250 or shall be double insulated. Power systems derived within listed information technology equipment that supply information technology systems through receptacles or cable assemblies supplied as part of this equipment shall not be considered separately derived for the purpose of applying 250.20(D). Where signal reference structures are installed, they shall be bonded to the equipment grounding conductor provided for the information technology equipment.
FPN No. 1: The bonding requirements in the product standards governing this listed equipment ensure that it complies with Article 250.
FPN No. 2: Where isolated grounding-type receptacles are used, see 250.146(D) and 406.2(D).

645.16 Marking. Each unit of an information technology system supplied by a branch circuit shall be provided with a manufacturer's nameplate, which shall also include the input power requirements for voltage, frequency, and maximum rated load in amperes.

645.17 Power Distribution Units. Power distribution units that are used for information technology equipment shall be permitted to have multiple panelboards within a single cabinet, provided that the power distribution unit is utilization equipment listed for information technology application.

645.25 Engineering Supervision. Feeder and service load calculations for new or existing loads shall be permitted by a licensed and qualified professional engineer. Feeder conductors shall not be required to be of greater ampacity than the service conductors. Service or feeder conductors shall be permitted to have neutral load determined by 220.61.
Panel Meeting Action: Accept
Panel Statement: CMP-12 recognizes that scope is under the purview of the TCC. CMP-12 recommends acceptance of this proposal.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-123 Log #742 NEC-P12 **Final Action: Reject**
(645.2.Abandoned Supply Circuits and Interconnecting Cables)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Delete the definition and consequently the entire Section 645.2:
~~**645.2 Definition.**~~
~~**Abandoned Supply Circuits and Interconnecting Cables.** Installed supply circuits and interconnecting cables that are not terminated at equipment and not identified for future use with a tag.~~
Substantiation: Companion proposals have been made to add a single generalized definition in Article 100 and to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
NEC® Manual of Style 2.2.2.1. Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2. Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discreet definitions can be broadly consolidated into a single definition in Article 100.
The specific method by which identification for future use is achieved ("… with a tag") is conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 violates *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …") and is omitted in the generalized definition for "Abandoned" being added in Article 100. This identification-with-a-tag requirement in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 is redundant to the actual requirement statements in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Also, words regarding the possibility of ceasing connection to an electric supply have been added in the generalized definition for "Abandoned" to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC directed task group including representation from CMP-3, CMP-12 and CMP-16 determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-124 Log #810 NEC-P12 **Final Action: Reject**
(645.2.Abandoned Supply Circuits and Interconnecting Cables)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Supply Circuits and Interconnecting Cables. Installed supply circuits and interconnecting cables that are not terminated at equipment and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-123.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-125 Log #2062 NEC-P12 **Final Action: Accept in Principle**
(645.2.Information Technology Equipment (ITE))

Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.2 Definitions.
Information Technology Equipment (ITE).
Equipment and systems rated 600V or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, which are used for creation, and manipulation of data, voice, video and similar signals.
Substantiation: This definition is derived from UL.
It is necessary to be able to distinguish between IT equipment and communications equipment in order to know what Article applies. Both might be installed in the same room. Section 90.3 states:
Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 12-126.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-126 Log #3737 NEC-P12 **Final Action: Accept in Principle**
(645.2.Information Technology Equipment (ITE))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action on this proposal to comply with 2.2.2 and 3.1.3 of the NEC Style Manual with respect to mandatory requirements in Fine Print Notes.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc. / Rep. The Society of the Plastics Industry
Recommendation: Add the following new text:
Information Technology Equipment (ITE).
Equipment and systems rated 600V or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, which are used for creation, and manipulation of data, voice, video and similar signals that are not communications equipment as defined in Part I of Article 100 and do not process communications circuits as defined in 800.2.
Substantiation: I am a member of the Panel 12 Article 645 Task Group. I reviewed the task group's proposals with a member of the NEC TCC, Mr. James Dollard. Mr. Dollard noted that some of the proposals did not fully comply with the NEC Style Manual and others had correlation issues. In order to address these issues before the deadline for proposals, I prepared amended proposals and submitted them for the panel to consider.
Bob Johnson proposed the following definition.
"Information Technology Equipment (ITE).
Equipment and systems rated 600V or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, which are used for creation, and manipulation of data, voice, video and similar signals."
The substantiation for the above definition is:
"This definition is derived from UL.
It is necessary to be able to distinguish between IT equipment and communications equipment in order to know what Article applies. Both might be installed in the same room. Section 90.3 states:
Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation."
Unfortunately the definition submitted by the Bob Johnson for task group has serious correlation issues. I agree with the statement in the substantiation that "It is necessary to be able to distinguish between IT equipment and communications equipment in order to know what Article applies. Both might be installed in the same room."
A comparison of the definition of communications equipment from Article 100 with the proposed definition of IT equipment submitted by Bob Johnson for the task group shows the task group's proposal will actually include communications equipment in the definition of IT equipment.
Article 100 Definition of Communications Equipment
"Communications Equipment. The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries) and technical support equipment (e.g., computers)."
Definition of IT equipment from Bob Johnson's proposal
"Information Technology Equipment (ITE).
Equipment and systems rated 600V or less, normally found in offices or other business establishments and similar environments classified as ordinary locations, which are used for creation, and manipulation of data, voice, video and similar signals."
If a definition is IT equipment is adopted that includes communications equipment, then article 645 will cover communications equipment in a computer room. That will be a clear violation of section 90.3.
The simple solution to this conundrum is to define IT equipment is such a manner that it does not include communications equipment. Acceptance of this proposal will achieve that goal and avoid bringing about a lack of correlation between Articles 645, 100 and 800.
Panel Meeting Action: Accept in Principle
Accept the definition of Information Technology Equipment and add to 645..2 as proposed in the recommendation. In addition, add a FPN to read as follows:
FPN: UL 60950-1 includes listing requirements for both information technology equipment and communications equipment.
Panel Statement: CMP-12 accepts the submitter's proposal.
Additionally, CMP-12 adds a FPN. The FPN following the definition clarifies that the code makes a distinction between ITE and communications equipment on functionality, whereas a single term may be used by equipment standards.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-127 Log #2063 NEC-P12 **Final Action: Accept**
(645.2.Information Technology Equipment Room)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to locate the reference to NFPA 75:3.3.9 in a FPN and include the document title.
This action will be considered by the panel as a public comment.
Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.2 Definitions.
Information Technology Equipment Room. A room within the information technology equipment area that contains the information technology equipment. [**75**:3.3.9].
Substantiation: This term is used several times in Article 645. This definition is found in NFPA 75.3.3.9.
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-128 Log #2058 NEC-P12 **Final Action: Accept in Principle**
(645.2 and 645.10)

Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.2 Definitions
Critical Operations Data System. An Information Technology Equipment System that requires continuous operation for the reasons of public safety, emergency management, national security, or business continuity.
Remote Disconnect Control - An electric device and circuit that controls a disconnecting means through a relay or equivalent device**.**
Zone. A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room with dedicated power and cooling systems for the information technology equipment or systems.
645.10 Disconnecting Means. An approved means shall be provided to disconnect power to all electronic equipment in the information technology equipment room or in designated zones within the room. There shall also be a similar approved means to disconnect the power to all dedicated HVAC systems serving the room or designated zones and shall cause all required fire/smoke dampers to close. Disconnecting means shall be implemented by either (A) or (B) below.
~~The control for these disconnecting means shall be grouped and identified and shall be readily accessible at the principal exit doors. A single means to control both the electronic equipment and HVAC systems in the room or in a zone shall be permitted. Where a pushbutton is used as a means to disconnect power, pushing the button in shall disconnect the power. Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.~~
Exception: Installations qualifying under the provisions of Article 685.
(A) Remote Disconnect Controls
(1) Remote Disconnect Controls shall be located at approved locations readily accessible in case of fire to authorized personnel and emergency responders.
(2) The Remote Disconnect Controls for the control of electronic equipment power and HVAC systems shall be grouped and identified. A single means to control both shall be permitted.
(3) Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.
(4) Additional means to prevent unintentional operations of remote disconnect controls shall be permitted.
FPN: *For further information see NFPA 75-2009 Standard for the Protection of Information Technology Equipment.*
(A) Remote disconnecting controls shall not be required for critical operations data systems when all of the following are met:
(1) An approved procedure has been established and maintained for removing power and air movement within the room or zone.

(2) Qualified personnel are continuously available to meet emergency responders and to advise them of disconnecting methods.
(3) A smoke-sensing fire detection system is in place.
FPN - *For further information see NFPA 72-2007, National Fire Alarm Code.*
(4) An approved fire suppression system suitable for the application is in place.
(5) Cables installed under a raised floor, other than branch circuit wiring and power cords installed in compliance with 645.5(D)(2) or (3), are in compliance with 300.22(C), 725.154(A), 770.154(A), or 800.154(A).

Substantiation: Definition- Critical Operations Data System: This term is used in 645.5 and 645.10(B).

Definition- Remote Disconnect Control: This term is used in proposed 645.10. The definition clarifies the distinction between the disconnect itself and the controls to operate it. "Control" has always been implied and practiced. This proposal clarifies the existing practice.

Definition- Zone: NEC 2008 permits "zones" within an ITE room, but it does not provide a definition. This definition clarifies that a zone is separated from the rest of the room so that all power within a zone can be shut down and fire or products of combustion will not spread to adjacent areas or to other zones within the ITE room. Other zones and the rest of the ITE room itself can remain operational.

This proposal for 645.10 is partly editorial and partly technical. It implements the NEC Style Manual (3.3.2) instructions to use lists or tables. It also introduces two acceptable methods of implementation of a disconnecting means. Part A is primarily an editorial revision of existing Code and adds some clarifying material. Part B is new Material that explains when a disconnecting means may not be required.

The nature of Information Technology (IT), as well as the features of an IT equipment room, have changed dramatically since the requirements for a disconnecting means were put into Article 645 almost 50 years ago. Today all business as well as telecommunications systems, building controls, and mission critical operations run through IT Equipment. Examples include medical robotic control; voice-over-internet telephone systems (VoIP); process controls; air traffic controls; disaster preparedness and response; on-line transactions; medical records; internet commerce; GPS, on-board safety/navigation systems; etc.

Unintentional operation of disconnecting means has been a problem. The proposal permits increased security and greater protection. This is vitally important for safety systems, including those using Critical Operations Power Systems (COPS).

The requirement for a disconnecting means can introduce a single point of failure that increases the possibility of operation shutdown due to human error, mechanical failure, or deliberate sabotage. This proposal restricts the operation to its intended use

Erroneous operation of the disconnecting means can frequently jeopardize life safety, but also can creates severe financial losses. [Note: as used here, "erroneous" operation can include deliberate sabotage, human error, and mechanical error.]

This proposal creates a two-level hierarchy of criticality.

645.10(A) is a normal operation and has nearly the same requirements as the existing (2008) Code, except as specifically noted.

(A)(1) has been revised to ensure that the location of the disconnecting means is consistent with its intended use.

(A)(2) is reformatting; it does not introduce any new material.

(A)(3) is reformatting; it does not introduce any new material.

(A)(4) is new. It permits additional means to prevent unintended operation

(A)(4)(FPN) is new. It helps the reader coordinate the requirements of 645 with the relevant NFPA standard for items covered by this clause.

645.10(B) introduces an alternate method for those who choose to invest in a higher level of systems and procedures to assure system availability while also ensuring safety for critical operations. It lists a higher level of criteria that must be met for fire detection, fire suppression, continuous staffing, and documented training of personnel. It says when unplanned operation of a disconnecting means could pose a threat to a critical mission (such as posing a threat to life safety), a Remote Disconnect Control (single point of failure) does not have to be provided. It also permits the same exemption as exists in the 2008 Code for installations qualifying under Article 685. It ensures that the presence of a disconnecting means is consistent with its intended use.

645.10(B)(1-5) list all of the conditions that must be met to permit the alternative method.

Although no requirement exists to report loss of operation due to operation of disconnecting means, polls of organizations such as AFCOM (3,600 IT and Facility Managers) and the Site Uptime Network (85 mostly Fortune 500 member companies) document that nearly all disconnecting means activation is either unintentional or sabotage. Attachments (B) and (C) give some examples of the industry's history with disconnecting means.

This proposal recognizes that a disconnecting means is often necessary, but it also addresses situations when the disconnecting means can create more hazards than it prevents. It offers a reasonable balance between conflicting needs.

Following is the experience of a single company with multiple data center facilities. It demonstrates that the "disconnecting means" is not being used as intended (i.e., for emergencies). It is creating a single point of failure that shuts down the IT equipment due to human or mechanical error, thereby creating major financial loss and potentially threatening the safety of people and equipment.

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 12-129.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-129 Log #3735 NEC-P12 **Final Action: Accept**
(645.2.Critical Operations Data System, Remote Disconnect Control, Zone and 645.10)

Submitter: Stanley Kaufman, CableSafe Inc. / Rep. The Society of the Plastics Industry

Recommendation: Revise text as follows:

645.2 Definitions

Critical Operations Data System. An Information Technology Equipment System that requires continuous operation for the reasons of public safety, emergency management, national security, or business continuity.

Remote Disconnect Control - An electric device and circuit that controls a disconnecting means through a relay or equivalent device**.**

Zone. A physically identifiable area (such as barriers or separation by distance) within an information technology equipment room with dedicated power and cooling systems for the information technology equipment or systems.

645.10 Disconnecting Means. An approved means shall be provided to disconnect power to all electronic equipment in the information technology equipment room or in designated zones within the room. There shall also be a similar approved means to disconnect the power to all dedicated HVAC systems serving the room or designated zones and shall cause all required fire/smoke dampers to close. Disconnecting means shall be implemented by either (A) or (B).

~~The control for these disconnecting means shall be grouped and identified and shall be readily accessible at the principal exit doors. A single means to control both the electronic equipment and HVAC systems in the room or in a zone shall be permitted. Where a pushbutton is used as a means to disconnect power, pushing the button in shall disconnect the power. Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.~~

Exception: Installations qualifying under the provisions of Article 685.

(A) Remote Disconnect Controls
(1) Remote Disconnect Controls shall be located at approved locations readily accessible in case of fire to authorized personnel and emergency responders.
(2) The Remote Disconnect Controls for the control of electronic equipment power and HVAC systems shall be grouped and identified. A single means to control both shall be permitted.
(3) Where multiple zones are created, each zone shall have an approved means to confine fire or products of combustion to within the zone.
(4) Additional means to prevent unintentional operations of remote disconnect controls shall be permitted.
FPN: *For further information see NFPA 75-2009 Standard for the Protection of Information Technology Equipment.*

(B) Critical Operations Data Systems. Remote disconnecting controls shall not be required for critical operations data systems when all of the following are met:
(1) An approved procedure has been established and maintained for removing power and air movement within the room or zone.
(2) Qualified personnel are continuously available to meet emergency responders and to advise them of disconnecting methods.
(3) A smoke-sensing fire detection system is in place.FPN - For further information see NFPA 72-2007, National Fire Alarm Code
(4) An approved fire suppression system suitable for the application is in place.
(5) Cables installed under a raised floor, other than branch circuit wiring and power cords installed in compliance with 645.5(D)(2) or (3), are in compliance with 300.22(C), 725.154(A), 770.154(A), or 800.154(A).

Substantiation: I am a member of the Panel 12 Article 645 Task Group. I reviewed the task group's proposals with a member of the NEC TCC, Mr. James Dollard. Mr. Dollard noted that some of the proposals did not fully comply with the NEC Style Manual and others had correlation issues. In order to address these issues before the deadline for proposals, I prepared amended proposals and submitted them for the panel to consider.

The substantiation for this proposal as submitted by Bob Johnson for the task group is:

"Definition- Critical Operations Data System: This term is used in 645.5 and 645.10(B).

Definition- Remote Disconnect Control: This term is used in proposed 645.10. The definition clarifies the distinction between the disconnect itself and the controls to operate it. "Control" has always been implied and practiced. This proposal clarifies the existing practice.

Definition- Zone: NEC 2008 permits "zones" within an ITE room, but it does not provide a definition. This definition clarifies that a zone is separated from the rest of the room so that all power within a zone can be shut down and fire or products of combustion will not spread to adjacent areas or to other zones within the ITE room. Other zones and the rest of the ITE room itself can remain operational.

This proposal for 645.10 is partly editorial and partly technical. It implements the NEC Style Manual (3.3.2) instructions to use lists or tables. It also introduces two acceptable methods of implementation of a disconnecting means. Part A is primarily an editorial revision of existing Code and adds some clarifying material. Part B is new Material that explains when a disconnecting means may not be required.

The nature of Information Technology (IT), as well as the features of an IT equipment room, have changed dramatically since the requirements for a disconnecting means were put into Article 645 almost 50 years ago. Today all business as well as telecommunications systems, building controls, and mission critical operations run through IT Equipment. Examples include medical robotic control; voice-over-internet telephone systems (VoIP); process controls; air traffic controls; disaster preparedness and response; on-line transactions; medical records; internet commerce; GPS, on-board safety/navigation systems; etc.

Unintentional operation of disconnecting means has been a problem. The proposal permits increased security and greater protection. This is vitally important for safety systems, including those using Critical Operations Power Systems (COPS).

The requirement for a disconnecting means can introduce a single point of failure that increases the possibility of operation shutdown due to human error, mechanical failure, or deliberate sabotage. This proposal restricts the operation to its intended use

Erroneous operation of the disconnecting means can frequently jeopardize life safety, but also can creates severe financial losses. [Note: as used here, “erroneous” operation can include deliberate sabotage, human error, and mechanical error.]

This proposal creates a two-level hierarchy of criticality.

645.10(A) is a normal operation and has nearly the same requirements as the existing (2008) Code, except as specifically noted.

(A)(1) has been revised to ensure that the location of the disconnecting means is consistent with its intended use.

(A)(2) is reformatting; it does not introduce any new material.

(A)(3) is reformatting; it does not introduce any new material.

(A)(4) is new. It permits additional means to prevent unintended operation

(A)(4)(FPN) is new. It helps the reader coordinate the requirements of 645 with the relevant NFPA standard for items covered by this clause.

645.10(B) introduces an alternate method for those who choose to invest in a higher level of systems and procedures to assure system availability while also ensuring safety for critical operations. It lists a higher level of criteria that must be met for fire detection, fire suppression, continuous staffing, and documented training of personnel. It says when unplanned operation of a disconnecting means could pose a threat to a critical mission (such as posing a threat to life safety), a Remote Disconnect Control (single point of failure) does not have to be provided. It also permits the same exemption as exists in the 2008 Code for installations qualifying under Article 685. It ensures that the presence of a disconnecting means is consistent with its intended use.

645.10(B)(1-5) list all of the conditions that must be met to permit the alternative method.

Although no requirement exists to report loss of operation due to operation of disconnecting means, polls of organizations such as AFCOM (3,600 IT and Facility Managers) and the Site Uptime Network (85 mostly Fortune 500 member companies) document that nearly all disconnecting means activation is either unintentional or sabotage. Attachments (B) and (C) give some examples of the industry’s history with disconnecting means.

This proposal recognizes that a disconnecting means is often necessary, but it also addresses situations when the disconnecting means can create more hazards than it prevents. It offers a reasonable balance between conflicting needs.

Following is the experience of a single company with multiple data center facilities. It demonstrates that the “disconnecting means” is not being used as intended (i.e., for emergencies). It is creating a single point of failure that shuts down the IT equipment due to human or mechanical error, thereby creating major financial loss and potentially threatening the safety of people and equipment.”

Please see Bob Johnson’s proposal to see the remainder of his substantiation. This proposal introduces two changes in order to comply with the NEC Style Manual. The text as proposed by the task group and Bob Johnson does not have a title for proposed section 645.10(B). This proposal introduces a title for the subsection. The word “below” was struck from the end of the first paragraph in section 645.10 of the task group’s proposal. See sections 3.3.4 and 2.1.5.2 of the NEC Style Manual.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-130 Log #4564 NEC-P12 **Final Action: Reject**

(645.3 (New))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council

Recommendation: Add the following new text:

645.3 Mechanical Execution of Work.

Information technology circuits and equipment shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4 and 300.11.

Substantiation: This proposal recommends added wording, consistent with that in articles 640, 725, 760, 770 and others to ensure that cables are installed appropriately. This article lacks the corresponding information.

Panel Meeting Action: Reject

Panel Statement: It should not be necessary to reiterate 110.12 in each code section.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-131 Log #2064 NEC-P12 **Final Action: Accept in Principle**

(645.3, 645.6, and 645.7 (New))

TCC Action: The Technical Correlating Committee directs that the panel delete FPN No. 2 in 645.3(F) and the FPN in 645.3(G) since compliance with 90.3 is already required and revise the references in (E), (F), and (G) from entire Articles to specific parts or sections to comply with 2.5 and 4.1.1 of the NEC Style Manual.

This action will be considered by the panel as a public comment.

Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group

Recommendation: **645.3 Other Articles.** Circuits and equipment shall comply with 645.3(A) through (H), as applicable.

(A) **Spread of Fire or Products of Combustion**. Sections 300.21, 770.26, 800.26, and 820.26 shall apply to penetrations of the fire resistant room boundary

(B) **Ceiling Cavity Plenums.** Sections 300.22(C)(1), 725.154(A), 760.53(B)(2), 760.154(A), 770.154(A), 800.154(A) and 820.154(A) shall apply to wiring and cabling in ceiling cavity plenums above an information technology equipment room.

(C) **Grounding.** The non-current-carrying conductive members of optical fiber cables in an information technology equipment room shall be grounded in accordance with 770.101.

(D) **Electrical Classification of Data Circuits.** Sections 725.121(A)(4) shall apply to the electrical classification of listed information technology equipment signaling circuits. 725.139(D)(1), and 800.133(A)(1)(b) shall apply to the electrical classification of class 2 and class 3 circuits in the same cable with communications circuits.

(E) **Critical Operations Power Systems**. The definition of Critical Operations Power Systems in Article 708 shall apply.

(F) **Fire Alarm Equipment**. Article 760 shall apply to fire alarm systems equipment installed in an information technology equipment room.

(G) **Communications Equipment.** Article 800 shall apply to communications equipment installed in an information technology equipment room. Article 645 shall apply to the powering of communications equipment in an information technology equipment room.

FPN No. 1: See Part I of Article 100, Definitions, for a definition of communications equipment.FPN No. 2: See 90.3, Code Arrangement.

(H) **Community Antenna Television and Radio Distribution Systems Equipment.** Article 820 shall apply to community antenna television and radio distribution systems equipment installed in an information technology equipment room. Article 645 shall apply to the powering of community antenna television and radio distribution systems equipment installed in an information technology equipment room.FPN: See 90.3, Code Arrangement.

645.6 Cables Not in Information Technology Equipment Room. Cables extending beyond the information technology equipment room shall be subject to the applicable requirements of this Code.

FPN: For signaling circuits, refer to Article 725; for optical fiber cables and raceways, refer to Article 770; ~~and~~ for communications circuits, refer to Article 800~~. F~~; for fire alarm systems, refer to Article 760; and for CATV circuits, refer to Article 820.

~~**645.7 Penetrations.** Penetrations of the fire-resistant room boundary shall be in accordance with 300.21~~**4.**

Substantiation: 645.3: Adoption of an “Other Articles” section will add clarity.

In recent code cycles, significant emphasis has been placed on making the NEC a more user-friendly document. The addition of Section 645.3, *Other Articles,* will add clarity and enhanced usability for proper application of the Code.

Installations falling under the scope of Article 645, many times will include, in addition to IT equipment, equipment and systems subject to additional requirements contained in later chapters of the NEC. Referencing other sections will ensure that special requirements in Chapter 7 will be met. In addition, 90.3, Code Arrangement, clearly identifies that Chapter 8 is a stand-alone chapter and is not subject to the requirements of earlier chapters.

645.6: FPN: Article 820 had been omitted.

Reference to CATV circuits was overlooked and is added with this change.

645.7: This paragraph is not necessary as it duplicates the reference in proposed section 645.3.

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 12-132.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-132 Log #3736 NEC-P12 **Final Action: Accept**

(645.3, 645.6, and 645.7 (New))

TCC Action: The Technical Correlating Committee directs that the panel delete FPN No. 2 in 645.3(F) and the FPN in 645.3(G) since compliance with 90.3 is already required and revise the references in (E), (F), and (G) from entire Articles to specific parts or sections to comply with 2.5 and 4.1.1 of the NEC Style Manual.

This action will be considered by the panel as a public comment.

Submitter: Stanley Kaufman, CableSafe Inc. / Rep. The Society of the Plastics Industry

Recommendation: Revise text as follows:

645.3 Other Articles. Circuits and equipment shall comply with 645.3(A) through (H), as applicable.

(A) Spread of Fire or Products of Combustion. Sections 300.21, 770.26, 800.26, and 820.26 shall apply to penetrations of the fire resistant room boundary.

(B) Plenums. Sections 300.22(C)(1), 725.154(A), 760.53(B)(2), 760.154(A), 770.154(A), 800.154(A) and 820.154(A) shall apply to wiring and cabling in a plenum (other space used for environmental air) above an information technology equipment room.

(C) Grounding. The non-current-carrying conductive members of optical fiber cables in an information technology equipment room shall be grounded in accordance with 770.101.

(D) Electrical Classification of Data Circuits. Sections 725.121(A)(4) shall apply to the electrical classification of listed information technology equipment signaling circuits. 725.139(D)(1), and 800.133(A)(1)(b) shall apply to the electrical classification of class 2 and class 3 circuits in the same cable with communications circuits.

(E) Fire Alarm Equipment. Article 760 shall apply to fire alarm systems equipment installed in an information technology equipment room.

(F) Communications Equipment. Article 800 shall apply to communications equipment installed in an information technology equipment room. Article 645 shall apply to the powering of communications equipment in an information technology equipment room.

FPN No. 1: See Part I of Article 100, Definitions, for a definition of communications equipment.

FPN No. 2: See 90.3, Code Arrangement.

(G) Community Antenna Television and Radio Distribution Systems Equipment. Article 820 shall apply to community antenna television and radio distribution systems equipment installed in an information technology equipment room. Article 645 shall apply to the powering of community antenna television and radio distribution systems equipment installed in an information technology equipment room.

FPN: See 90.3, Code Arrangement.

645.6 Cables Not in Information Technology Equipment Room. Cables extending beyond the information technology equipment room shall be subject to the applicable requirements of this Code.

FPN: For signaling circuits, refer to Article 725; for optical fiber cables and raceways, refer to Article 770; ~~and~~ for communications circuits, refer to Article 800~~. F~~; for fire alarm systems, refer to Article 760; and for CATV circuits, refer to Article 820.

~~**645.7 Penetrations.** Penetrations of the fire-resistant room boundary shall be in accordance with 300.21~~

Substantiation: I am a member of the Panel 12 Article 645 Task Group. I reviewed the task group's proposals with a member of the NEC TCC, Mr. James Dollard. Mr. Dollard noted that some of the proposals did not fully comply with the NEC Style Manual and others had correlation issues. In order to address these issues before the deadline for proposals, I prepared amended proposals and submitted them for the panel to consider.

The substantiation for the proposal submitted by Bob Johnson for the task group is:

"645.3: Adoption of an "Other Articles" section will add clarity.

In recent code cycles, significant emphasis has been placed on making the NEC a more user-friendly document. The addition of Section 645.3, *Other Articles*, will add clarity and enhanced usability for proper application of the Code.

Installations falling under the scope of Article 645, many times will include, in addition to IT equipment, equipment and systems subject to additional requirements contained in later chapters of the NEC. Referencing other sections will ensure that special requirements in Chapter 7 will be met. In addition, 90.3, Code Arrangement, clearly identifies that Chapter 8 is a stand-alone chapter and is not subject to the requirements of earlier chapters.

645.6: FPN: Article 820 had been omitted.

Reference to CATV circuits was overlooked and is added with this change.

645.7: This paragraph is not necessary as it duplicates the reference in proposed section 645.3.

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation."

Bob Johnson and the task group proposed the test below:

"645.3 Other Articles. Circuits and equipment shall comply with 645.3(A) through (H), as applicable.

(A) Spread of Fire or Products of Combustion. Sections 300.21, 770.26, 800.26, and 820.26 shall apply to penetrations of the fire resistant room boundary

(B) Ceiling Cavity Plenums. Sections 300.22(C)(1), 725.154(A), 760.53(B)(2), 760.154(A), 770.154(A), 800.154(A) and 820.154(A) shall apply to wiring and cabling in ceiling cavity plenums above an information technology equipment room.

(C) Grounding. The non-current-carrying conductive members of optical fiber cables in an information technology equipment room shall be grounded in accordance with 770.101.

(D) Electrical Classification of Data Circuits. Sections 725.121(A)(4) shall apply to the electrical classification of listed information technology equipment signaling circuits. 725.139(D)(1), and 800.133(A)(1)(b) shall apply to the electrical classification of class 2 and class 3 circuits in the same cable with communications circuits.

(E) Critical Operations Power Systems. The definition of Critical Operations Power Systems in Article 708 shall apply.

(F) Fire Alarm Equipment. Article 760 shall apply to fire alarm systems equipment installed in an information technology equipment room.

(G) Communications Equipment. Article 800 shall apply to communications equipment installed in an information technology equipment room. Article 645 shall apply to the powering of communications equipment in an information technology equipment room.FPN No. 1: See Part I of Article 100, Definitions, for a definition of communications equipment.FPN No. 2: See 90.3, Code Arrangement.

(H) Community Antenna Television and Radio Distribution Systems Equipment. Article 820 shall apply to community antenna television and radio distribution systems equipment installed in an information technology equipment room. Article 645 shall apply to the powering of community antenna television and radio distribution systems equipment installed in an information technology equipment room.FPN: See 90.3, Code Arrangement."

This proposal differs from the task group proposal by offering the following additional substantiation.

It is common practice for an electric inspector to require compliance with Article 645 for any room marked "computer room" on the building plans. Because of this common error, it is important for Article 645 to clearly state where it applies and where other chapters in the code apply. The relationship between Article 645 and the power wiring articles in the front of the code (1 through 4) is clear; additional clarifications have been offered by the task group's proposals. Likewise section 90.3 is quite clear that chapters 5, 6 and 7 modify chapters 1 through 4. However, section 90.3 is silent on the relationship between chapters 5, 6 and 7. Article 645 modifies the requirements of Articles 725 and 770 without any authorization from 90.3. Hence the relationship between Article 645 and provisions of Articles 725, 760 and 770 are proper material for new section 645.3. Notwithstanding the clarity of section 90.3 on the relationship between Chapter 8 and the rest of the code, it is not at all widely understood that communications cables and equipment in a computer room must comply with Article 800. Also, Article 800 is completely silent on the powering of communications equipment. This proposal clarifies that Article 645 applies to the power wiring.

The text of proposed 645.3(B) has been modified to avoid using the undefined term "ceiling cavity plenum".

The reference to the definition of critical operations power systems in the task group's proposal has been deleted from this proposal because the term "critical operations power system" is not used in any text in the task group's proposals other than in the task group's proposed 645.3(B). It also does not exist in the current Article 645.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-133 Log #2065 NEC-P12 **Final Action: Accept in Principle**
(645.4)

Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.4 Special Requirements for Information Technology Equipment Room. This article shall be permitted to apply, ~~provided~~ when all of the following conditions are met:
FPN: This article provides alternate wiring methods to the provisions of chapters 1 through 4 for power wiring and Article 725.154(A) for signaling wiring for information technology equipment rooms constructed in compliance with NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*
(1) Disconnecting means complying with 645.10 are provided.
(2) A separate heating/ventilating/air-conditioning (HVAC) system is provided that is dedicated for information technology equipment use and is separated from other areas of occupancy. Any HVAC system that serves other occupancies shall be permitted to also serve the information technology equipment room if fire/smoke dampers are provided at the point of penetration of the room boundary. Such dampers shall operate on activation of smoke detectors and ~~also~~ by operation of the disconnecting means required by 645.10.
FPN: For further information, see NFPA 75-200~~3~~9, Standard for the Protection of Information Technology Equipment, Chapter 10, 10.1, 10.1.1, 10.1.2, and 10.1.3.
(3) All ~~Listed~~ information technology and communications equipment ~~is~~ installed in the room is listed.
(4) The room is occupied ~~only~~ by, and accessible to, only those personnel needed for the maintenance and functional operation of the installed information technology equipment.
(5) The room is separated from other occupancies by fire-resistant-rated walls, floors, and ceilings with protected openings.
FPN: For further information on room construction requirements see NFPA 75-200~~3~~9, *Standard for the Protection of Information Technology Equipment, Chapter 5.*
Substantiation: This rewording and a new FPN clarify the original intent of the article. It gives permission for specialized equipment to be exempt from Chapters 1-4 provided more restrictive measures are met in order to correlate with 90.3.
(3) is editorially changed to improve it's meaning.
(4) clarifies that both limited occupancy and limited access are required. Not only is the ITE room minimally occupied, but access is restricted. Only authorized personnel can get in, usually by an access security system such as a card reader, biometric analyzer, and/or pass code.
Changes made to reflect the latest date of NFPA 75.
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 12-134.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-134 Log #3739 NEC-P12 **Final Action: Accept**
(645.4)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by removing the mandatory text in the first Fine Print Note under the 645.4 text.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc. / Rep. The Society of the Plastics Industry
Recommendation: Revise text as follows:
645.4 Special Requirements for Information Technology Equipment Room. This article shall be permitted to apply, ~~provided~~ when all of the following conditions are met:
FPN: This article provides alternate wiring methods to the provisions of chapters 1 through 4 for power wiring, and 725.154(A) and 770.154(A) for signaling wiring and optical fiber cabling, for information technology equipment rooms constructed in compliance with NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*
(1) Disconnecting means complying with 645.10 are provided.
(2) A separate heating/ventilating/air-conditioning (HVAC) system is provided that is dedicated for information technology equipment use and is separated from other areas of occupancy. Any HVAC system that serves other occupancies shall be permitted to also serve the information technology equipment room if fire/smoke dampers are provided at the point of penetration of the room boundary. Such dampers shall operate on activation of smoke detectors and ~~also~~ by operation of the disconnecting means required by 645.10.
FPN: For further information, see NFPA 75-200~~3~~9, Standard for the Protection of Information Technology Equipment, Chapter 10, 10.1, 10.1.1, 10.1.2, and 10.1.3.
(3) All ~~Listed~~ information technology and communications equipment ~~is~~ installed in the room is listed.
(4) The room is occupied ~~only~~ by, and accessible to, only those personnel needed for the maintenance and functional operation of the installed information technology equipment.
(5) The room is separated from other occupancies by fire-resistant-rated walls, floors, and ceilings with protected openings.
FPN: For further information on room construction requirements see NFPA 75-200~~3~~9, *Standard for the Protection of Information Technology Equipment. Chapter 5*
Substantiation: I am a member of the Panel 12 Article 645 Task Group. I reviewed the task group's proposals with a member of the NEC TCC, Mr. James Dollard. Mr. Dollard noted that some of the proposals did not fully comply with the NEC Style Manual and others had correlation issues. In order to address these issues before the deadline for proposals, I prepared amended proposals and submitted them for the panel to consider.
The substantiation for this proposal as submitted by the Bob Johnson for the task group is:
"This rewording and a new FPN clarify the original intent of the article. It gives permission for specialized equipment to be exempt from Chapters 1-4 provided more restrictive measures are met in order to correlate with 90.3.
(3) is editorially changed to improve it's meaning.
(4) clarifies that both limited occupancy and limited access are required. Not only is the ITE room minimally occupied, but access is restricted. Only authorized personnel can get in, usually by an access security system such as a card reader, biometric analyzer, and/or pass code.
Changes made to reflect the latest date of NFPA 75.
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation."
The only change from the task group's proposal is in the fine print note as shown below:
FPN: This article provides alternate wiring methods to the provisions of chapters 1 through 4 for power wiring and Article 725.154(A) for signaling wiring for information technology equipment rooms constructed in compliance with NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*
The fine print note has been changed in this proposal to delete the word 'Article" because the reference is to subsection 725.154(A), not to an article. Furthermore a reference or section 770.154(A) was added to include optical fiber cables. The modified proposed fine print note reads as follows:
FPN: This article provides alternate wiring methods to the provisions of chapters 1 through 4 for power wiring, and 725.154(A) and 770.154(A) for signaling wiring and optical fiber cabling, for information technology equipment rooms constructed in compliance with NFPA 75-2009, *Standard for the Protection of Information Technology Equipment.*
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-135 Log #4751 NEC-P12 **Final Action: Accept in Principle**
(645.4)

Submitter: Charles M. Trout, Maron Electric Company
Recommendation: Add a new 645.4(6) and FPN to read: Electrical equipment and wiring not directly associated with the operation of the information technology room shall not be installed in the information technology room.
FPN: HVAC systems, communications systems and monitoring systems such as telephone, fire alarm systems, security systems, water detection systems and other related protective equipment are examples of equipment associated with the operation of the information technology room.
Substantiation: Relaxation of the rules relating to plenum wiring as shown in 300.22 were made based on the limited wiring methods shown in 645.5. The disconnecting means required in 645.10 is based on an emergency condition where all electrical wiring within the ITE room would be easily and conveniently deenergized. The five provisions of 645.4 provide for the sanctity of the ITE room related to the relaxed or less stringent requirements and in accordance all non associated equipment and wiring should be prohibited.
Panel Meeting Action: Accept in Principle
Add a new 645.4(6) to read as follows:
645.4(6) Only electrical equipment and wiring associated with the operation of the information technology room is installed in the room.
FPN: HVAC systems, communications systems, and monitoring systems such as telephone, fire alarm systems, security systems, water detection systems, and other related protective equipment are examples of equipment associated with the operation of the information technology room.
Panel Statement: CMP-12 changed the text to put the requirement into positive code language. The change meets the submitter's intent.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-136 Log #4802 NEC-P12 **Final Action: Reject**
(645.4(6) (New))

Submitter: Eric Brunn, Gainesville, FL
Recommendation: Add: (6) Signage shall be provided at the approved disconnecting means identifying the room as being compliant with this article.
Substantiation: At times electrical circuits are installed according to the relaxed requirements of Article 645. Installers and inspectors should have a readily available means of identifying these rooms as being compliant with this article without doing a field inspection for each installation.
Panel Meeting Action: Reject
Panel Statement: Identification of disconnects is already required. The purpose of identifying compliance with 645 is unclear. The proposal does not provide substantiation in accordance with 4.3.3(d) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-137 Log #2066 NEC-P12 **Final Action: Accept in Principle**
(645.5)

Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: 645.5 Supply Circuits and Interconnecting Cables.
(A) Branch-Circuit Conductors. The branch-circuit conductors supplying one or more units of ~~a data processing system~~ Information technology equipment shall have an ampacity not less than 125 percent of the total connected load.
(B) Power Cord-~~and-Plug~~ Connections. ~~The data processing system~~ Information technology equipment shall be permitted to be connected to a branch circuit by ~~any of the following listed means:~~ cord sets or flexible cord and plug cap assemblies.
(1) Power cords shall not ~~Flexible cord and attachment plug cap not to~~ exceed 4.5 m (15 feet).
~~(2) Cord set assembly, where run on the surface of the floor, shall be protected against physical damage.~~
(2) Power cords shall be listed and suitable for information technology equipment.
FPN: One method of determining cords are suitable for the purpose is found in UL 60950 *Standard for Information Technology Equipment – Safety – Part 1*
(C) Interconnecting Cables. Separate ~~data processing~~ information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies.
FPN: The 4.5 m (15 ft) limitation in (B) does not apply to interconnecting cables.
(D) Physical protection. Where exposed to physical damage, ~~the installation~~ supply circuits and interconnecting cables shall be protected. ~~by approved means~~.
(E~~D~~) Under Raised Floors. Power cables, communications cables, connecting cables, interconnecting cables, cord-and-plug connections, and receptacles associated with the information technology equipment shall be permitted under a raised floor, provided the following conditions are met:
(1) The raised floor is of suitable construction, and the area under the floor is accessible.
(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.
Exception; Compliance with 300.11(A) shall not be required when raceway is supported by the floor of the building under the raised floor.
(3) Supply cords of listed information technology equipment in accordance with 645.5(B).
(4) Ventilation in the underfloor area is used for the information technology equipment room only, except as provided in 645.4(2). The ventilation system shall be so arranged, with approved smoke detection devices, that upon the detection of fire or products of combustion in the underfloor space, the circulation of air will cease.
(5) Openings in raised floors for cords and cables protect cords and cables against abrasion and minimize the entrance of debris beneath the floor.
(6) Cables, other than those covered in (E~~D~~)(2) and (E)(3) and those complying with (E)(6)(a) or (E)(6)(b), ~~(D)(6)(a), (D)(6)(b) or (D)(6)(c),~~ shall be listed as Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room.
a. Interconnecting cables enclosed in a raceway.
b. ~~Interconnecting cables listed with equipment manufactured prior to July 1, 1994, being installed with that equipment.~~
c. Cable type designations shown in Table 645.5 shall be permitted. Green, or green with one or more yellow stripes, insulated single-conductor cables, 4 AWG and larger, marked "for use in cable trays" or "for CT use" shall be permitted for equipment grounding.

FPN: One method of defining fire resistance is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.* The smoke measurements in the test method are not applicable.
Another method of defining fire resistance is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Table 645.5 Cable Types Permitted Under Raised Floors

Article	Plenum	Riser	General Purpose
336	TC		
725	CL2P & CL3P	CL2R & CL3R	CL2, CL3 & PLTC
727	ITC		
760	NPLFP & FPLP	NPLFR & FPLR	NPLF & FPL
770	OFNP & OFCP	OFNR & OFCR	OFN & OFC
800	CMP	CMR	CM & CMG
820	CATVP	CATVR	CATV

(F~~E~~) Securing in Place. Power cables; communications cables; connecting cables; interconnecting cables; and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, information technology equipment shall not be required to be secured in place.
(G~~F~~) Abandoned Supply Circuits and Interconnecting Cables. The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a ~~metal~~ raceway.
(H~~G~~) Installed Supply Circuits and Interconnecting Cables Identified for Future Use.
(1) Supply circuits and interconnecting cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.
(2) Supply circuit tags and interconnecting cable tags shall have the following information:
a. Date identified for future use
b. Date of intended use
c. Information relating to the intended future use
Substantiation: (B): Cord and Plug Connections - Replace the phrase "data processing system' with the phrase "information technology equipment," which is consistent with the title of Article 645.
Plug caps do not play a part in this requirement and are deleted.
(B)(2): Physical protection is moved to new (D).
UL 60950 lists power cords styles with appropriate durability for ITE applications.
(C): Interconnecting Cables - Replace the phrase "data processing system' with the phrase "information technology equipment."
645.5(B)(1) is sometimes interpreted to mean that no *interconnecting cable* can be longer than 15'. This proposed FPN for (C) clarifies that the 15' limitation applies only to the cord-and-plug connections of IT equipment and not to other types of interconnecting cables.
(D): Physical Protection – separated out and covers both power and interconnect cables. Renumber (D) thru (G) as (E) thru (H)
(E)(2): This exception is a change suggested from an associated proposal by the task group on 645.5(D)(2) presented separately for discussion and approval but reproduced here.
(E)(6): Add exclusion for supply cords of listed information technology equipment in 645.5(E)(3).
Delete 645.5(D)(6)b. This section is no longer needed. Equipment more than 12 years old is unlikely to be reinstalled.
(G): Treat all raceways the same, regardless of the material.
This is one of a group of proposals prepared by the CMP-12 Article 645 Task Group. Refer to the Proposal on 645.1, FPN, for a consolidated presentation.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 12-139.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-138 Log #2870 NEC-P12 **Final Action: Reject**
(Table 645.5)

Submitter: James M. Imlah, City of Hillsboro
Recommendation:

Table 645.5 Cable Types Permitted Under Raised ~~Floors~~ Platforms

Article	Plenum	Riser	General Purpose
336			TC
725	CL2P & CL3P	CL2R & CL3R	CL2, CL3 & PLTC
727			ITC
760	NPLFP & FPLP	NPLFR & FPLR	NPLF & FPL
770	OFNP & OFCP	OFNR & OFCR	OFN & OFC
800	CMP	CMR	CM & CMG
820	CATVP	CATVR	CATV

Substantiation: This is a companion proposal for changes to 645.5 (D) (1) (5) & (6) for the changing of floor to "platform." "Floor" should be changed to a raised "platform" as the pedestals are required to be on a solid permanent base to assure proper support of equipment and for weight limitations as per manufacturer's documentation. By identifying the raised area as a platform will remove the conflict of article 400.8 (2) for allowing a cord through a "floor." The definition of a floor is (Webster Dictionary) "a main level space distinguished from a platform" and a floor is designed as permanent in nature. Additionally, platform supports can be removed from an area and underneath it is a considered a floor area.
Panel Meeting Action: Reject
Panel Statement: Raised floor is a familiar and recognized term. Changing the term to "platform" is not necessary. "Raised floor" is a term consistent with NFPA 90A.
Article 645 specifically permits flexible cords to be run through "raised floors" in 645.5(D)(5).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-139 Log #3734 NEC-P12 **Final Action: Accept in Principle in Part**
(645.5)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relative to the word "suitable".
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc. / Rep. The Society of the Plastics Industry
Recommendation: Revise text as follows:
645.5 Supply Circuits and Interconnecting Cables.
(A) Branch-Circuit Conductors. The branch-circuit conductors supplying one or more units of ~~a data processing system~~ Information technology equipment shall have an ampacity not less than 125 percent of the total connected load.
(B) Power Cord-~~and-Plug~~ Connections. ~~The data processing system~~ Information technology equipment shall be permitted to be connected to a branch circuit by ~~any of the following listed means:~~ cord sets or flexible cord and plug cap assemblies.
(1) Power cords shall not ~~Flexible cord and attachment plug cap not to~~ exceed 4.5 m (15 feet).
~~(2) Cord set assembly, where run on the surface of the floor, shall be protected against physical damage.~~
(2) Power cords shall be listed as suitable for information technology equipment.
FPN: One method of determining cords are suitable for the purpose is found in UL 60950 *Standard for Information Technology Equipment – Safety – Part 1*
(C) Interconnecting Cables. Separate ~~data processing~~ information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies. The 4.5 m (15 ft) limitation in (B) shall not apply to interconnecting cables.
(D) Physical protection. Where exposed to physical damage, ~~the installation~~ supply circuits and interconnecting cables shall be protected. ~~by approved means~~.
(E~~D~~) Under Raised Floors. Power cables, communications cables, connecting cables, interconnecting cables, cord-and-plug connections, and receptacles associated with the information technology equipment shall be permitted under a raised floor, provided the following conditions are met:
(1) The raised floor is of suitable construction, and the area under the floor is accessible.
(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.
Exception: Raceways and cables shall not be required to be securely fastened in place when the raceways and cables are supported by the floor of the building under the raised floor.
(3) Supply cords of listed information technology equipment in accordance with 645.5(B).
(4) Ventilation in the underfloor area is used for the information technology equipment room only, except as provided in 645.4(2). The ventilation system shall be so arranged, with approved smoke detection devices, that upon the detection of fire or products of combustion in the underfloor space, the circulation of air will cease.
(5) Openings in raised floors for cords and cables protect cords and cables against abrasion and minimize the entrance of debris beneath the floor.
(6) Cables, other than those covered in (E~~D~~)(2) and (E)(3) and those complying with (E)(6)(a) or (E)(6)(b), ~~(D)(6)(a), (D)(6)(b) or (D)(6)(c),~~ shall be listed as Type DP cable having adequate fire-resistant characteristics suitable for use under raised floors of an information technology equipment room.
a. Interconnecting cables enclosed in a raceway.
b. ~~Interconnecting cables listed with equipment manufactured prior to July 1, 1994, being installed with that equipment.~~
c. Cable type designations shown in Table 645.5 shall be permitted. Green, or green with one or more yellow stripes, insulated single-conductor cables, 4 AWG and larger, marked "for use in cable trays" or "for CT use" shall be permitted for equipment grounding.
FPN: One method of defining fire resistance is by establishing that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.* The smoke measurements in the test method are not applicable.
Another method of defining fire resistance is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Table 645.5 Cable Types Permitted Under Raised Floors

Article	Plenum	Riser	General Purpose
336			TC
725	CL2P & CL3P	CL2R & CL3R	CL2, CL3 & PLTC
727			ITC
760	NPLFP & FPLP	NPLFR & FPLR	NPLF & FPL
770	OFNP & OFCP	OFNR & OFCR	OFN & OFC
800	CMP	CMR	CM & CMG
820	CATVP	CATVR	CATV

(F~~E~~) Securing in Place. Power cables; communications cables; connecting cables; interconnecting cables; and associated boxes, connectors, plugs, and receptacles that are listed as part of, or for, information technology equipment shall not be required to be secured in place.
(G~~F~~) Abandoned Supply Circuits and Interconnecting Cables. The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a ~~metal~~ raceway.
(H~~G~~) Installed Supply Circuits and Interconnecting Cables Identified for Future Use.
(1) Supply circuits and interconnecting cables identified for future use shall be marked with a tag of sufficient durability to withstand the environment involved.
(2) Supply circuit tags and interconnecting cable tags shall have the following information:
a. Date identified for future use
b. Date of intended use
c. Information relating to the intended future use
Substantiation: I am a member of the Panel 12 Article 645 Task Group. I reviewed the task group's proposals with a member of the NEC TCC, Mr. James Dollard. Mr. Dollard noted that some of the proposals did not fully comply with the NEC Style Manual and others had correlation issues. In order to address these issues before the deadline for proposals, I prepared amended proposals and submitted them for the panel to consider.
The substantiation for the proposal submitted by the Bob Johnson for the task group is:
"(B): Cord and Plug Connections - Replace the phrase "data processing system' with the phrase "information technology equipment," which is consistent with the title of Article 645.
Plug caps do not play a part in this requirement and are deleted.
(B)(2): Physical protection is moved to new (D).
UL 60950 lists power cords styles with appropriate durability for ITE applications.
(C): Interconnecting Cables - Replace the phrase "data processing system' with the phrase "information technology equipment."
645.5(B)(1) is sometimes interpreted to mean that no *interconnecting cable* can be longer than 15 ft. This proposed FPN for (C) clarifies that the 15' limitation applies only to the cord-and-plug connections of IT equipment and not to other types of interconnecting cables.
(D): Physical Protection – separated out and covers both power and interconnect cables. Renumber (D) thru (G) as (E) thru (H)

(E)(2): This exception is a change suggested from an associated proposal by the task group on 645.5(D)(2) presented separately for discussion and approval but reproduced here.

(E)(6): Add exclusion for supply cords of listed information technology equipment in 645.5(E)(3).

Delete 645.5(D)(6)b. This section is no longer needed. Equipment more than 12 years old unlikely to be reinstalled.

(G): Treat all raceways the same, regardless of the material.

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation."

This proposal introduces three changes from the task group proposal.

In 645.(5)(2) it corrects a typographical error by changing "and" to "as":

As submitted by Bob Johnson:

"(2) Power cords shall be listed and suitable for information technology equipment."

Change in this proposal:

"(2) Power cords shall be listed as suitable for information technology equipment."

In 645.5(5)(2) the FPN is has a requirement and is therefore not in compliance with the style manual.

"(C) Interconnecting Cables. Separate ~~data processing~~ information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies.

FPN: The 4.5 m (15 ft) limitation in (B) does not apply to interconnecting cables."

This proposal moves the text from the FPN to the second sentence of the mandatory text.

"(C) Interconnecting Cables. Separate ~~data processing~~ information technology equipment units shall be permitted to be interconnected by means of listed cables and cable assemblies. The 4.5 m (15 ft) limitation in (B) shall not apply to interconnecting cables."

The third change is to the exception to 645.5(E) which reads as follows in the task group proposal submitted by Bob Johnson.

"Exception; Compliance with 300.11(A) shall not be required when raceway is supported by the floor of the building under the raised floor."

Since the requirement for securing in place is in multiple places in the code, not just in 300.11(A), the proposed text of the exception in this proposal is:

"Exception: Raceways and cables shall not be required to be securely fastened in place when the raceways and cables are supported by the floor of the building under the raised floor."

Panel Meeting Action: Accept in Principle in Part

Revise text to read as follows:

(B) ~~Cord-and-Plug Connections:~~ Power Supply Cords. ~~The data processing system~~ Information technology equipment shall be permitted to be connected to a branch circuit by ~~any of the following listed means~~ a power supply cord.

(1) ~~Flexible cord and attachment plug cap~~ Power supply cords shall not ~~to~~ exceed 4.5 (15 ft).

(2) ~~Cord set assembly, where run on the surface of the floor, shall be protected against physical damage.~~ Power supply cords shall be listed and suitable for information technology equipment or shall be constructed of listed flexible cord and listed attachment plugs and cord connectors suitable for information technology equipment.

645.5(E)(2) to read as follows:

(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable and associated metallic and nonmetallic boxes or enclosures. These supply conductors shall be installed in accordance with the requirements of 300.11.

Panel Statement: CMP-12 accepts the proposal as submitted except for 645.5(B) and 645.5(E)(2). CMP-12 does not accept 645.5(E)(2) Exception. See revised wording for 645.5(B) and 645.5(E)(2).

The current proposed wording does not accurately describe the type of power supply cords typically used with ITE in ITE rooms.

CMP-12 revised 645.5(E)(2) to incorporate the recommendations from Proposal 12-143.

CMP-12 does not agree with the exception. Securing and supporting of raceways is required.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

KOVACIK, J.: In 645.5(B), FPN, the correct designation of the Standard should be "UL 60950-1, Standard for Information Technology Equipment - Safety - Part 1". This is consistent with the current information in (and proposed clarifications to made to) Annex A (Product Safety Standards).

12-140 Log #2869 NEC-P12 **Final Action: Reject**
(645.5(D)(1), (5), and (6))

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

645.5 Supply Circuits and Interconnecting Cables.

(D) Under Raised ~~Floors~~ Platform. Power cables, communications cables, connecting cables, interconnecting cables, cord-and-plug connections, and receptacles associated with the information technology equipment shall be permitted under a raised ~~floor~~ platform, provided the following conditions are met:

(1) The raised ~~floor~~ platform is of suitable construction, and the area under the ~~floor~~ platform is accessible.

(5) Openings in raised ~~floors~~ platforms for cords and cables protect cords and cables against abrasion and minimize the entrance of debris beneath the floor.

(6) Cables, other than those covered in (D)(2) and those complying with (D)(6)(a), (D)(6)(b), or (D)(6)(c), shall be listed as Type DP cable having adequate fire-resistant characteristics suitable for use under raised ~~floors~~ platforms of an information technology equipment room.

Substantiation: "Floor" should be changed to a raised "platform" as the pedestals are required to be on a solid permanent base to assure proper support of equipment and for weight limitations as per manufacturer's documentation. By identifying the raised area as a platform will remove the conflict of article 400.8 (2) for allowing a cord through a "floor." The definition of a floor is (Webster Dictionary) "a main level space distinguished from a platform" and a floor is designed as permanent in nature. Additionally, platform supports can be removed from an area and underneath it is a considered a floor area.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 12-138.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-141 Log #2067 NEC-P12 **Final Action: Reject**
(645.5(D)(2))

Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group

Recommendation: 645.5(D)(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.

Exception; Compliance with 300.11(A) shall not be required when raceway is supported by the floor of the building under the raised floor.

Substantiation: The exception is required because 300.11(A) requirement for securing branch circuit supply conductors to floors should not apply to ITE cabling.

General industry practice for decades has been to not secure under the floor because:

1) the wiring methods are supported by the floor and supporting grid system

2) IT environments require ease and frequent installation, removal, and relocation of power cables.

3) no evidence has been provided to suggest that the practice has resulted in damage, fire or injury.

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 12-139.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

12-142 Log #3738 NEC-P12 **Final Action: Reject**
(645.5(D)(2))

Submitter: Stanley Kaufman, CableSafe Inc. / Rep. The Society of the Plastics Industry
Recommendation: Add the following new text:
645.5(D)(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC cable, or Type AC cable. These supply conductors shall be installed in accordance with the requirements of 300.11.
<u>Exception: Raceways and cables shall not be required to be securely fastened in place when the raceways and cables are supported by the floor of the building under the raised floor.</u>
Substantiation: I am a member of the Panel 12 Article 645 Task Group. I reviewed the task group's proposals with a member of the NEC TCC, Mr. James Dollard. Mr. Dollard noted that some of the proposals did not fully comply with the NEC Style Manual and others had correlation issues. In order to address these issues before the deadline for proposals, I prepared amended proposals and submitted them for the panel to consider.
The substantiation for the proposal submitted by Bob Johnson is:
"The exception is required because 300.11(A) requirement for securing branch circuit supply conductors to floors should not apply to ITE cabling.
General industry practice for decades has been to not secure under the floor because:
1) the wiring methods are supported by the floor and supporting grid system
2) IT environments require ease and frequent installation, removal, and relocation of power cables.
3) no evidence has been provided to suggest that the practice has resulted in damage, fire or injury.
This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation."
Since the requirement for securing in place is in multiple places in the code, not just in 300.11(A), the proposed text of the exception in this proposal is:
<u>"Exception: Raceways and cables shall not be required to be securely fastened in place when the raceways and cables are supported by the floor of the building under the raised floor."</u>
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-139.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-143 Log #4017 NEC-P12 **Final Action: Accept in Principle**
(645.5(D)(2))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise text to read as follows:
(2) The branch-circuit supply conductors to receptacles or field-wired equipment are in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, electrical metallic tubing, electrical nonmetallic tubing, metal wireway, nonmetallic wireway, surface metal raceway with metal cover, nonmetallic surface raceway, flexible metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit, Type MI cable, Type MC Cable, or Type AC cable <u>and associated metallic and nonmetallic boxes or enclosures</u>. These supply conductors shall be installed in accordance with the requirements of 300.11.
Substantiation: 645.5(D)(2) was revised to indicate that the use of metallic and nonmetallic boxes and enclosures are acceptable for use under raised floors. The wiring methods listed in this section utilize uniquely listed boxes and enclosures to complete the mechanical continuity as described in 300.12 and the electrical continuity found in 300.10.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 12-139.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-144 Log #4654 NEC-P12 **Final Action: Accept in Principle**
(645.5(D)(3))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows:
The length and arrangement for physical protection of supply cords for listed information technology equipment comply with 645.5(B).
Substantiation: The parent language for item (D) describes the numbered list that follows as conditions to be met. This item, in the 2008 NEC, does not contain a condition to be met. This editorial proposal restates the provision using appropriate syntax.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 12-139.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-145 Log #2968 NEC-P12 **Final Action: Accept in Principle in Part**
(645.5(F))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text as follows:
645.5 Supply Circuits and Interconnecting Cables.
[645.5(A) through 645.5(E) unchanged by this Proposal]
(F) Abandoned Supply Circuits and Interconnecting Cables. The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a ~~metal~~ raceway. <u>Within ducts, plenums, and spaces specified in 300.22(B) and (C), the accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a metal raceway.</u>
[remainder of 645.5 unchanged by this Proposal]
Substantiation: The explicit allowance for abandoned circuit and cables in metal raceways functions as an implicit disincentive for circuits and cables to be installed in allowed nonmetallic raceways if abandoned circuits and cables in nonmetallic raceways must be removed, even if NOT in ducts, plenums or spaces for environmental air-handling. The requirement was written more broadly than the original proposer intended or substantiated.
As presently written, 645.5(F) does not differentiate for abandoned supply circuit and interconnecting cables between those INSIDE of and those OUTSIDE of air-handling spaces (ducts or plenums used for environmental air, the spaces above hung ceilings and below raised floors used for environmental air-handling purposes). Wiring methods are limited to exclude nonmetallic raceways ONLY in 300.22(B) for circuits within ducts or plenums used for environmental air-handling and in 300.22(C) for circuits within spaces above hung ceilings and below raised floors <u>used for environmental air-handling</u>. Elsewhere nonmetallic raceways are permitted. Indeed, for under raised floors, 645.5(D)(2) explicitly allows nonmetallic raceway wiring methods for ACTIVE supply circuits and 645.5(D)(6)a does not distinguish between nonmetallic and metal raceways permitted for ACTIVE interconnecting cables. Within NON-air-handling open spaces of Information Technology Equipment Rooms occupied by personnel, Article 645 does NOT between nonmetallic and metal raceways permitted for ACTIVE supply circuits and interconnecting cables.
645.5(F) in the 2008 *NEC*® originated from Proposal 12-206 (Log #4135) to the 2002 *NEC*®. Proposal 12-206 requested as an addition of a NEW 645.5(<u>**D**</u>)(6) to the requirements UNDER RAISED FLOORS, without mention of metal raceway, for removal of supply circuit conductors and interconnecting cables abandoned UNDER RAISED FLOORS. Its Substantiation indicated: "There is, as yet, no indication that the additional cable in **PLENUMS** causes an added fire hazard, and the fire record of cables in concealed spaces, **BOTH ABOVE CEILINGS AND BELOW FLOORS**, remains excellent. … However, this type of preventive measure is worthwhile." Code Panel 12 Accepted In Principle Proposal 12-106.
Panel Action to Comment 12-55 (Log #660) to this Proposal 12-206 to the 2002 *NEC*® added "unless contained in metal raceway". At that point, the new requirement was still numbered 645.5(D)(6) and still within the requirements for UNDER RAISED FLOORS. Except for lacking the explicit qualification that this spaced under raised floors was being used for environmental air-handling, this Panel Action was completely consistent with requirements for metal raceway in 300.22(B) and 300.22(C).
Proposal 12-116 (Log #2649) to the 2008 *NEC*® relocated this requirement from 645.5(D)(6) to 645.5(F), and in doing so changed the applicability of the requirement NOT from just raised floors to all spaces for environmental air-handling, but to ALL SPACES, REGARDLESS of even if the space is <u>NOT</u> FOR ENVIRONMENTAL AIR-HANDLING. Period. The Substantiation indicated: "The requirement should not be just for under raised floors", but did <u>NOT</u> indicate <u>WHERE</u> it <u>SHOULD</u> be applicable NOR did it justify any other type of spaces.
If the supply circuit conductors and interconnecting cables are OUTSIDE of environmental air-handling spaces and it's permissible to use EITHER METAL OR NONMETALLIC RACEWAY for ACTIVE conductors and cables, then there should be no discrimination in which type of raceway such conductors and cables are abandoned.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: See panel action and statement on Proposal 12-139.
CMP-12 accepts the change in the proposal to delete "metal" in 645.5(F) (NEW 645.5(G)).
CMP-12 does not accept the remainder of the submitter's text because this section does not pertain to 300.22(B) and (C).
It is the intent of CMP-12 that all abandoned cable except in raceway be removed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-146 Log #4548 NEC-P12 **Final Action: Reject**
(645.5(F))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
645.5 Supply Circuits and Interconnecting Cables.
(F) Abandoned Supply Circuits and Interconnecting Cables. The accessible portion of abandoned supply circuits and interconnecting cables shall be removed unless contained in a metal raceway. Removal of abandoned cables shall be performed in a neat and workmanlike manner.
Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and not removal. It is important to point out that similar care must be taken when removing cables.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Consistent wording is being proposed for other sections in the code.
For information, see relevant definitions in the NEC.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.
Panel Meeting Action: Reject
Panel Statement: The requirement is unenforceable. Disposition of removed materials is not a code responsibility.
The remaining installation is required to be in accordance with 110.3, which is enforceable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-147 Log #250 NEC-P12 **Final Action: Accept**
(645.17)

TCC Action: The Technical Correlating Committee recognizes that this proposal is identical to Tentative Interim Amendment 08-1.
Submitter: Rodney Belisle, NIETC
Recommendation: Revise text to read as follows:
645.17 Power Distribution units. Power distribution units that are used for information technology equipment shall be permitted to have multiple panelboards within a single cabinet, provided that ~~each panelboard has no more than 42 overcurrent devices and~~ the power distribution unit is utilization equipment listed for information technology application.
Substantiation: This is a change that was implemented into article 408 during the '08 cycle, with the removal of 408.35, allowing for more than 42 OCPDs in a cabinet or enclosure. Article 645 was unintentional overlooked during the correlation process, yet a very likely place to see the use of a larger panelboard within the new rules. There is no technical reason to limit the number of OCPDs to 42.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

12-148 Log #2059 NEC-P12 **Final Action: Accept in Principle in Part**
(645.25)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 2 for correlating action in Table 220.3.
This action will be considered by the panel as a public comment.
Submitter: Robert E. Johnson, ITE Safety / Rep. CMP-12 Article 645 Task Group
Recommendation: Add a new section in Article 645 for Engineering Supervision for feeder and service load calculations:
645.25 Engineering Supervision. As an alternative to the feeder and service load calculations required by Parts III and IV of Article 220, feeder and service load calculations for new or existing loads shall be permitted to be used if performed by a licensed and qualified professional engineer. Feeder conductors shall not be required to be of greater ampacity than the service conductors. Service or feeder conductors shall be permitted to have neutral load determined by 220.61.
Add row to Table 220.3 to read as follows:
Additional Load Calculation References Article Section
Information Technology Equipment 645 645.25
Substantiation: Information technology equipment rooms are a dynamic with it equipment often being changed, replaced or upgraded. Feeder and Service load calculations performed upon a single equipment snapshot in time do not permit and accurate calculation over the life of the installation. Also, the diversity of the load based on the sum of the nameplate ratings does not provide an accurate representation of the actual load that occurs when this equipment is operated simultaneously. Therefore, special allowances are needed for the unusual load needs of information technology equipment rooms. The following data is provided to show common values and special considerations likely to be encountered. Feeder and Service sizing based on calculations performed by a licensed and qualified professional engineer using such actual performance data are provided by this new section 645.25.
Calculating Projected Loads for Data Center Feeders and Services - Sample Data:
This information is provided to assist engineers and utility providers in estimating total loads for data center facilities. It is drawn from anecdotal data provided in 2008 by a number of companies who operate critical data center facilities in the U.S.A. It should be noted that load density is highly variable and has consistently increased for this comparison group over the last five years, as computer hardware has continued to draw more power. Load densities for smaller facilities or for sites with special computer applications may often be higher. Future computer hardware design changes should be expected to continue to drive load density changes.
The following table depicts average load densities measured at 130 data center facilities in 2008. These were calculated by dividing actual UPS load by electrically active raised floor area on a specific date. "Electrically active" is the gross area minus blocks of space that are empty or electrically inactive (tape storage, office space, etc.).

Load density by industry	Average	Maximum observed for one site
Airlines:	42 W/sf	124 W/sf
Banking/Finance:	42 W/sf	78 W/sf
Computer Mfg.:	77 W/sf	102 W/sf
Web Hosting:	62 W/sf	97 W/sf
Healthcare:	54 W/sf	113 W/sf
Manufacturing:	52 W/sf	78 W/sf
Insurance:	34 W/sf	105 W/sf
Oil:	49 W/sf	112 W/sf
Retail:	56 W/sf	150 W/sf
Telecommunications:	29 W/sf	67 W/sf

Several sample individual site calculations for the maximum loads observed from the table above:

Industry	Watts/ft^2	UPS Load	Active Raised Floor Area
Airline	124	785	6,320
Computer Mfg.	100	722	17,271
Computer Mfg.	102	858	18,238
Healthcare	113	800	7,064
Insurance	104	1,146	11,033
Insurance	105	2,657	25,383
Oil	112	3,363	29,943
Retail	150	2,753	18,362

Data center facility designs must take into account specific areas within a computer room that will likely have significantly higher load densities than the average density for the room. As of 2008, a single server rack could generate up to 25 Kw of load in a 30 square foot area (833 W/sf). Individual branch circuit calculations would be based upon the individual equipment connected to the circuit while feeder and service load calculations would be conducted on either the average, maximum or combination expected load for the particular facility.
Sample "Actual" Load vs. Computer "Nameplate" (Diversity) Load (comparison group of 6 companies)
By bench testing individual computer hardware devices, these companies determined the actual measured continuous load for a given computer device. By company, these are the average "actual" loads measured vs. the load described on the manufacturer's "nameplate":

- Company 1: Continuous load was 47% of nameplate
- Company 2: Continuous load was 50% of nameplate
- Company 3: Continuous load was 50-60% of nameplate
- Company 4: Continuous load was 62% of nameplate
- Company 5: Continuous load was 70-75% of nameplate
- Company 6: Continuous load was 80% of nameplate

It is important to note that actual load will vary considerably for two identical facilities with identical computer hardware employed, based on the operating systems and software applications utilized on the computer hardware.

Cooling load will often be equal to the electronic load.1 Proper planning of power density needs and its deployment will require calculation based on planned and projected equipment needs.2

1 Sawyer, Richard, *Calculating Total Power Requirements for Data Centers*, http://www.apc.com/support/whitepapers, WP3, 2004,

[2] Rasmussen, Neil, Guidelines for Specification of Data Center Power Density, http://www.apc.com/support/whitepapers, WP120, 2005,

This is one of a group of Proposals prepared by the CMP-12 Article 645 task group. Refer to the proposal on 645.1 FPN for a consolidated presentation.

Panel Meeting Action: Accept in Principle in Part

Add a new section in Article 645 for engineering supervision for feeder and service load calculations:

645.25 Engineering Supervision. As an alternative to the feeder and service load calculations required by Parts III and IV of Article 220, feeder and service load calculations for new or existing loads shall be permitted to be used if performed by qualified persons under engineering supervision.

Panel Statement: CMP-12 accepts the submitter's text but not the last two sentences.

By virtue of referencing Parts III and IV of Article 220, the last two sentences are redundant. A design of this nature is required to be accomplished under engineering supervision. The requirement for a licensed and qualified professional engineer has been correlated with the concept of 215.2(B)(3).

Further, CMP-12 requests the TCC direct further action to CMP-2 to add the following:

Add row to Table 220.3 in alphabetical order to read as follows:

Additional Load Calculation References Article Section (or Part)

Information Technology Equipment 645 645.25

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

ARTICLE 647 — SENSITIVE ELECTRONIC EQUIPMENT

12-149 Log #4800 NEC-P12 **Final Action: Reject**
(647)

Submitter: Martin Glasband, Equi-Tech Corp.

Recommendation: Revise text to read as follows:

ARTICLE 647 -- SENSITIVE ELECTRONIC EQUIPMENT

647.1 Scope. This article covers the installation and wiring of separately derived systems operating at 120 volts line-to-line and 60 volts to ground for sensitive electronic equipment.

647.3 General. Use of a separately derived 120-volt single-phase 3-wire system with 60 volts on each of two ungrounded conductors to a grounded neutral conductor shall be permitted for the purpose of reducing objectionable noise in sensitive electronic equipment locations provided that ~~the following conditions apply~~ all of the requirements in 647.4 through 647.8 are met.

~~**(1)** The system is installed only in commercial or industrial occupancies.~~

~~**(2)** The system's use is restricted to areas under close supervision by qualified personnel.~~

~~**(3)** All of the requirements in 647.4 through 647.8 are met.~~

647.4 Wiring Methods

(A) Panelboards and Overcurrent Protection. Use of standard single-phase panelboards and distribution equipment with a higher voltage rating shall be permitted. The system shall be clearly marked on the face of the panel or on the inside of the panel doors. Common-trip two-pole circuit breakers that are identified for operation at the system voltage shall be provided for both ungrounded conductors in all feeders and branch circuits.

(B) Junction Boxes. All junction box covers shall be clearly marked to indicate the distribution panel and the system voltage.

(C) Color Coding. All feeders and branch-circuit conductors installed under this section shall be identified as to system at all splices and terminations by color, marking, tagging or equally effective means. The means of identification shall be posted at each branch-circuit panelboard and at the disconnecting means for the building.

(D) Voltage Drop. The voltage drop on any branch circuit shall not exceed 1.5 percent. The combined voltage drop of feeder and branch-circuit conductors shall not exceed 2.5 percent.

(1) Fixed Equipment. The voltage drop on branch circuits supplying equipment connected using wiring methods in Chapter 3 shall not exceed 1.5 percent. The combined voltage drop of feeder and branch-circuit conductors shall not exceed 2.5 percent.

(2) Cord-Connected Equipment. The voltage drop on branch circuits supplying receptacle outlets shall not exceed 1 percent. For the purposes of making this calculation, the load connected to the receptacle outlet shall be considered to be 50 percent of the branch circuit rating. The combined voltage drop of feeder and branch-circuit conductors shall not exceed 2.0 percent.

(FPN): The purpose of this provision is to limit voltage drop to 1.5 percent where portable cords may be used as a means of connecting equipment.

647.5 3-phase Systems. Where 3-phase power is supplied, a separately derived 6-phase "Wye" system with 60 volts to ground installed under this article shall be configured as three separately derived 120-volt single-phase systems having a combined total of no more than six main disconnects.

647.6 Grounding.

(A) General. The system shall be grounded as provided in Section 250.30 as a separately derived single-phase 3-wire system.

(B) Grounding Conductors Required. Permanently wired utilization equipment and receptacles shall be grounded by means of an equipment grounding conductor run with the circuit conductors to an equipment grounding bus prominently marked "Technical Equipment Ground" in the originating branch-circuit panelboard. The grounding bus shall be connected to the grounded conductor on the line side of the separately derived system's disconnecting means. The grounding conductor shall not be smaller than that specified in Table 250.122 and run with the feeder conductors. The technical equipment grounding bus need not be bonded to the panelboard enclosure. Other grounding methods authorized elsewhere in this Code shall be permitted where the impedance of the grounding return path does not exceed the impedance of equipment grounding conductors sized and installed in accordance with this article.

FPN No. 1: See Section 250.122 for equipment grounding conductor sizing requirements where circuit conductors are adjusted in size to compensate for voltage drop.

FPN No. 2: These requirements limit the impedance of the ground fault path where only 60 volts applies to a fault condition instead of the usual 120 volts.

647.7 Receptacles.

(A) General. Where receptacles are used as a means of connecting equipment, the following conditions shall be met:

(1) All 15- and 20-ampere receptacles shall be GFCI protected.

(2) All outlet strips, adapters, receptacle covers and faceplates shall be marked with the following words or equivalent:

WARNING - TECHNICAL POWER Do not connect to lighting equipment For electronic equipment use only 60/120 V. 1-phase AC GFCI protected.

(3) A 125-volt, single-phase, 15- or 20-ampere rated receptacle outlet having one of its current carrying poles connected to a grounded circuit conductor shall be located within 1.8 m (6 ft) of all permanently installed 15- or 20-ampere-rated 60/120-volt technical power-system receptacles.

(4) All 125-volt receptacles used for 60/120-volt technical power shall have a unique configuration and be identified for use with this class of system. ~~125-Volt, single phase, 15- or 20-ampere-rated receptacle outlets and attachment plugs that are identified for use with grounded circuit conductors shall be permitted in machine rooms, control rooms, equipment rooms, equipment racks and other similar locations that are restricted to use by qualified personnel..~~

(a) International standard configuration type receptacle outlets and cord attachment plugs that are rated at an equal or higher voltage shall be permitted under this article provided that they are NRTL listed and the outlet cover plate is properly identified under 647.7 A(2).

(b) Locking type receptacle outlets and cord attachment plugs that are not identified for use with a grounded circuit conductor and are rated at an equal or higher voltage and shall be permitted under this article provided that the receptacle cover plate is properly identified under 647.7 A(2)

(5) All receptacle outlets in residential occupancies installed under this article shall have a disconnecting means that simultaneously opens all ungrounded conductors that shall be located within sight of the of the receptacles installed under this article.

(6) 125-Volt, single phase, 15- or 20-ampere-rated receptacle outlets and attachment plugs that are identified for use with grounded circuit conductors shall be permitted in machine rooms, control rooms, equipment rooms, equipment racks and other similar locations that are restricted to use by qualified personnel. This provision shall apply to commercial and industrial occupancies only.

(C) Isolated ground receptacles. Isolated ground receptacles shall be permitted as described in Section 250.146(D), however, the branch circuit equipment grounding conductor shall be terminated as required in Section 647.6(B).

647.8 Lighting Equipment. Lighting equipment installed under this article for the purpose of reducing electrical noise originating from lighting equipment shall meet the following conditions (A) through (C).

(A) Disconnecting Means. All lighting equipment, luminaires and associated control equipment if provided shall have a disconnecting means that simultaneously opens all ungrounded conductors that shall be located within sight of the luminaire or be capable of being locked in the open position.

(B) Luminaires. All luminaires shall be permanently installed, listed and ballast operated.

(C) Screw-shell. Lighting fixtures installed under this section shall not have an exposed lamp screw-shell.

Substantiation: Presently as it is written, Article 647 does not provide for the use of 120-volt circuits with 60 Volts to ground in residential occupancies.

Residential occupancies present some unique concerns that must be addressed differently for this system to be installed and used safely. The two areas that need to be addressed to avoid unsafe use are: (1) a receptacle device configuration that differentiates this system from conventional 120-volt outlets in residences to prevent abuse and (2) preventative measures to discourage misapplication of this system due to a change of occupants in a residence. The attached proposal to amend Article 647 addresses these issues.

A unique safety problem presents itself because of the potential use of 120-volt portable lighting equipment with exposed lamp screwshells where there are 2 ungrounded circuit conductors present. This issue is particularly problematical where standard "Edison-type" (NEMA 5-15) receptacle outlets may be used such as in locations where permitted (under 647) in specific commercial and industrial areas under close supervision by qualified personnel. Where supervised by qualified persons, misuse of lighting equipment can be avoided. However, this provision cannot hold up in residential occupancies where it is likely that qualified personnel will not be present. Furthermore, a change of occupants could result in widespread misuse under these conditions. To remedy this problem in residences, some unique receptacle configurations are suggested in this proposal that would limit their use strictly to the sensitive electronic equipment for which this system is intended.

One of the suggested configurations included in this proposal is an "International standard type" (ISO/IEC) receptacle configuration commonly known as an "IEC" type receptacle or connector. The C-13, C-14 & C-19, C-20 designations identify some of the specific receptacles and connectors to which this proposal refers. These inlets and outlets are commonly found on the rear of computer chassis and other electronic components for which the use of "balanced AC" is ideal. Additionally, this specific configuration is rarely if ever seen or used with potentially hazardous portable lighting equipment. Aside from labeling and identification requirements, this receptacle configuration is intuitively associated with sensitive electronic equipment by untrained users. These receptacles are typically UL approved for the voltage and current mentioned in 647. Use of this type of receptacle outlet configuration would address these various safety concerns and uniquely configured receptacles could very easily be made available for use in building wiring. The important issue is to provide for a unique receptacle configuration that greatly reduces or eliminates the possibility of misuse in residences. Present code language requires a uniquely configured receptacle however this provision doesn't go far enough to specify a type of receptacle outlet that would be appropriate for residential use. This proposal attempts to clarify this provision by providing acceptable configurations that are unique and appropriate.

The GFCI requirement has also been left intact for all 15- and 20-ampere receptacles and should be anticipated in residences. This requirement is useful because, among other reasons, at least some equipment utilizes internal single-pole AC switching, which could leave components partially energized when presumably turned off. The possibility of a low level short circuit to ground within components so switched would be addressed by the GFCI. Furthermore, new language that requires a 2-pole switch be present that opens all ungrounded circuit conductors allows for complete disconnection of all utilization equipment from the circuit.

It is felt that the above requirements (along with labeling/identification requirements) in the proposed amendment to 647 adequately address the change of occupants issue as well as potential safety issues due to possible misuse of portable lighting equipment with this system in residences.

In a practical sense, where common industry wiring methods in sensitive electronic systems have led to nuisance callbacks for contractors, the option to use "balanced AC" in residences would lead to a greatly improved track record, especially in areas where noise issues and equipment malfunctions have been problematical. As it has been proven in the professional audio/video industries, when "balanced AC" is used, there has been a marked reduction in problems arising from nuisance electrical noise. These problems typically manifest as audible hum and video "hum bars" that can be detected in the final product or at the very least in performance/playback situations in residences. It has also been proven that proper grounding assures quieter performance in sensitive electronics where "balanced AC" is used. This discourages the common practice of lifting grounding wires and terminals as a potentially dangerous method of defeating system noise. Other types of sensitive equipment (including computer based systems) used in other industries has also shown marked improvement in performance due to diminished noise provided by the use of "balanced AC." Better performing equipment and cleaner, clearer audio and video can be expected with fewer nuisance callbacks to resolve when "balanced AC" is properly installed in a home theater wiring system. The home theater and construction industry will also benefit from adoption of this proposal.

As progress leads us towards ever more sophisticated electronic utilization equipment, more and larger switching power supplies find their way into typical residential neighborhoods. Today, the common television set and home computer use power supplies that each consumes upwards of 5 Amps or more. Multiplied by two or 3 or more of these power supplies per household times the number of residences in a neighborhood has resulted in poorer and poorer power quality in residential areas. This is a costly problem for utilities to address. The reactive currents and harmonics produced by these power supplies has been long known by many commercial and industrial users to be quite problematical for everyone involved, from the end user to the utility company. Where "balanced power" is applied to reactive loads, harmonic currents cancel out at the secondary of the "balanced AC" transformer. This leaves power factor in an area unaffected by reactive loads. Adoption of this proposal could put a stop to all of these power quality issues. It would also provide for a higher power factor across the board in bulk power utility grids which could result in the savings of untold millions of dollars and savings of a lot of wasted fuel needed to generate additional power to compensate for low power factor. Use of "balanced AC" is in itself is a "green" solution for today's energy hungry world.

(Additional material can be found on my website: www.equitech.com)

Panel Meeting Action: Reject

Panel Statement: Sensitive electronic equipment powered by separately derived systems operating at 120-Volt line-to-line and 60 volts to ground originally was restricted to TV and motion picture studios (Article 530). In the 2005 NEC, this equipment was moved from Article 530 and put in its own Article 647 (sensitive electronic equipment), but with a restriction limiting its use to commercial/industrial installations under the supervision of qualified personnel.

The submitter admits there would be some potential safety issues expanding permitted use of these types of installations and equipment in a home environment, but he does not provide adequate solutions for addressing those safety issues.

It is noted that the proposed use of "international standard configuration type receptacle outlets and cord attachment plugs" for this type of equipment is not a sound solution since those configurations only address the 'appliance inlet' and "connector" (cord connector body) aspects of the power supply wiring, not the plugs and receptacles, and those configurations already are used prevalently with information technology equipment, consumer electronics, and similar forms of household products.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-150 Log #2708 NEC-P12 **Final Action: Reject**

(647.4(A), (B), and (C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete text of (A) and substitute:

Use of single-phase panelboards and distribution equipment with a higher voltage rating shall be permitted. The system shall be clearly and durably on or immediately adjacent to panelboards and other distribution equipment. Each branch circuit and feeder shall be protected by a common trip circuit breaker or two-pole fused switch.

Revise text: (B):

All junction box, pull box, and cabinet covers shall be clearly and durably marked to indicate the distribution source ~~panel~~ and the system voltage. (C) All feeder and branch circuit ungrounded conductors ~~installed under this section~~ covered by this article shall be identified as to system at all splices and terminations by color(s) different from other premises wiring systems or by approved marking, tagging or other ~~equally effective~~ approved means. The means if identification shall be posted at each branch-circuit distribution equipment ~~panelboard~~ and at the disconnecting means for the building.

Substantiation: Distribution equipment may be other than a panelboard. Such as the common trip circuit breaker or two-pole fused switch. Pull boxes and cabinets should be included in (B). Since (C) does not modify requirements for grounded circuit conductors which will be with ungrounded conductors they should not require marking. If identification is by color, it should be different from other systems.

Panel Meeting Action: Reject

Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

12-151 Log #2711 NEC-P12 **Final Action: Reject**

(647.6(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text:

~~Permanently wired~~ Utilization equipment ~~and~~ receptacles and flush surface devices shall be grounded by a wire-type equipment grounding conductor run with the branch circuit conductors to an equipment grounding bus or terminal(s) prominante and durable marked "TECHNICAL EQUIPMENT GROUND", in the distribution equipment where the branch circuit originates. ~~Originating branch circuit panelboard.~~ The grounding bus or terminal(s) shall be connected to the grounded circuit conductor on the line side of the separately derived system disconnecting means ~~The grounding conductor shall not be smaller than that specified in table 250.122 and run with the feeder conductors~~. (remainder unchanged).

Substantiation: Edit. "Permanently wired" may imply a wiring method of Chapter 3. The provision should also apply to equipment supplied by permanently connected cords where permitted by 400.7 (A)(6), (7), (8), (9). A wire type EGC should be specified as that seems to be the intent. A branch circuit may originate from equipment which is not a panelboard, e.g., a single circuit breaker or fused switch. Reference to Table 250.122 is superfluous, it already applies unless amended.

Panel Meeting Action: Reject

Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.

The proposed change is not editorial in nature.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-152 Log #3257 NEC-P12 **Final Action: Reject**
(647.7(A)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:

All 125-volt receptacles, cord connectors, flanged surface devices, and attachment plugs used for a 60/120 technical power shall have a ~~unique~~ configuration that ~~differs from all~~ is not compatible with other such devices on the premises ~~attachment plugs~~ and shall be identified for use on this class system. (remainder unchanged)

Substantiation: Edit. “Unique” has various interpretations; a T-slot or locking type receptacle or plug is unique if all other such devices are parallel straight type. Cord connectors, attachment plugs and flanged surface devices should be included.

Panel Meeting Action: Reject
Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.

The proposed change is not editorial in nature.

See panel action and statement on Proposal 12-153.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-153 Log #4655 NEC-P12 **Final Action: Accept**
(647.7(A)(4))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise as follows, restoring the exception format that was originally used for this material, as follows:

All 125-volt receptacles used for 60/120-volt technical power shall have a unique configuration and shall be identified for use with this class of system.

Exception: 125-volt, single-phase, 15- or 20-ampere rated receptacles and attachment plugs that are identified for use with grounded circuit conductors shall be permitted in machine rooms, control rooms, equipment rooms, equipment racks, and other similar locations that are restricted to use by qualified personnel.

Substantiation: The reason for the rules in this section is to make as certain as possible that the receptacles aren’t used for cord- and plug-connected loads designed for use on systems with only one ungrounded conductor. For example, if a floor lamp were connected, the screw shell would remain alive at 60V to ground, even with the switch off, assuming a single-pole lampholder. Item (4) asks for a unique configuration, which has yet to be developed. The exception allows a conventionally configured receptacle in “machine rooms, control rooms, equipment rooms, equipment racks, and similar locations that are restricted to use by qualified personnel.” This is essential because the industry is awaiting a larger market presence for these systems prior to developing the configuration. At some point it may be appropriate for the NEC committee to announce a sunset year for this exception, and to thereby force the issue, but that seems premature as of this writing.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-154 Log #1582 NEC-P12 **Final Action: Reject**
(647.8)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:

Lighting equipment installed under this article for the purpose of reducing electrical noise originating from lighting equipment shall meet the conditions of 647.8(A) through (C).

Disconnecting Means. All luminaires connected to separately derived systems operating at 60 volts to ground, and associated control equipment if provided, shall have a disconnecting means that simultaneously opens all ungrounded conductors. **A lockable disconnecting means shall be installed where T**he disconnecting means ~~shall be~~ **is not** located within sight of the luminaire**.** ~~or be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.~~

Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.

A companion proposal has been submitted to Article 100 containing a new definition for “Disconnecting Means, Lockable.”

Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 650 — PIPE ORGANS

12-155 Log #3457 NEC-P12 **Final Action: Accept in Principle**
(650.3(A) (New))

Submitter: Arthur E. Schlueter, Jr., A. E. Schlueter Pipe Organ Company / Rep. American Institute of Organ Builders & American Pipe Builders Association
Recommendation: Add text to read as follows:

(A) Electronic organs shall comply with the appropriate provisions of Article 640.

Substantiation: The addition of other articles necessitates adding (A) through (D) to the present wording of 650.3 new lettered (A) is the same wording as previously stated in the 2008 Code. “Electronic organs shall company with the appropriate provisions of Article 640”.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 12-156.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MARCOVICI, S.: I agree with paragraph (A). However, the text of 650.3 should be changed to read as follows:

“650.3 Other Articles. Circuits and equipment shall comply with 650.3(A) through (C)”. (Note: (B) and (C) are added by Proposals 12-156 and 12-157).

12-156 Log #3458 NEC-P12 **Final Action: Accept in Principle**
(650.3(B) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with 4.1.1 of the NEC Style Manual relating to references to an entire article.

The Technical Correlating Committee further directs that the action on this proposal be rewritten to comply with the NEC Style Manual 2.1.5.2 related to titles for the first level subdivisions.

This action will be considered by the panel as a public comment.

Submitter: Arthur E. Schlueter, Jr., A. E. Schlueter Pipe Organ Company / Rep. American Institute of Organ Builders & American Pipe Builders Association
Recommendation: Add text to read as follows:

(B) Installations of digital/analog sampled sound production technology and associated audio signal processing, amplification and reproduction equipment shall be in accordance with Article 640.

Substantiation: Some pipe organ installations are incorporating digital/analog sampled sound technology which may include amplification and speakers and associate wiring. In pipe organ installations incorporating such technology, should be per Article 640.

Panel Meeting Action: Accept in Principle

Renumber existing text of 650.3 Other Articles as (A) to read as follows:

(A) Electronic organs shall comply with the appropriate provisions of Article 640.

Add new (B) to read as follows:

(B) Installations of digital/analog sampled sound production technology and associated audio signal processing, amplification, and reproduction equipment shall be in accordance with Article 640.

Panel Statement: CMP-12 renumbers existing text and adds new (B).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-157 Log #3459 NEC-P12 **Final Action: Accept**
(650.3(C) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with 4.1.1 of the NEC Style Manual relating to references to an entire article.

The Technical Correlating Committee further directs that the action on this proposal be rewritten to comply with the NEC Style Manual 2.1.5.2 related to titles for the first level subdivisions.

This action will be considered by the panel as a public comment.

Submitter: Arthur E. Schlueter, Jr., A. E. Schlueter Pipe Organ Company / Rep. American Institute of Organ Builders & American Pipe Builders Association
Recommendation: Add text to read as follows:

(C) Installations of optical fiber cable shall be in accordance with Article 770.

Substantiation: Some pipe organ installations use fiber optical cable.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-158 Log #3460 NEC-P12 **Final Action: Accept in Principle**
(650.3(D) (New))

Submitter: Arthur E. Schlueter, Jr., A. E. Schlueter Pipe Organ Company / Rep. American Institute of Organ Builders & American Pipe Builders Association
Recommendation: Add text to read as follows:
(D) Abandoned cables that are not terminated at equipment are to be identified for future use with a tag.
Substantiation: Electronic signal circuit technologies is replacing cotton covered paraffin covered signal circuits wiring. Installation of new solid state relays necessitates the rewiring of the console and relays, abandoned cables are to be identified with a tag.
Panel Meeting Action: Accept in Principle
Revise 650.7 to read as follows:
650.7 Installation of Conductors.
Cables shall be securely fastened in place and shall be permitted to be attached directly to the organ structure without insulating supports. Cables shall not be placed in contact with other conductors. Abandoned cables that are not terminated at equipment shall be identified with a tag.
Panel Statement: CMP-12 realizes the the submitter's text does not belong in 650.3. Rather, it belongs as new sentence at the end of section 650.7.
Further, CMP-12 revised the new sentence to be in mandatory language and removed the requirement "for future use."
CMP-12 recognizes that some abandoned pipe organ cables are impractical to be removed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 660 — X-RAY EQUIPMENT

12-159 Log #2272 NEC-P12 **Final Action: Accept**
(660.2.Long-Time Rating (X-Ray Equipment) and Momentary Rating (X-Ray Equipment) (New))

TCC Action: The Technical Correlating Committee directs that this proposal be referred to Code-Making Panel 15 for correlating action in Article 517.
This action will be considered by Code-Making Panel 15 as a public comment.
Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Relocate and revise two definitions from Articles 660 and 517 to Article 100.
Long-Time Rating (X-Ray Equipment). A rating based on an operating interval of 5 minutes or longer.
Momentary Rating (X-Ray Equipment). A rating based on an operating interval that does not exceed 5 seconds.
This proposal has also been sent to CMP-15 for 517.2.
Substantiation: These definitions are identical and are used in two separate articles of the NEC. This change proposal is in compliance with the NEC Style Manual section 2.2.2.1.
Panel Meeting Action: Accept
Panel Statement: CMP-12 notes to the TCC relocation of definition and correlation with CMP-15.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MARCOVICI, S.: These two definitions are specific to Article 660 and should not be relocated. This is the reason why some Articles include the section titled "Definitions."

12-160 Log #2583 NEC-P12 **Final Action: Reject**
(660.4(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence:
Fixed and stationary X-ray equipment shall be connected to the power supply by means of ~~a~~ an identified wiring method covered in Chapter 3. ~~meeting the general requirements of this Code.~~
Substantiation: Edit. Section 110.1 indicates Article 110 covers general requirements, which do not cover wiring methods. The wiring method should be identified for the use.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
The requirements proposed are covered in 90.3.
The proposed change is not editorial in nature.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

12-161 Log #1936 NEC-P12 **Final Action: Reject**
(660.6(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add to (A) and (B): Overcurrent protection device ratings shall not exceed the manufacturers specification or recommendation.
Substantiation: No ratings are specified; ratings should be determined by the manufacturer or the panel.
Panel Meeting Action: Reject
Panel Statement: The upper limits for overcurrent protection are covered by existing requirements. The proposal does not add clarity.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
SCHAMEL, D.: Change to "Accept in Principal":
Overcurrent protective devices should be separated out under the existing heading "(A) Branch-Circuit Conductors" and this proposal should apply in principal.

12-162 Log #1935 NEC-P12 **Final Action: Accept**
(660.8)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by 300.17 which applies unless modified, and also covers power circuit conductors not specifically noted in this article.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
CROUSHORE, T.: This revision looks harmless, but it deletes a specific reference to 300.17 that makes the requirement clear. It is my opinion that this section is made less clear by removing the specific reference to a specific section in Chapter 3 of the NEC. This proposal should have been rejected.
MARCOVICI, S.: 300.17 deals with power conductors, while 660.8 addresses "control circuit conductors". 660.8 clarifies that the requirement applicable to power conductors also extends to control circuit conductors. Eliminating 660.8 might lead to confusion. Besides, the FPN at 300.17 does not cross-reference 660.8.

12-163 Log #1934 NEC-P12 **Final Action: Accept**
(660.23(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "current-carrying".
Substantiation: Edit. Superfluous phrase; a part can be live but not conducting current at the same time.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
MCCLINTOCK, T.: This proposal should have been a Reject. The substantiation suggests a part can be live but not conducting current at the same time. This is contrary to the definition of Live Parts found in Article 100, which states: Live Parts. Energized conductive components. Accordingly, the inclusion of "live current carrying" clarifies the intent of this section.

ARTICLE 665 — INDUCTION AND DIELECTIC HEATING EQUIPMENT

12-164 Log #1933 NEC-P12 **Final Action: Accept in Principle**
(665.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Superfluous; Chapters 1 through 4 already apply per 90.3 unless amended.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 12-165.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12 Negative: 1
Explanation of Negative:
MARCOVICI, S.: The statement used in this section, "unless specifically amended by this Article" provides a useful clarification regarding the wiring for heating equipment. Recommend retaining this section.

12-165 Log #2806 NEC-P12 **Final Action: Accept**
(665.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~665.3 Other Articles.~~
~~Unless specifically amended by this article, wiring from the source of power to the heating equipment shall comply with Chapters 1 through 4.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 665.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-164.

12-166 Log #4296 NEC-P12 **Final Action: Accept in Principle**
(665.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~665.3 Other Articles.~~
~~Unless specifically amended by this article, wiring from the source of power to the heating equipment shall comply with Chapters 1 through 4.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 665.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 12-165.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12 Negative: 1
Explanation of Negative:
MARCOVICI, S.: See My Negative Comment on 12-164.

12-167 Log #1932 NEC-P12 **Final Action: Reject**
(665.4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Already covered by Part III of Articles 501, 502, 503.
Panel Meeting Action: Reject
Panel Statement: CMP-12 does not accept the submitter's substantiation. The submitter's interpretation of 90.3 is incorrect.
The reference to Article 500 in 665.4 is appropriate.
The proposed change is not editorial in nature.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-168 Log #1583 NEC-P12 **Final Action: Reject**
(665.12)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
665.12 Disconnecting Means.
A readily accessible disconnecting means shall be provided to disconnect each heating equipment from its supply circuit. **A lockable disconnecting means shall be installed where t**he disconnecting means ~~shall be~~ **is not** located within sight from the controller**.** ~~or be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted~~.
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-13.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-169 Log #717 NEC-P12 **Final Action: Reject**
(665.23)

Submitter: Joe Tedesco, Boston, MA
Recommendation: Add a FPN: NFPA 70E-2009, Standard for Electrical Safety in the Workplace, covers arc flash hazard analysis, 130.3.
Substantiation: Signs - "DANGER HIGH VOLTAGE KEEP OUT" are not used in 70E.
Panel Meeting Action: Reject
Panel Statement: The necessity of the FPN in the proposal is not understood, and the substantiation does not clarify the need for it.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

ARTICLE 668 — ELECTROLYTIC CELLS

12-170 Log #967 NEC-P12 **Final Action: Reject**
(668.15)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
For equipment, apparatus, and structural components ~~that are required to be grounded by provisions of Article 668~~ the provisions of Article 250 shall apply except that a water pipe electrode shall not be required to be used. Any electrode or combinations of electrodes described in 250.32 shall be <u>used</u> ~~permitted~~.
Substantiation: Edit. The provision should apply where grounding is done by choice and not required, Article 250 already applies unless amended. "Permitted" does not impose a requirement per 90.5(B).
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
The proposed change is not editorial in nature.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-171 Log #2620 NEC-P12 **Final Action: Reject**
(668.21(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Receptacle, cord connectors, and flanged surface outlets and their mating attachment plugs for ungrounded equipment shall be non-grounding types.
Substantiation: Cord connectors and flanged surface outlets should be included. The configuration of a device, in itself, cannot prevent use for equipment required to be grounded. A nongrounding type attachment plug itself does not prevent its misuse for equipment required to be grounded.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-171a Log #CP1202 NEC-P12 **Final Action: Accept**
(668.30)

Submitter: Code-Making Panel 12,
Recommendation: Revise 668.30(D) to read as follows:
(D) Circuit ~~Overcurrent~~ Protection. Circuit protection shall not be required for control and instrumentation that are totally within the cell line working zone.
Substantiation: In electrolytic cell lines there is instrumentation connected directly to the energized cells. The cells operate in the range from 20,000 amps to 500,000 amps. There are no devices that exist to protect this instrumentation from a backfeed or overcurrent. Overcurrent protection in the title is removed because it is misleading to individuals not familiar to cell line working zones.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-172 Log #958 NEC-P12 **Final Action: Reject**
(668.30(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Insert "overcurrent" between "circuit" and "protection".
Substantiation: Edit. The type of protection should be specified as is commonly done throughout the Code.
Panel Meeting Action: Reject
Panel Statement: In electrolytic cell lines there is instrumentation connected directly to the energized cells. The cells operate in the range from 20,000 amps to 500,000 amps. There are no devices that exist to protect this instrumentation from a backfeed or overcurrent.
See panel proposal 12-171a.
The proposed change is not editorial in nature.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

ARTICLE 669 — ELECTROPLATING

12-173 Log #1931 NEC-P12 **Final Action: Reject**
(669.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "total connected load" to "maximum current to be employed".
Substantiation: Edit. Load may vary; "connected load" is not defined; is it the same as computed load?
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
The proposed change is not editorial in nature.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-174 Log #1930 NEC-P12 **Final Action: Reject**
(669.6(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "protected from" to "not likely to be subject to".
Substantiation: Edit. Present wording indicates protection is required, without exception. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
The proposed change is not editorial in nature.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

ARTICLE 670 — INDUSTRIAL MACHINERY

12-175 Log #957 NEC-P12 **Final Action: Reject**
(670.3(A)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
(1) Supply voltage, <u>type of current (ac or dc)</u>, number of phases and frequency if ac, and full-load current.
Substantiation: Edit. Type of current should be indicated.
Panel Meeting Action: Reject
Panel Statement: This change would cause a conflict with NFPA 79.
The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
The proposed change is not editorial in nature.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-176 Log #1904 NEC-P12 **Final Action: Reject**
(670.4(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: A machine ~~shall be considered as an individual unit and therefore~~ shall be provided with <u>an identified</u> disconnecting means <u>attached to or immediately adjacent to the machine and readily accessible</u>. ~~The disconnecting means shall be permitted to be supplied by branch circuits protected by either fuses or circuit breakers.~~ The disconnecting means shall not be required to incorporate overcurrent protection <u>unless required by manufacturers instructions or other Code provisions</u>.
Substantiation: Whether a machine is considered as an individual unit is irrelevant to a requirement to provide disconnecting means and unnecessary. Location of the disconnecting means should be specified. Whether or not supplied by a branch circuit would normally be dependent on whether other branch circuits on the machine are supplied which make the supply conductors a feeder. "Permitted to be supplied by branch circuits protected by either fuses or circuit breakers" is superfluous; this is normally a requirement; what other overcurrent devices can be used? The disconnecting means should be readily accessible. Overcurrent protection may be required by manufacturers instructions or Code rules re: tap conductors from the disconnecting means.
Panel Meeting Action: Reject
Panel Statement: CMP-12 does not agree with the substantiation as it is critical to know if a machine is an integral unit to allow for proper removal of power for isolating and troubleshooting the equipment.
There is insufficient substantiation for the removal of the requirement for the specific types of overcurrent protective devices that are suitable for the proper protection of a supply circuit to industrial machinery. There are various overcurrent protective devices available on the market that are used for protection of machinery circuits; however only fuses and circuit breakers are suitable for protection of machinery supply circuits.
There is insufficient technical substantiation for the requirement for the disconnecting means to be attached to or be immediately adjacent to the machine.
This change would cause a conflict with NFPA 79.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

12-177 Log #4406 NEC-P12 **Final Action: Accept in Principle**
(670.5)

Submitter: Jay Tamblingson, Rockwell Automation
Recommendation: Add new paragraph 670.5 as follows:
670.5 Short-Circuit Current Rating. Industrial machinery shall not be installed at a point on the electrical system where the available fault current is in excess of its marked short-circuit current rating as marked per 670.3(A)(4).
Substantiation: The present language in 670.5 includes requirements for short-circuit current rating (SCCR) markings on the nameplate for industrial machinery or its control panel. In many cases, the marked SCCR rating for the panel may be less than the interrupting rating(s) or SCCR's of the branch circuit protective devices and other components in the panel, which can lead to confusion to the suitability for the available fault current. The added paragraph provides clear language that the overall SCCR rating on the panel as determined by 670.3(A)(4) is to be used to evaluate suitability.
Similar language can be found in Article 285.6 for TVSS devices and in Section 4.8 of the 2007 NFPA 79.
Panel Meeting Action: Accept in Principle
Add new paragraph 670.5 as follows:
670.5 Short-Circuit Current Rating. Industrial machinery shall be installed where the available fault current does not exceed its marked short-circuit current rating as marked in accordance with 670.3(A)(4).
Panel Statement: CMP-12 edits the text to put it into positive code language.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
MARCOVICI, S.: Industrial equipment should be sized and selected based on the facility's electrical system rating. The place of installation should dictate the machine's ratings. Accordingly, the text of the section should be re-phrased as follows:
"The short-circuit current rating of an industrial machine shall not be less than the available fault-current at the place of installation."

ARTICLE 675 — ELECTRICALLY DRIVEN OR CONTROLLED IRRIGATION MACHINES

19-299 Log #1903 NEC-P19 **Final Action: Accept**
(675.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Edit. Superfluous; already covered by 90.3.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-300 Log #2807 NEC-P19 **Final Action: Accept**
(675.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~675.3 Other Articles.~~
~~These provisions are in addition to, or amendatory of, the provisions of Article 430 and other articles in this Code that apply except as modified in this article.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 675.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-301 Log #4295 NEC-P19 **Final Action: Accept**
(675.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~675.3 Other Articles.~~
~~These provisions are in addition to, or amendatory of, the provisions of Article 430 and other articles in this Code that apply except as modified in this article.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 675.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-302 Log #2191 NEC-P19 **Final Action: Accept**
(675.5)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
675.5 More Than Three Conductors in a Raceway or Cable.
The signal and control conductors of a raceway or cable shall not be counted for the purpose of ampacity adjustment, ~~derating the conductors~~ as required in 310.15(B)(2)(a).
Substantiation: The term "ampacity adjustment factor" is a term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-303 Log #3022 NEC-P19 **Final Action: Accept**
(675.5)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
675.5 More Than Three Conductors in a Raceway or Cable.
The signal and control conductors of a raceway or cable shall not be counted for the purpose of ampacity adjustment, ~~derating the conductors~~ as required in 310.15(B)(2)(a).
Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-304 Log #4487 NEC-P19 **Final Action: Accept in Principle**
(675.5)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
675.5 More Than Three Conductors in a Raceway or Cable.
The signal and control conductors of a raceway or cable shall not be counted for the purpose of ~~derating~~ adjusting the ampacity of current-carrying conductors as required in 310.15(B)(2)(a).
Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors". 366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).
Panel Meeting Action: Accept in Principle
See panel actions on Proposals 19-302 and 19-303.
Panel Statement: The panel actions on Proposals 19-302 and 19-303 meet the submitter's intent. "Ampacity adjustment" is a more concise way of saying what the submitter intends.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-305 Log #1584 NEC-P19 **Final Action: Reject**
(675.8(B))

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
(B) Main Disconnecting Means.
The main disconnecting means for the machine shall provide overcurrent protection, shall be at the point of connection of electric power to the machine, or shall be **a lockable disconnecting means located where readily accessible and within sight.** ~~visible and not more than 15 m (50 ft) from the machine, and shall be readily accessible~~**.** ~~and capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed.~~ This disconnecting means shall have a horsepower and current rating not less than required for the main controller.
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: The term "lockable disconnecting means" is not defined in Article 100. It is noted that CMP-1 rejected the proposed definition as it contained requirements that must be located in the body of the code. No technical substantiation has been provided for the replacement of the specific placement distance.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-306 Log #3301 NEC-P19 **Final Action: Reject**
(675.8(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part of the first sentence:...Shall be readily accessible and ~~capable of~~ have permanent integral identified means for being locked in the open (off) position.
Substantiation: Edit. "Capable of being locked" is not specific and allows for makeshift methods. "Off" clarifies open contacts not covers or doors.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided for the proposed revisions.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-307 Log #1897 NEC-P19 **Final Action: Reject**
(675.8(B) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (B) and substitute: (B) A fused switch or circuit breaker that simultaneously disconnects all ungrounded supply conductors shall be provided at the point of connection of electric power to the machine. The disconnecting means shall be readily accessible and provided with identified integral and permanent means for locking in the open (off) position. A fusible switch shall have a horsepower and current rating not less than required by 430.110(C).
Revise text of (C): A disconnecting means in accordance with 430.109 and 430.110 shall be provided...(remainder unchanged).
Substantiation: Present wording does not specifically require a main disconnecting means. Proposal specifies a fusible switch or circuit breaker which is implied by present wording re: locking and the exceptions. Provision for the disconnecting means to be up to 50 ft. away is unrealistic due to traveling distances of the machine. Proposal for locking is specific and eliminates makeshift methods.
Proposal for (C) is more specific.

Panel Meeting Action: Reject
Panel Statement: The proposed revisions do not add clarity or improve usability of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

ARTICLE 680 — SWIMMING POOLS, FOUNTAINS, AND SIMILAR INSTALLATIONS

17-90 Log #2357 NEC-P17 **Final Action: Accept**
(680.2.Dry-Niche Luminaire)

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:

Dry-Niche Luminaire. A luminaire intended for installation in the floor or wall of a pool, spa, or fountain in a niche that is sealed against the entry of ~~pool~~ water.

Substantiation: Existing text assumes these units are only for use in the walls of swimming pools or fountains. New designs are intended for floor mounting. They are also installed in spas. The word "pool" was deleted from the last sentence, as it is not necessary to specify pool, fountain or spa water. "Water" alone should be sufficient.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-91 Log #2081a NEC-P17 **Final Action: Reject**
(680.2.Equipment, Fixed; Equipment, Portable; and Equipment Stationary)

Submitter: Jim Davis, Electrical Education Services, LLC
Recommendation: Move the definitions in section 680.2 for "EQUIPMENT, FIXED," "EQUIPMENT, PORTABLE," and "EQUIPMENT, STATIONARY" to Article 100, and delete those definitions from Article 680. Also consider the deletion of similar definitions for "appliances" from Articles 550 and 551 as the existing definition in Article 100 for EQUIPMENT already includes appliances.

A companion proposal has been sent to CMP-19 for the suggested definitions in 550.2 and 551.2.

Substantiation: The concept of "fixed," "portable," and "stationary" equipment is used throughout the NEC and is not defined in a central location such as Article 100. Some examples of places where this occurs are found in: Article 100 "Electric Signs;" sections 210.23(B) and (C); section 220.53 ("fastened in place"); and the titles to Articles 424, 426, and 427 to name a few. The outcome of the acceptance of this proposal is a more coherent and user friendly code by locating important definitions in only one location. The opportunity would then exist to streamline other parts of the code, thereby, increasing usability.
Panel Meeting Action: Reject
Panel Statement: See NEC Style Manual 2.2.2.1.

Article 100 is beyond the purview of this panel. CMP-17 refers this proposal to the TCC for correlation if needed.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-92 Log #2451 NEC-P17 **Final Action: Reject**
(680.2.Power Safe Protector (PSP))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Add new text to read as follows:

Article 100

DEFINITION: Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.

Substantiation: If proposals 680.22 and 680.32 for PSP are accepted, a definition may be required. A proposal is also being sent to Article 100.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-30.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-93 Log #2358 NEC-P17 **Final Action: Reject**
(680.2.Through-Wall Lighting Assembly)

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Delete text as follows:

~~**Through-Wall Lighting Assembly.** A lighting assembly intended for installation above grade, on or through the wall of a pool, consisting of two interconnected groups of components separated by the pool wall.~~

Substantiation: These units are really variations of a no-niche luminaire. If my proposals for Sections 680.23(D) and 680.23(E) are accepted, this definition would no longer be necessary.
Panel Meeting Action: Reject
Panel Statement: As there are distinctions between the definitions of and the requirements for through-wall lighting assemblies and no-niche type luminaires, this section is still required. This term "through-wall lighting assemblies" is used five times in Article 680.
See action and substantiation on Proposal 17-147.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:

BLEWITT, T.: UL believes that the distinction between "no-niche luminaire" and "through-wall lighting assembly" is unnecessary for newer lighting technology. However, we are in agreement with the Panel discussion that the proposal is premature given the continuing availability of older technology.

17-94 Log #3469 NEC-P17 **Final Action: Reject**
(680.2 Indoor Pool, Lightning, Thunder, Thunder Storm & 680.28)

Submitter: Todd W McGibney, Law Office of Marc E. Mandel, LLC
Recommendation: Add text to read as follows:

Article 680.

Swimming Pools, Fountains, and Similar Installations.

680.2 Definitions.

Indoor Pool. Manufactured of field constructed equipment designed to contain water on a permanent or semi-permanent basis and is contained in a permanent structure that provides overhead cover and is used for swimming, wading, immersion, or therapeutic purposes.

Lightning. The flashing of light producd by a discharge of atmospheric electricity; also: the discharge itself.

Thunder. The sound that follows a flash of lighting and is caused by sudden expansion of the air in the path of the electrical discharge.

Thunder Storm. A storm accompanied by lighting and thunder.

680.28 Indoor Pool Safety during a Thunderstorm. An indoor pool should be properly grounded in accordance with this Code. Compliance with this Code and proper maintenance of equipment greatly reduces the risk of injury to swimmers using the indoor pool during a thunderstorm. This code should not be construed to prevent swimmers from using an indoor pool during a thunderstorm.

Substantiation: During inclement weather, many indoor pools operate under the recommendation that swimmers must exit the pool and remain out of the pool for a full 30 minutes from the last report of lightning or thunder. As a result, the swimmer's recreation or therapeutic time in the pool is disrupted. This need not be the case, because there is virtually no risk of injury to an individual who is swimming in a properly grounded building pursuant to the National Electrical Code. In the event that lightning strikes a properly grounded building containing an indoor pool, the charge should be carried away from the body of water and not pose danger to the swimmers. In fact, there has not been any recorded deaths to persons in indoor pools from lightning. Richard Kithil & Kevin Johnston, *Lightning and Aquatics Safety: A Cautionary Perspective for Indoor Pools*, http://www. lightningsafety.com/nlsi pls/indoor pools.html (accessed Nov. 1, 2008).
Panel Meeting Action: Reject
Panel Statement: The proposal provides recommendations concerning pool use. No enforceable NEC requirement is proposed. See 90.1.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-94a Log #CP1700 NEC-P17 **Final Action: Accept**
(Table 680.3)

Submitter: Code-Making Panel 17,
Recommendation: Add a new row to Table 680.3 prior to "Audio Equipment Article 640, Parts I and II" to read as follows:

Topic Section or Article

Site lighting systems operating at 30 volts or less 411.4(B).

Substantiation: CMP-17 adds a reference to 411.4(B) to Table 680.3 for clarity and usability.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-95 Log #1332 NEC-P17 **Final Action: Reject**
(680.3)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Except as modified in this article, wiring and equipment in or ~~adjacent~~ associated with pools, ~~and~~ fountains, spas, hot tubs, or hydromassage bathtubs shall comply...(remainder unchanged).
Substantiation: "Adjacent" is subjective, not defined and a term to be avoided. The additional equipment should be included.
Panel Meeting Action: Reject
Panel Statement: The submitter is intending to change the current meaning of the code by using the word "associated."
Spas, hot tubs, or hydromassage bathtubs are presently covered by the code in this section as written. CMP-17 refers the submitter to the definitions in 680.2.
CMP-17 does not agree with the submitter's substantiation. The submitter has not provided technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-96 Log #2808 NEC-P17 **Final Action: Accept in Part**
(680.3)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal to identify what was not accepted and the reason it was not accepted.
This action will be considered by the panel as a public comment.
Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section, associated text and Table
Delete this section and Table.
~~680.3 Other Articles.~~
~~Except as modified by this article, wiring and equipment in or adjacent to pools and fountains shall comply with other applicable provisions of this Code, including those provisions identified in Table 680.3.~~
~~Table 680.3 Other Articles~~
~~Topic Section or Article~~
~~Wiring Chapters 1 - 4~~
~~Junction box support 314.23~~
~~Rigid polyvinyl chloride conduit (Type PVC) 352.12~~
~~Reinforced thermosetting resin conduit (Type RTRC) 355.12~~
~~Audio Equipment Article 640, Parts I and II~~
~~Adjacent to pools and fountains 640.10~~
~~Underwater speakers*~~
~~*Underwater loud speakers shall be installed in accordance with 680.27(A).~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 680.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept in Part
Retain 680.3 in its entirety.
Retain Table 680.3 with column headings and the last three rows to read as follows:
Audio Equipment Article 640, Parts I and II
Adjacent to pools and fountains 640.10
Underwater speakers*
*Underwater loud speakers shall be installed in accordance with 680.27(A).
Panel Statement: CMP-17 chooses to retain 680.3 and Table 680.3 as modified to retain reference to 640, Parts I and II, 640.10, 680.27(A), and the asterisk reference.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-97 Log #4294 NEC-P17 **Final Action: Accept in Principle**
(680.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section and Table.
~~680.3 Other Articles.~~
~~Except as modified by this article, wiring and equipment in or adjacent to pools and fountains shall comply with other applicable provisions of this Code, including those provisions identified in Table 680.3.~~

~~Table 680.3 Other Articles~~

~~Topic~~	~~Section or Article~~
~~Wiring~~	~~Chapters 1–4~~
~~Junction box support~~	~~314.23~~
~~Rigid polyvinyl chloride conduit (Type PVC)~~	~~352.12~~
~~Reinforced thermosetting resin conduit (Type RTRC)~~	~~355.12~~
~~Audio Equipment~~	~~Article 640, Parts I and II~~
~~Adjacent to pools and fountains~~	~~640.10~~
~~Underwater speakers*~~	

~~*Underwater loudspeakers shall be installed in accordance with 680.27(A).~~

Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 680.3 partially repeats the requirement previously expressed in 90.3 and serves no additional purpose. Providing an incomplete list of applicable requirements from the general rules could lead users to believe that other requirements were not applicable. It should also be noted that other "Special" articles do not include partial list of applicable general requirements which could also lead to confusion.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-96.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-98 Log #1902 NEC-P17 **Final Action: Reject**
(680.4)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: All electrical equipment in the water, walls, walls or decks of pools, fountains, (except portable decorative fountains) ~~and similar installations,~~ or associated with such installations shall comply with applicable provisions of this article.
Substantiation: Proposal clarifies that associated equipment and installations not installed in water, walls or decks are covered. "Similar" is subjective, not defined, and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated a problem to this section of the code.
Portable decorative fountains are addressed in Part V of Article 680.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-99 Log #2359 NEC-P17 **Final Action: Accept in Part**
(680.6)

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
680.6 Grounding. Electrical equipment shall be grounded in accordance with Parts V, VI, and VII of Article 250 and connected by wiring methods of Chapter 3, except as modified by this article. The following equipment shall be grounded:
(1) ~~Through-wall lighting assemblies and~~ U~~u~~nderwater luminaires, other than those ~~low-voltage~~ lighting products listed for the application without a grounding conductor
(2) All electrical equipment located within 1.5 m (5 ft) of the inside wall of the specified body of water
(3) All electrical equipment associated with the recirculating system of the specified body of water
(4) Junction boxes
(5) Transformer and power supply enclosures
(6) Ground-fault circuit interrupters
(7) Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the specified body of water
Substantiation: Item 5 is updated to reflect DC rated LED luminaires. The term "Through-wall lighting assemblies" is not necessary. It is really a type of underwater luminaire. "Underwater luminaires" is sufficient. The exception for low-voltage lighting products listed for use without a grounding conductor is overly restrictive. The exception should be made more generic. The standard used for all types of underwater luminaires, UL 676 is being revised to accommodate both low and line voltage luminaires that do not require an equipment grounding conductor.
Panel Meeting Action: Accept in Part
Panel Statement: CMP-17 accepts the submitter's text change for (5) Transformer "and power supply" enclosures.
CMP-17 does not accept the text change pertaining to (1). Substantiation was not provided to justify the requirements for these new installation requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
BLEWITT, T.: The proposed revisions were intended to update the Code to address new technologies, particularly the use of LED's and plastics in underwater luminaires. These changes would reduce confusion between installers and Inspection Authorities when dealing with advancing luminaire technologies. More specific substantiation shall be provided during the Comment phase.

17-100 Log #3591 NEC-P17 **Final Action: Reject**
(680.8)

Submitter: Joseph J. White, KCI Technologies
Recommendation: Revise text to read as follows:
680.8 Overhead Conductor Clearances. Overhead conductors shall meet the clearance requirements in this section. Where a minimum clearance from the water level is given, the measurement shall be taken from the maximum water level of the specified body of water. <u>Above ground permanently installed and storable swimming pools not having a walkable surface at the maximum water level or a deck constructed at the top level of the pool may have the conductor clearances in Table 680.8 maintained from the ground.</u>
Substantiation: Pools not having a walkable surface at the maximum water level of the pool or do not have a deck constructed around the perimeter of the pool should not require overhead conductor clearances to be maintained from the maximum water level. It is my understanding that the clearance requirements are intended to protect persons from electrical hazards when using such devices as skimmers. If a walkable surface does not exist, and a person must stand on the ground to use a skimmer, why not maintain the clearances in Table 680.8 from the ground.
Panel Meeting Action: Reject
Panel Statement: The code is clear as written. No substantiation was provided to justify this change. The submitter's change would reduce safety. See 90.1.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-101 Log #532 NEC-P17 **Final Action: Reject**
(Figure 680.8)

Submitter: Alan Chech, Alan Chech Electrical Seminars
Recommendation: Revise text to read as follows:
Figure 680.8 - Dimension "A" is not drawn in the correct place. By definition of max. water level is highest water level it can reach before overflowing?
Substantiation: "A" should be drawn from cable to level of pool deck in this case, unless skimmer level is max. water level?
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
The submitter has not specified which "A" is incorrect and how it (they) is to be redrawn.
Presently, "A" correctly illustrates the clearance in any direction to the water level, edge of water surface, base of diving platform, or permanently anchored raft.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
MALDONADO, J.: This Proposal should have been to "Accept in Principle". The discussion within the ROC meeting was that the "A" dimension in the center of Figure 680.8 only works when the pool has a negative edge at one of the ends of the pool that is not shown in the diagram and the water level as shown is at the level of the outflow level of the pool.
Recommendation: Add an asterisk beside the "A" dimension in the center of the diagram, with a footnote asterisk that Clearly identifies the intent of this dimension. Add "A*" to diagram with a footnote below the diagram that reads "* =This dimension requires the outflow level of the pool water is at the level shown."
Comment on Affirmative:
BLEWITT, T.: The submitter did not provide a drawing depicting the changes requested.

17-102 Log #152 NEC-P17 **Final Action: Reject**
(680.8(B))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "communication" to "communications".
Substantiation: Section 3.3.3 of the NEC Style Manual States: "**3.3.3 Plural.** Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the *NEC* provision refers to *all* components or parts of a given type or class." Changing "communication" to "communications" will correlate with the title of Chapter 8, "Communications Systems"**.**
Panel Meeting Action: Reject
Panel Statement: CMP-17 contends that the wording in the code is correct in the context as used.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-103 Log #475 NEC-P17 **Final Action: Reject**
(680.10 Exception No. 1 (New))

Submitter: Paul W. Abernathy, Electrical Service Specialists & The Electrical Guru
Recommendation: Revise text to read as follows:
680.10 Underground Wiring Location. Underground wiring shall not be permitted under the pool or within the area extending 1.5 m (5 ft) horizontally from the inside wall of the pool unless this wiring is necessary to supply pool equipment permitted by this article. Where space limitations prevent wiring from being routed a distance 1.5 m (5 ft) or more from the pool, such wiring shall be permitted where installed in complete raceway systems of rigid metal conduit, intermediate metal conduit, or a nonmetallic raceway system. All metal conduit shall be corrosion resistant and suitable for the location. The minimum cover depth shall be as given in Table 680.10.
Table 680.10 Minimum Cover Depths
Wiring Method Minimum Cover mm in.
Rigid metal conduit (150 mm/6 in.)
Intermediate metal conduit (150 mm/6 in.)
Nonmetallic raceways listed for direct burial without concrete encasement (450 mm/18 in.)
Other approved raceways* (450 mm/18 in.)
*Raceways approved for burial only where concrete encased shall require a concrete envelope not less than 50 mm (2 in.) thick.
<u>Exception No. 1: Where nonmetallic raceways listed for direct burial serving Residential Branch Circuits rated 120V or Less with GFCI protection and maximum Overcurrent Protection of 20 Amperes are installed below a minimum of (100 m/4 in.) concrete slab or equivalent, the reduction of depth may be reduced to (150 mm/6 in.).</u>
Substantiation: Reason for Exception - While we know the intent of the NEC and 680.10 depth requirement was to reduce the shock effect of saturation around the 5 ft. boundary of a pool or spa area. The adding of a concrete slab area offers additional protection as well as a barrier to excessive moisture. While concrete does absorb moisture its wicking properties would reduce the effects down to the conduit which is already sealed in a direct bury rated conduit. While all conduits underground are considered wet locations the conductors within the conduit will already be rated for wet conditions.
If you go beyond the 5 ft. boundary listed in 680.10 you are able to refer to 300.5 and its depth allowances. In regards to the installation of pool lighting for example, the 20A protected GFCI circuit required by the NEC allows for a reduction if under a concrete slab or equivalent of 6 in.... and if under a 4 in. slab with no vehicle traffic a reduction to 4 in. provided you are outside of the 5 ft. boundary area listed in 680.10.
While I agree the area around the pool is subject to saturation and effects are greater on leaking voltage, I would venture to say the concrete adds for this element of protection as well as the conduit. However, the protection of the circuit by GFCI requirements would protect this as it does for the lighting issue with the wet niche which is in direct contact with the water anyway... reducing the touch potential on the ground around it should be taken care of in regards to the new requirement in 680.25(C) and the equipotential requirement of 3 ft. on the decking slab... which probably should be increased to 5 ft. if you are going to make the DEPTH issue around the pool meet the space requirements of 680.10.
Panel Meeting Action: Reject
Panel Statement: As the submitter proposes, conduit could be run under a pool. Joints are not watertight. This is not an approved installation method.
The submitter has not provided technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-104 Log #1518 NEC-P17 **Final Action: Reject**
(680.12)

Submitter: L. Keith Lofland, IAEI
Recommendation: Revise text to read as follows:
680.12 Maintenance Disconnecting Means. One or more means to ~~simultaneously~~ disconnect all ungrounded conductors shall be provided for all utilization equipment other than lighting. Each means shall be readily accessible<u>, grouped,</u> and within sight from its equipment and shall be located at least 1.5 m (5 ft) horizontally from the inside walls of a pool, spa, or hot tub unless separated from the open water by a permanently installed barrier that provides a 1.5 m (5 ft) reach path or greater. This horizontal distance is to be measured from the water's edge along the shortest path required to reach the disconnect.
Substantiation: How does one go about "simultaneously" disconnecting two or more individual disconnects? Changes to Section 680.12 in the 2002 NEC made it clear that more than one individual disconnect was permitted as maintenance disconnects at pools, spas, or hot tubs. May 2001 ROP 20-69 (page 1171) added the words "One or more" for disconnecting means with part of the substantiation stating "…multiple disconnects may be required, and the present language (1999 NEC) suggests only one is allowed." The Panel statement for this proposal states, "The panel agrees that the original wording of 680-12 did not clearly communicate the panel's intention with respect to requirements for disconnects…" (plural).

For the 2008 NEC, the original proposal (17-79) asking for "simultaneously" to be added to 680.12 was rejected. Comment 17-70 brought the "simultaneously" issue back to CMP-17. In the substantiation, the submitter made the following statement: "Simultaneous disconnection should be specified since literal wording, infers that two or three individual disconnecting means may be used." This statement from the submitter went unchecked by the panel and the word "simultaneously" was accepted at 680.12. I believe that statement should have been refuted by CMP-17 since the original 2002 proposal clearly indicated that "two or three individual disconnecting means" are permitted by 680.12.

If it is the intent of CMP-17 (as indicated in 2002) that more than one individual disconnecting means is permitted by 680.12, then "simultaneous" disconnection is unenforceable. Which is it, "simultaneous" disconnection or more than one individual disconnecting means?

Add the word "grouped" here to coincide with other multiple disconnecting means requirements in the Code [225.34, 230.71(A), 230.72(A)].

Panel Meeting Action: Reject

Panel Statement: "Simultaneous disconnection" refers to the conductors within a switch and not to the simultaneous disconnection of more than one disconnect switch. CMP-17 rejects the need to group disconnects for several pieces of equipment.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-105 Log #875 NEC-P17 **Final Action: Reject**
(680.12 Exception (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete first sentence and substitute: Approved means to simultaneously disconnect the ungrounded conductors of each branch circuit supplying utilization equipment shall be grounded.

Add: *Exception: The disconnecting means shall not be required to be within sight from the equipment it controls if provided with an identified integral permanent means for locking in the open (off) position.*

Substantiation: The means specified for "all" conductors could be a feeder or service disconnecting means. The proposed exception is similar to other sections where lock-off provisions provide safety. It may not be practical to have disconnecting means within sight (50 ft) of equipment for large pools or fountains.

Panel Meeting Action: Reject

Panel Statement: See panel action and substantiation on Proposal 17-104.

The exception is not acceptable as each means is required to be readily accessible and within sight from its equipment.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-106 Log #3605 NEC-P17 **Final Action: Accept**
(680.13)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with 3.1.3 of the NEC Style Manual regarding mandatory language in Fine Print Notes.

This action will be considered by the panel as a public comment.

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Add new text to read as follows:

680.13 Voltages for Wet Contact.

Requirements of this article recognized for an operating voltage of 15 volts or less and for an operating voltage of more than 15 volts are based the assumed use of sinusoidal ac. Where the supply source is other than sinusoidal ac, the following wet contact voltage values shall apply instead of 15 volts sinusoidal ac:

(1) 21.2 volts peak for nonsinusoidal ac.

(2) 30 volts for continuous dc.

(3) 12.4 volts peak for dc that is interrupted at a rate of 10 to 200 Hz.

FPN: Immersion is not included in the meaning of wet. See Chapter 9, listing references, Table 11(A), Note 2, last sentence, and Table 11(B), Note 4, last sentence.

Substantiation: The result of a July 2008 e-mail discussion amongst some fellow Code Panel 17 members, originating with UL's Code Panel 17 member Gary Siggins, regarding wet contact voltage values necessary for **emerging lighting technologies applied to underwater luminaires**. Energy-saving "green" light source technologies, such as light-emitting diodes (LEDs), use supply sources other than conventional sinusoidal ac, such as continuous dc and switching power supplies. The present values for requirements in Article 680 were based solely on commonly available sinusoidal ac.

These same wet contact voltage values for sinusoidal ac, nonsinusoidal ac, continuous dc and switched dc used to appear as installation requirements in Article 725 but have been relocated to Table 11(A), Note 2, and to Table 11(B), Note 4, solely as listing references ["For listing purposes …", "As part of the listing …", etc.] based on all relevant Article 725 requirements mandating only the use of listed equipment. Article 680 has many requirements mandating use of listed equipment but some installation requirements still govern equipment that may or may not be listed.

Code Panel 17 may wish to add FPNs referencing this new 680.13 to 680.23(A)(3), 680.23(A)(8), 680.24(A)(2), 680.24(A)(2)(c), 680.33(A), 680.33(B), 680.43(B)(2), 680.51(A), and 680.62(F).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

BLEWITT, T.: This new text may need correlation with that of additional changes introducing the term "Voltages for Wet Contact."

17-107 Log #4656 NEC-P17 **Final Action: Reject**
(680.20(C) (New))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as the proposal does comply with the NFPA Regulations Governing Committee Projects.

This action will be considered by the panel as a public comment.

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Insert the following lettered paragraph:

(C) GFCI Protection. Outlets supplying pool pump motors with short-circuit and ground-fault protection rated 15 or 20 amperes, and connected to 120-volt, 208-volt, or 240-volt branch circuits, single-phase, and whether by receptacle or by direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.

Delete 680.22(B) and reletter Section 680.22 accordingly.

Substantiation: This proposal relocates requirements for swimming pool pump motors from a section that covers area lighting and receptacles to one that actually covers the motors described in the rule. There is little substantive change in this proposal beyond correcting the improper placement of this requirement. The proposal does fix the minor problem that a hard-wire line-to-line connection from a wye distribution is not addressed in the current wording

Panel Meeting Action: Reject

Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.

The submitter did not reference the correct section.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-108 Log #2566 NEC-P17 **Final Action: Accept**
(680.21(A)(5))

Submitter: Brian J. Dolan, IBEW/NECA Technical Institute

Recommendation: Change the last sentence of this section to read:

The flexible cord shall include a copper equipment grounding conductor sized in accordance with 250.122 but not smaller than 12 AWG. The cord shall terminate in a grounding-type attachment plug.

Substantiation: This change corrects a conflict with 680.7(B). Since Part I and Part II of Article 680 pertain to permanently installed pools, there should be no difference between the requirements of 680.7(B) and 680.21(A)(5).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-109 Log #336 NEC-P17 **Final Action: Accept in Principle**
(680.21(B))

Submitter: Paul J. Cormier, Worcester Electrician School

Recommendation: Revise as follows:

Where the bonding grid is connected to the equipment grounding conductor of the motor circuit in accordance with the second paragraph of ~~680.26(B)(4)~~ 680.26(B)(6)(a), the branch-circuit wiring shall comply with 680.21(A).

Substantiation: The existing referenced article was relocated.

Panel Meeting Action: Accept in Principle

680.21(B) to read as follows:

Where the bonding grid is connected to the equipment grounding conductor of the motor circuit in accordance with the second ~~paragraph~~ sentence of ~~680.26(B)(4)~~ 680.26(B)(6)(a), the branch-circuit wiring shall comply with 680.21(A).

Panel Statement: CMP-17 agrees with the submitter but editorially changes "paragraph" to "sentence."

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-109a Log #CP1701 NEC-P17 **Final Action: Accept**
(680.22)

Submitter: Code-Making Panel 17,

Recommendation: Remove the word "Area" from the title of 680.22.

Substantiation: This section clearly does not cover underwater luminaires, which are covered in 680.23.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-110 Log #511 NEC-P17 **Final Action: Reject**
(680.22)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "circuit" and "interrupter" in (A)(4), (C)(2), (C)(3), and (C)(4).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-111 Log #2334 NEC-P17 **Final Action: Reject**
(680.22(A))

Submitter: David Nemchik, Medina County Building Department [Ohio]
Recommendation: Revise text as follows:
(1) Circulation and Sanitation System, Location. Receptacles that provide power for water-pump motors or for other loads directly related to the circulation and sanitation system shall be located ~~at least 3.0 m (10 ft) from the inside walls of the pool, or~~ not less than 1.83 m (6 ft) from the inside walls of the pool ~~if they meet all of the following conditions:~~
~~(1) Consist of single receptacles~~
~~(2) Employ a locking configuration~~
~~(3) Are of the grounding type~~
~~(4) Have GFCI protection~~
(2) Other Receptacles, Location. Other receptacles shall be located at least 3.0 m (10 ft) from the inside walls of the pool, or not less than 1.83 m (6 ft) from the inside walls of the pool if they meet all of the following conditions:
(1) Employ a locking configuration
(2) Are of the grounding type
Substantiation: When the 2008 NEC deleted 680.22(A)(4) Restricted Space paragraph that was in the 2005 NEC, any reason to treat circulation and sanitation system receptacles differently than other receptacles was eliminated. In the 2008 NEC a receptacle located 6 ft to 10 ft from the pool must only be twist lock if it is for the pool circulation and sanitation system receptacles. The circulation and sanitation system equipment is a known variable with a known safety record. Items powered by the other receptacles are unknown variables with unknown safety and might be handheld and placed on the pool top rail. The safety of these items should be of greater or equal concern than the circulation and sanitation system equipment.
Panel Meeting Action: Reject
Panel Statement: Sanitation equipment receptacles located between 6 ft and 10 ft is a reduction of safety without the additional four requirements.
Receptacles for pool pump motors may be of a higher voltage than 125 V and therefore may present a higher danger than 125 volt circuits.
The submitter has not provided adequate technical substantiation.
For (2), see panel action and substantiation on Proposal 17-119.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-112 Log #2336 NEC-P17 **Final Action: Reject**
(680.22(A))

Submitter: David Nemchik, Medina County Building Department [Ohio]
Recommendation: Revise text as follows:
(1) All Receptacles ~~Circulation and Sanitation System~~, Location. All rReceptacles ~~that provide power for water-pump motors or for other loads directly related to the circulation and sanitation system~~ shall be located at least 3.0 m (10 ft) from the inside walls of the pool, or not less than 1.83 m (6 ft) from the inside walls of the pool if they meet all of the following conditions:
~~(1) Consist of single receptacles~~
~~(2)~~(1) Employ a locking configuration
~~(3)~~(2) Are of the grounding type
~~(4) Have GFCI protection~~
~~(2) Other Receptacles, Location. Other receptacles shall be not less than 1.83 m (6 ft) from the inside walls of the pool.~~
Substantiation: When the 2008 NEC deleted 680.22(A)(4) Restricted Space paragraph that was in the 2005 NEC, any reason to treat circulation and sanitation system receptacles differently than other receptacles was eliminated. In the 2008 NEC a receptacle located 6 ft to 10 ft from the pool must only be twist lock if it is for the pool circulation and sanitation system receptacles. The circulation and sanitation system equipment is a known variable with a known safety record. Items powered by the other receptacles are unknown variables with unknown safety and might be handheld and placed on the pool top rail. The safety of these items should be of greater or equal concern than the circulation and sanitation system equipment.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-111.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-113 Log #2452 NEC-P17 **Final Action: Reject**
(680.22(A) and (B))

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
680.22 Area Lighting, Receptacles, and Equipment.
(A) Receptacles.
(1) Circulation and Sanitation System, Location. Receptacles that provide power for water-pump motors or for other loads directly related to the circulation and sanitation system shall be located at least 3.0 m (10 ft) from the inside walls of the pool, or not less than 1.83 m (6 ft) from the inside walls of the pool if they meet all of the following conditions:
(1) Consist of single receptacles
(2) Employ a locking configuration
(3) Are of the grounding type
(4) Have ~~GFCI~~ power safe protector protection
(2) Other Receptacles, Location. Other receptacles shall be not less than 1.83 m (6 ft) from the inside walls of a pool.
(3) Dwelling Unit(s). Where a permanently installed pool is installed at a dwelling unit(s), no fewer than one 125-volt, 15- or 20-ampere receptacle on a general-purpose branch circuit shall be located not less than 1.83 m (6 ft) from, and not more than 6.0 m (20 ft) from, the inside wall of the pool. This receptacle shall be located not more than 2.0 m (6 ft 6 in.) above the floor, platform, or grade level serving the pool.
(4) ~~GFCI~~ Power Safe Protector Protection. All 15- and 20-ampere, single-phase, 125-volt receptacles located within 6.0 m (20 ft) of the inside walls of a pool shall be protected by ~~a ground-fault circuit-interrupter~~ power safe protector.
~~(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15- and 20-amperes, 125 volt or 240 volt, single-phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.~~
(B) Power Safe Protector Protection.
(1) 120V Outlets. Outlets supplying pool pump motors from branch circuits with short-circuit and power safe protector protection rated 15 and 20 amperes, 125 volt or ~~240 volt,~~ single phase, whether by receptacle or direct connection, shall be provided with power safe protector protection for personnel.
(2) 240V Outlets. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, ~~125 volt or~~ 240 volt, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.
(C)(4) ~~GFCI~~ Power Safe Protector Protection in Adjacent Areas. Luminaires, lighting outlets, and ceiling-suspended (paddle) fans installed in at the area extending between 1.5 m (5 ft) and 3.0 m (10 ft) horizontally from the inside walls of a pool shall be protected by a ~~ground-fault circuit-interrupter~~ power safe protector unless installed not less than 1.5 m (5 ft) above the maximum water level and rigidly attached to the structure adjacent to or enclosing the pool.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-30.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-114 Log #312 NEC-P17 **Final Action: Reject**
(680.22(A)(1))

Submitter: Alan Chech, Alan Chech Electrical Seminars
Recommendation: Revise text as follows:
...directly related to the circulation and sanitation system shall be located ~~at 3.0 m (10 ft) from the inside walls of the pool, or~~ not less than 1.83 m (6 ft)...
Substantiation: Other receptacles can be 6 ft. from inside walls.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-111.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-115 Log #2235 NEC-P17 **Final Action: Reject**
(680.22(A)(1))

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Delete entire section 680.22(A)(1).
Substantiation: There is no need for this section with the change of all other receptacles to be permitted to be 6 ft from a pool. If I can have a standard receptacle 6 ft from a pool, why would a receptacle for a pool pump 9 ft from a pool have to comply with all the requirements of 680.22(A)(1)?
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-111.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-116 Log #2543 NEC-P17 **Final Action: Reject**
(680.22(A)(1) and (2))

Submitter: Rick Wohl, Bismarck, ND
Recommendation: Revise text to read as follows:
(1) ~~Circulation and Sanitation System,~~ Location. Receptacles ~~that provide power for water-pump motors or for other loads directly related to the circulation and sanitation system~~ shall be located at least ~~3.0 m (10 ft) from the inside walls of the pool, or not less than~~ 1.83 m (6 ft) from the inside walls of the pool, ~~if they meet all of the following conditions:~~
~~(1) Consist of single receptacles~~
~~(2) Employ a locking configuration~~
~~(3) Are of the grounding type~~
~~(4) Have GFCI protection~~
~~**(2) Other Receptacles, Location.** Other receptacles shall be not less than 1.83 m (6 ft) from the inside walls of a pool.~~
Substantiation: 680.22(A)(2) allows any receptacle other than those for the circulation or sanitation system to be located not less than 6 ft from the inside walls of a pool. 680.22(A)(1), as it is currently written, requires receptacles for the circulation or sanitation system to be located not less than 10 ft from the inside walls of a pool unless (4) four specific requirements are met. If these requirements are met, the distance may be reduced to not less than 6 ft.
If receptacles for purposes other than providing power to the circulation and sanitation systems are allowed within 6 ft of the inside walls of the pool, those for the circulation and sanitation system need not be subjected to additional restrictions.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-111.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-117 Log #3481 NEC-P17 **Final Action: Reject**
(680.22(A)(2))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Revise text to read as follows:
(2) Other Receptacles, Location. Other receptacles shall be not less than ~~1.83 m (6 ft)~~ 3.0 m (10 ft) from the inside walls of a pool.
Substantiation: 680.22(A)(1) allows a receptacle to be installed for water pumps or for other loads directly related to the circulation and sanitation system as close as 1.83 m (6 ft) if the receptacle meets all of the 4 conditions listed.
This receptacle in 680.22(A)(2) which could be a duplex can be located as close as 1.83 m (6 ft) from the inside wall of the pool without being required to meet any conditions.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-119.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-118 Log #3483 NEC-P17 **Final Action: Reject**
(680.22(A)(2))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Revise text to read as follows:
(2) Other Receptacles, Location. Other receptacles shall be not less than ~~1.83 m (6 ft)~~ 3.0 m (10 ft) from the inside walls of a pool.
Substantiation: 680.22(A)(1) allows a receptacle to be installed for water pumps or for other loads directly related to the circulation and sanitation system as close as 1.83 m (6 ft) if the receptacle meets all of the 4 conditions listed.
This receptacle in 680.22(A)(2) which could be a duplex can be located as close as 1.83 m (6 ft) from the inside wall of the pool without being required to meet any conditions.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-119.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-119 Log #2231 NEC-P17 **Final Action: Reject**
(680.22(A)(2) and (3))

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Revise text to read as follows:
"...shall not be less than 10 ft from the inside wall.
Substantiation: The change to 6 ft in the 2008 NEC increases electrical hazards around the pool. Under the 2008 NEC, a radio with a 6 ft cord would be able to be at the edge of the pool, allowing somebody in the pool to come in contact with an electrical appliance, the change to 6 ft does not comply with 90.1.
Panel Meeting Action: Reject
Panel Statement: CMP-17 reaffirms its position to retain the 6 ft requirement.
The submitter has not provided technical substantiation to make this change.
CMP-17 refers the submitter to Comment 17-85a of the last cycle, with a panel statement that read as follows: "The panel changed 5 ft to 6 ft and 10 ft to 6 ft for receptacle locations relative to distance to water to ensure consistency throughout Article 680. The 10 ft has been in the Code for many years, previous to the introduction of GFCI devices. The panel determined that 6 ft is sufficient. 6 ft correlates with standard power supply cord lengths."
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-120 Log #3482 NEC-P17 **Final Action: Reject**
(680.22(A)(3))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Revise text to read as follows:
Dwelling Units. Where a permanently installed pool is installed at a dwelling unit(s), no fewer than one 125 volt, 15- or 20-ampere receptacle on a general purpose branch circuit shall be located not less than ~~1.83 m (6 ft)~~ 3.0 m (10 ft) and not more than 6.0 m (20 ft) from, the inside wall of the pool.
Substantiation: 680.22(A)(1) allows a receptacle to be installed for water pumps or for other loads directly related to the circulation and sanitation system as close as 1.83 m (6 ft) if the receptacle meets all of the 4 conditions listed.
This receptacle in 680.22(A)(2) which could be a duplex can be located as close as 1.83 m (6 ft) from the inside wall of the pool without being required to meet any conditions.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-119.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-121 Log #3484 NEC-P17 **Final Action: Reject**
(680.22(A)(3))

Submitter: Danny Thomas, Henderson, NC
Recommendation: Revise text to read as follows:
Dwelling Units. Where a permanently installed pool is installed at a dwelling unit(s), no fewer than one 125 volt, 15- or 20-ampere receptacle on a general purpose branch circuit shall be located not less than ~~1.83 m (6 ft)~~ 3.0 m (10 ft) and not more than 6.0 m (20 ft) from the inside wall of the pool
Substantiation: 680.22(A)(1) allows a receptacle to be installed for water pumps or for other loads directly related to the circulation and sanitation system as close as 1.83 m (6 ft) if the receptacle meets all of the 4 conditions listed.
This receptacle in 680.22(A)(2) which could be a duplex can be located as close as 1.83 m (6 ft) from the inside wall of the pool without being required to meet any conditions.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-119.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-122 Log #193 NEC-P17 **Final Action: Accept in Principle**
(680.22(B))

Submitter: Bryan P. Holland, City of North Port
Recommendation: Revise as follows:
(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with S.C. and G.F. protection rated 15 or 20 amperes, ~~125 volt~~ 120 volt ~~or~~ through 240 volt, single phase...
Substantiation: Changing to 120 volts indicates a nominal outlet rating rather than a 125 volt device rating. Changing from "or" to "through" will include 208 volt systems which could have the same hazard of a 120 volt or 240 volt system.
Panel Meeting Action: Accept in Principle
Panel Statement: See action and substantiation on Proposal 17-126.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-123 Log #337 NEC-P17 **Final Action: Reject**
(680.22(B))

Submitter: Paul J. Cormier, Worcester Electrician School
Recommendation: Revise as follows:
(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, 125 volt or 240 volt, single phase, and outlets supplying pool water heaters, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.
Substantiation: Since the NEC has elevated the protection of direct connection pool pump motors, it only seems appropriate to do the same to pool water heaters.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided any technical substantiation to support the expansion of this requirement.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-124 Log #567 NEC-P17 **Final Action: Accept in Principle**
(680.22(B))

Submitter: Michael J. Johnston, National Electrical Contractors Association
Recommendation: Revise text to read as follows:
(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, 125 volt ~~or~~ through 240 volt, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.
Substantiation: This proposal is an effort to include this GFCI requirement for all outlets for pool pump motors rated 15 or 20 amperes, 125 volts, 200 volts, 208 volts, and 240 volts. This proposal is an effort to correct an inadvertent oversight in the 2008 NEC development process.
Panel Meeting Action: Accept in Principle
Panel Statement: See action and substantiation on Proposal 17-126.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-125 Log #1521 NEC-P17 **Final Action: Accept in Principle**
(680.22(B))

Submitter: L. Keith Lofland, IAEI
Recommendation: Revise text to read as follows:
680.22(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, 125 volt ~~or 240 volt~~ through 250 volts, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.
Substantiation: Wording in 2008 NEC does not require GFCI protection such things as 208 volt motors. We're back to the language and problems that arose from the 1999 NEC. Only two selected voltages (125 volt and 240 volt) require GCI protection as currently written.
Panel Meeting Action: Accept in Principle
Panel Statement: See action and substantiation on Proposal 17-126.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-126 Log #2784 NEC-P17 **Final Action: Accept**
(680.22(B))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise 680.22(B) as shown:
(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, ~~125~~ 120 volt ~~or~~ through 240 volt, single phase, whether by receptacle or direct connection, shall be provided with ground-fault-circuit-interrupter protection for personnel.
Substantiation: This proposal is an effort to include this GFCI requirement for all outlets for pool pump motors rated 15 or 20 amperes, 120 V thru 240 volts. We believe that it was an oversight during the 2008 NEC proposal cycle to specify 125 V or 240 V. This leaves out 208 V motors which by all of the substantiation submitted should be included.
In addition, this proposal recommends changing from 125 V to 120 V since the 125 V may not be applicable in all instances. For example, if a 120 V pool motor is direct wired, the "outlet" is not rated 125 V. The 125 V rating is applicable to a receptacle, but not to a generic reference to "outlet".
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-127 Log #3023 NEC-P17 **Final Action: Accept in Principle**
(680.22(B))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, ~~125~~120 volt or 240 volt, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.
Substantiation: Circuits are rated 120V, not 125V.
Panel Meeting Action: Accept in Principle
Panel Statement: See action and substantiation on Proposal 17-126.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-128 Log #3669 NEC-P17 **Final Action: Accept in Principle**
(680.22(B))

Submitter: Mark Smythe, Smythe Electric Inc.
Recommendation: Revise text as follows:
680.22(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, 125 volt, 208 volt, or 240 volt, single phase, whether by receptacle or direct connection, shall be provided with a ground-fault circuit-interrupter protection for personnel.
Substantiation: 208 volt single phase would be a very common voltage supplying pool equipment in a non dwelling unit installation. The argument could be made that this is not required to be GFCI protected as presently worded in this article. This installation should be provided the same GFCI protection as the 125 volt and 240 volt systems.
Panel Meeting Action: Accept in Principle
Panel Statement: See action and substantiation on Proposal 17-126.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-129 Log #3808 NEC-P17 **Final Action: Accept in Principle**
(680.22(B))

Submitter: Mike Weitzel, Bechtel
Recommendation: Revise existing text.
680.22(B) Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, ~~125 or 240 volt~~. 120 through 250 volt single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.
Substantiation: 2008 NEC Code wording does not include 208-volt single phase pump motors. The suggested language would cover these motors, and the slightly wider range of voltages will aid code enforcement personnel
Panel Meeting Action: Accept in Principle
Panel Statement: See action and substantiation on Proposal 17-126.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-130 Log #4401 NEC-P17 **Final Action: Reject**
(680.22(B))

Submitter: Carvin DiGiovanni, Association of Pool & Spa Professionals
Recommendation: Delete the following text:
~~(B) GFCI Protection. Outlets supplying pool pump motors from branch circuits with short-circuit and ground-fault protection rated 15 or 20 amperes, 125 volt or 240 volt, single phase, whether by receptacle or direct connection, shall be provided with ground-fault circuit-interrupter protection for personnel.~~
Substantiation: This requirement on all pool pumps is unwarranted and will be costly (minimum $100/pool, up to $500/pool for the more elaborate pools). This requirement will also cause a great deal of service issues.
Panel Meeting Action: Reject
Panel Statement: CMP-17 refers the submitter to the statement in Comment 17-75 of the last cycle.
This change would reduce the level of safety that this requirement provides.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-131 Log #2234 NEC-P17 **Final Action: Reject**
(680.22(C), FPN (New))

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Add new FPN as follows:
(C) Luminaires, lighting outlets and ceiling suspended (paddle) fans.
<u>FPN: See 411.4(B) for lighting systems operating at 30 volts or less.</u>
Substantiation: Make the NEC more user friendly and to remind people of that section for LV lighting around a pool.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 17-94a.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-132 Log #3685a NEC-P17 **Final Action: Reject**
(680.22(C)(6))

Submitter: Richard F. VanWert, Middle Department Inspection Agency
Recommendation: Relocate 411.4(B) to 680.22(C)(6).
This proposal has also been sent to CMP-18 as it references 411.4(B).
Substantiation: This practical and useful information should be included in Article 680.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 17-94a.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-133 Log #192 NEC-P17 **Final Action: Reject**
(680.22(E))

Submitter: Bryan P. Holland, City of North Port
Recommendation: Revise as follows:
(E) Other Outlets. Other outlets shall be not less than ~~3.0 m (10 ft)~~ <u>1.83 m (6 ft)</u> from the inside walls of the pool.
Substantiation: This change will result in a consistent dimension with the rest of Article 680, including 680.22, 680.34, 680.43, 680.62, and 680.71.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the proposal as the requirement would reduce the level of safety.
CMP-17 upholds its position as provided in the last cycle, Comment 17-82 Log #1798.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-134 Log #1522 NEC-P17 **Final Action: Reject**
(680.22(E))

Submitter: L. Keith Lofland, IAEI
Recommendation: Revise text to read as follows:
680.22(E) Other Outlets. Other outlets shall be not less than ~~3.0 m (10 ft)~~ <u>1.83 m (6 ft)</u> from the inside walls of the pool. Measurements shall be determined in accordance with 680.22(A)(5).
FPN: Other outlets may include, but are not limited to, remote-control, signaling, fire alarm, and communications circuits.
Substantiation: These “other outlets” should have the same consistent dimensions as throughout Article 680. This 1.8 m (6 ft) dimension was proposed and accepted for Sections 680.22(A)(1), 680.22(A)(2), 680.22(A)(3), 680.34, 680.43(A), 680.43(A)(1), 680.62(E), an 680.71 for the 2008 NEC.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-133.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-135 Log #512 NEC-P17 **Final Action: Reject**
(680.23)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between “circuit” and “interrupter” in (A)(1), two places in (A)(3), (A)(8), two places in (F)(2)(b), (F)(3), and (F)(3)(3).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-136 Log #2364 NEC-P17 **Final Action: Reject**
(680.23)

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(B) Wet-Niche Luminaires.
(1) Forming Shells. Forming shells shall be installed for the mounting of all wet-niche underwater luminaires (fixtures) and shall be equipped with provisions for conduit entries. Metal parts of the luminaire (fixture) and forming shell in contact with the pool water shall be of brass or other approved corrosion-resistant metal. All forming shells used with nonmetallic conduit systems, other than those that are part of a listed ~~low-voltage~~ lighting system not requiring grounding, shall include provisions for terminating an 8 AWG copper conductor.
(2) Wiring Extending Directly to the Forming Shell. Conduit shall be installed from the forming shell to a junction box or other enclosure conforming to the requirements in 680.24. Conduit shall be rigid metal, intermediate metal, liquidtight flexible nonmetallic, or rigid nonmetallic.
(a) *Metal Conduit*. Metal conduit shall be approved and shall be of brass or other approved corrosion-resistant metal.
(b) *Nonmetallic Conduit*. Where a nonmetallic conduit is used, an 8 AWG insulated solid or stranded copper bonding jumper shall be installed in this conduit unless a listed ~~low voltage~~ lighting system not requiring grounding is used. The bonding jumper shall be terminated in the forming shell, junction box or transformer enclosure, or ground-fault circuit-interrupter enclosure. The termination of the 8 AWG bonding jumper in the forming shell shall be covered with, or encapsulated in, a listed potting compound to protect the connection from the possible deteriorating effect of pool water.
(3) Equipment Grounding Provisions for <u>Wet-Niche Luminaires</u> ~~Cords~~. Wet-niche luminaires <u>shall comply with either (a) or (b):</u> ~~that are supplied by a flexible cord or cable shall have all exposed non-current-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG.~~
<u>(a) Have all exposed non-current-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of the cord or cable. This grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer enclosure, or other enclosure. The grounding conductor shall not be smaller than the supply conductors and not smaller than 16 AWG.</u>
<u>(b) Be a listed lighting system not requiring grounding.</u>
(4) Luminaire (Fixture) Grounding Terminations. The end of the flexible-cord jacket and the flexible-cord conductor terminations within a luminaire (fixture) shall be covered with, or encapsulated in, a suitable potting compound to prevent the entry of water into the luminaire (fixture) through the cord or its conductors. ~~In addition~~ <u>If present</u>, the grounding connection within a luminaire (fixture) shall be similarly treated to protect such connection from the deteriorating effect of the pool water in the event of water entry into the luminaire (fixture).
(5) Luminaire (Fixture) Bonding. <u>Unless listed as not requiring bonding, the</u> ~~The~~ luminaire (fixture) shall be bonded to and secured to the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to remove the luminaire (fixture) from the forming shell. ~~Bonding shall not be required for luminaires (fixtures) that are listed for the application and have no non-current-carrying metal parts.~~
Substantiation: The proposed text of 680.23(B)(1) only allows the option of a listed low-voltage lighting system to not require grounding. Although rare designs, it is possible to list a line voltage luminaire that does not require grounding. These requirements are being added to the standard used to evaluate underwater luminaires, UL 676.
Similar changes are proposed in 680.23(B) 3, 4 and 5 as grounding would not always be present. The heading of 680.23(B)(3) has been changed for clarity.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation to support this change.
Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
BLEWITT, T.: The proposed revisions were intended to update the Code to address new technologies, particularly plastic LED luminaires that are permanently factory sealed. These changes would help reduce confusion between installers and Inspection Authorities when dealing with advanced luminaire technologies. We are in agreement that the text of the proposal was too broad and might encompass unproven designs. More focused text and specific substantiation shall be provided during the Comment phase.

17-137 Log #2361 NEC-P17 **Final Action: Accept**
(680.23(A))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
680.23 Underwater Luminaires. This section covers all luminaires installed below the normal water level of the pool.
(A) General.
(1) Luminaire Design, Normal Operation. The design of an underwater luminaire supplied from a branch circuit either directly or by way of a transformer or power supply meeting the requirements of this section shall be such that, where the luminaire is properly installed without a ground-fault circuit interrupter, there is no shock hazard with any likely combination of fault conditions during normal use (not relamping).
Substantiation: The reference to power supplies is needed to accommodate DC rated LED luminaires.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-138 Log #2360 NEC-P17 **Final Action: Accept in Principle in Part**
(680.23(A)(2))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(2) Transformers and Power Supplies. Transformers and power supplies used for the supply of underwater luminaires, together with the transformer or power supply enclosure, shall be listed for ~~as a~~ swimming pool and spa use ~~transforme~~r. The transformer or power supply shall either incorporate a transformer of the ~~be an~~ isolated winding type with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings or one that incorporates an approved system of double insulation.
Substantiation: New LED luminaires use DC power supplies. The grounded shield transformer design has bee required so it requires at leaser two faults for line voltage to be fed to the luminaires. Newer transformer designs meet the same intend by employing double insulation. The requirements for construction and test is documented in UL 2097, The Reference Standard for Double Insulation Systems for Use in Electronic Equipment.
Panel Meeting Action: Accept in Principle in Part
680.23(A)(2) to read as follows:
(2) Transformers and Power Supplies. Transformers and power supplies used for the supply of underwater luminaires, together with the transformer or power supply enclosure, shall be listed for ~~as a~~ swimming pool and spa use ~~transforme~~r. The transformer or power supply shall incorporate either a transformer of the ~~be an~~ isolated winding type with an ungrounded secondary that has a grounded metal barrier between the primary and secondary windings or one that incorporates an approved system of double insulation between the primary and secondary windings.
Panel Statement: CMP-17 accepts the submitter's text but appends the last sentence.
CMP-17 edits the submitter's text for clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-139 Log #2362 NEC-P17 **Final Action: Accept in Principle in Part**
(680.23(A)(3))

TCC Action: The Technical Correlating Committee directs that the panel comply with the NEC Style Manual 3.1.1 and 3.1.3 and clarify the panel action and panel statement on this proposal to identify what was not accepted and the reason it was not accepted.
This action will be considered by the panel as a public comment.
Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(3) GFCI Protection, Relamping. A ground-fault circuit interrupter shall be installed in the branch circuit supplying luminaires ~~operating at more than 15 volts such that~~ if there is a ~~no~~ shock hazard during relamping. A shock hazard is considered to be present during relamping if the luminaire is supplied from a source that exceeds the Class 2 voltage limits "where wet contact is likely to occur" as specified in Table II(A). The installation of the ground-fault circuit interrupter shall be such that there is no shock hazard with any likely fault-condition combination that involves a person in a conductive path from any ungrounded part of the branch circuit or the luminaire to ground.
Substantiation: Existing text assumes the luminaire is connected to a 60Hz AC source. LED luminaires require DC sources. The present 15 (ac) limit is the Class 2 "wet" voltage limit. The reference to Table II(A) allows for both ac, dc as well as dc interrrupted at a rate of 10 to 200 hz. Also no change to this section would be needed in the future if revisions to these limits were made.
Panel Meeting Action: Accept in Principle in Part
680.23(A)(3) to read as follows:
(3) GFCI Protection, Relamping. A ground-fault circuit interrupter shall be installed in the branch circuit supplying luminaires ~~operating at more than 15 volts such that~~ if there is a ~~no~~ shock hazard during relamping. A shock hazard is considered to be present during relamping if the luminaire is supplied from a source that exceeds the Class 2 voltage limits "where wet contact is likely to occur" as specified in Chapter 9, Tables 11(A) and 11 (B). The installation of the ground-fault circuit interrupter shall be such that there is no shock hazard with any likely fault-condition combination that involves a person in a conductive path from any ungrounded part of the branch circuit or the luminaire to ground.
Panel Statement: CMP-17 accepts the submitter's proposal and adds Table 11(B) to address direct current power sources.
CMP-17 also notes and corrects "Table II" to be "Table 11."
Number Eligible to Vote: 11
Ballot Results: Affirmative: 8 Negative: 3
Explanation of Negative:
ROCK, B.: NEMA supports this Proposal's objective to allow energy-saving luminaires that operate from supplies of other than sinusoidal alternating current but opposes the wording of added sentence in the Panel Action based on the following:
o Readability: The Panel's revisions of the Proposal's wording results in navigation to Tables 11(A) or 11(B) but fails to indicate the required values are NOT in the tabulations but are buried in portions of Note 2 and Note 4. Multiple and ambiguous pointers could add further confusion or misdirection to wrong voltage values. Just state outright what these 4 voltage limits are: 15 volts for sinusoidal ac, 21.2 volts peak for nonsinusoidal ac, 30 volts for continuous dc, and 12.4 volts peak for dc interrupted at a rate of 10 to 200 Hz.
o NEC® Style Manual 3.1.1 and 3.1.3 violations: The added sentence relocates and amplifies what had been a mandatory requirement and must use the verb "shall be" for mandatory requirements, not the verb "is … to be" reserved for explanatory information, normally appearing in either a Fine Print Note or an informative Annex.
o Installation requirement versus Listing reference: The subject matter is an installation requirement. The preamble to Table 11(A) and Table 11(B), however, indicates "For listing purposes, …" and "As part of the listing, …". The absence of definitive wording in the revision may cause misinterpretation that the installation requirements associated with the existing 15 volt (sinusoidal ac) limit, as well as the added voltage levels for nonsinusoidal ac, continuous dc and interrupted dc, would be no longer incumbent upon the installation, only the Listed equipment.
SCHAPP, R.: I agree with the comment on vote submitted by Mr. Yasenchak.
YASENCHAK, R.: Referencing to the Tables 11(A) and (B) could be confusing to the installer. Simply listing the voltages in this section would add clarity and not cause confusion.

17-140 Log #3217 NEC-P17 **Final Action: Reject**
(680.23(A)(3))

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Revise 680.23(A)(3) as follows:
~~A ground fault circuit interrupter shall be installed in the branch circuit supply~~ Luminaires operating at more than 15 volts shall be provided with ground-fault circuit-interrupter protection for personnel such that there is no shock hazard during relamping.
Substantiation: The proposed revised wording is consistent with other areas of the NEC in which ground-fault circuit-interrupter (GFCI) protection is required. GFCI protection for underwater luminaires could be provided by an upstream 2-pole GFCI feeder circuit breaker that protects ALL branch circuits in a swimming pool sub-panel. GFCI 2-pole circuit breakers are available from at least one manufacturer ranging in size from 15 amperes to 50 amperes. They can be used for feeders, individual branch circuits, and multiwire branch circuits.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-139.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-141 Log #2233 NEC-P17 **Final Action: Reject**
(680.23(A)(6))

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Revise text to read as follows:
The removed luminaire on the deck or other dry location without lowering the water level or disconnecting the luminaire from the branch circuit conductors, for such maintenance.
Substantiation: This would make this section consistent with the requirements of UL.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted. The submitter references the wrong section.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-142 Log #2363 NEC-P17 **Final Action: Accept in Principle in Part**
(680.23(A)(8))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(8) Compliance. Compliance with these requirements shall be obtained by the use of a listed underwater luminaire
and by installation of a listed ground-fault circuit interrupter in the branch circuit or a listed transformer or power supply for luminaires operating at not more than ~~15 volts~~ the Class 2 voltage limits “where wet contact is likely to occur” as specified in Table II(A).
Substantiation: Existing text assumes the luminaire is connected to a 60Hz AC source. LED luminaires require DC sources. The present 15 (ac) limit is the Class 2 “wet” voltage limit. The reference to Table II(A) allows for both ac, dc as well as dc interrrupted at a rate of 10 to 200 hz. Also no change to this section would be needed in the future if revisions to these limits were made.
Panel Meeting Action: Accept in Principle in Part
Revise 680.23(A)(8) to to read as follows:
(8) Compliance. Compliance with these requirements shall be obtained by the use of a listed underwater luminaire and by installation of a listed ground-fault circuit interrupter in the branch circuit or a listed transformer or power supply for luminaires operating at not more than ~~15 volts~~ the Class 2 voltage limits “where wet contact is likely to occur” as specified in Chapter 9, Tables 11(A) and 11(B).
Panel Statement: CMP-17 accepts the submitter’s proposal and appends Table 11(B) to address direct current power sources.
CMP-17 also notes and corrects “Table II” to be “Table 11.”
Number Eligible to Vote: 11
Ballot Results: Affirmative: 8 Negative: 3
Explanation of Negative:
ROCK, B.: NEMA supports this Proposal’s objective to allow energy-saving luminaires that operate from supplies of other than sinusoidal alternating current but opposes the wording replacing “15 volts” in the Panel Action based on the following:
o Readability: The Panel’s revisions of the Proposal’s wording results in navigation to Tables 11(A) or 11(B) but fails to indicate the required values are NOT in the tabulations but are buried in portions of Note 2 and Note 4. Multiple and ambiguous pointers could add further confusion or misdirection to wrong voltage values. Just state outright what these 4 voltage limits are: 15 volts for sinusoidal ac, 21.2 volts peak for nonsinusoidal ac, 30 volts for continuous dc, and 12.4 volts peak for dc interrupted at a rate of 10 to 200 Hz.
o Installation requirement versus Listing reference: The subject matter is an installation requirement. The preamble to Table 11(A) and Table 11(B), however, indicates “For listing purposes, …” and “As part of the listing, …”. The absence of definitive wording in the revision may cause misinterpretation that the installation requirements associated with the existing 15 volt (sinusoidal ac) limit, as well as the added voltage levels for nonsinusoidal ac, continuous dc and interrupted dc, would be no longer incumbent upon the installation, only the Listed equipment.
SCHAPP, R.: I agree with the comment on vote submitted by Mr. Yasenchak.
YASENCHAK, R.: Referencing to the Tables 11(A) and (B) could be confusing to the installer. Simply listing the voltages in this section would add clarity and not cause confusion.

17-143 Log #1480 NEC-P17 **Final Action: Reject**
(680.23(B)(2)(B))

Submitter: Tony Perdue, Tee Pee Electric Inc.
Recommendation: Add a new Exception: The #8 AWG insulated solid or stranded copper bonding jam shall not be required to be installed in the nonmetallic conduit when the nonmetallic light niche is bonded at the forming shell by a external bonding lug located on the niche.
Substantiation: Will eliminate double bonding, also eliminate extra wire for transient voltage back to swimming pool.
Some cities require us to hook bonding jumper to ground!
Panel Meeting Action: Reject
Panel Statement: Eliminating the internal ground will reduce the level of safety. The installation must comply with 110.3.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-144 Log #2379 NEC-P17 **Final Action: Reject**
(680.23(B)(4))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(4) Encapsulation of Luminaire Grounding Cord Terminations~~.~~ The end of the flexible-cord jacket and the flexible-cord conductor terminations within a luminaire shall be covered with, or encapsulated in, a suitable potting compound to prevent the entry of water into the luminaire through the cord or its conductors. ~~In addition, the grounding connection within a luminaire shall be similarly treated to protect such connection from the deteriorating effect of pool water in the event of water entry into the luminaire.~~
(5) Encapsulation of Luminaire Grounding Connection. The main equipment grounding conductor connection and all splices in this path shall be covered with, or encapsulated in, a suitable potting compound to protect such connection from the deteriorating effect of pool water in the event of water entry into the luminaire.
(6)~~(5)~~ Luminaire Bonding. The luminaire shall be bonded to, and secured to, the forming shell by a positive locking device that ensures a low-resistance contact and requires a tool to remove the luminaire from the forming shell. Bonding shall not be required for luminaires that are listed for the application and have no non–current-carrying metal parts.
(7)~~(6)~~ Servicing. All wet-niche luminaires shall be removable from the water for inspection, relamping, or other maintenance. The forming shell location and length of cord in the forming shell shall permit personnel to place the removed luminaire on the deck or other dry location for such maintenance. The luminaire maintenance location shall be accessible without entering or going in the pool water.
Substantiation: Title of 680.23(B)(4) – Section 680.23(B)(5) contains two requirements – the requirement for encapsulation of the termination of the flexible cord within the luminaire and the requirement for encapsulation of the connection of the equipment grounding conductor within the luminaire. The present title “Luminaire Grounding Terminations” only reflects the second part of the requirement. The two have been split and the grounding conductor encapsulation requirement clarified as newer luminaire designs frequently splice into the main grounding connection and use the tap for other purposes. These splices must also be protected by encapsulation.
Panel Meeting Action: Reject
Panel Statement: The proposed wording does not add any clarity to the code. The submitter did not provide adequate technical substantiation.
The provisions of the proposed subsection (5) would violate the requirements of 680.23(F)(2).
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
BLEWITT, T.: The Panel discussion clarified the text. With this clarification, UL agrees that the proposal is not necessary.

17-145 Log #4334 NEC-P17 **Final Action: Reject**
(680.23(B)(5))

Submitter: Carvin DiGiovanni, Association of Pool & Spa Professionals
Recommendation: Revise as follows:
(5) Metal Fittings. Metal fittings within or attached to the pool structure shall be bonded. Isolated parts that are not over 100 mm (4 in.) in any dimension and do not penetrate into the pool structure more than 25 mm (1 in.) shall not require bonding.
Exception: Metallic pool cover anchors intended for insertion in the deck surface, 25 mm (1 in.) or less in diameter and 51 mm (2 in.) or less in length shall not be required to be bonded.
Substantiation: Addition of this exception eliminates a requirement currently being imposed by some AHJs which cannot be met and which also addresses issues created by passage of the Virginia Grahame Baker (VGB) Act, which now requires substantially expanded usage of pool covers to prevent accidental drowning. The proposed exception is clearly within the principles espoused by 680.23(B)(5). Typical pool cover anchors are approximately ¾" (19 mm) in diameter and 1-1/4" (32 mm) to 1-1/2" (38 mm) in length, substantially smaller in surface area and only slightly longer than the Article currently exempts. The anchor length cannot be reduced substantially and still withstand shear forces created by the cover. These anchors are generally installed 3-4 feet (0.9 – 1.2 m) away from the edge of the pool and are not mechanically capable of having a bond wire attached. Further, these anchors are, and are expected to be (in increasing numbers under VGB), installed in existing decks, and bonding, even if mechanically possible, would require expensive partial or total demolition of the deck with little or no increase in safety. The submitter knows of no shock or electrocution incidents involving these anchors. Further, as these anchors are installed in a deck that would already require incorporation of a bonding grid, they would be encompassed by the existing equipotential surface in the same fashion as rope anchors and other similar devices already exempt under this section, and which are allowed substantially larger exposed surfaces.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted. The submitter references the wrong section.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-146 Log #2365 NEC-P17 **Final Action: Reject**
(680.23(C)(1))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(C) Dry-Niche Luminaires.
(1) Construction. A dry-niche luminaire shall be provided with a provision for drainage of water and a means for
accommodating one equipment grounding conductor for each conduit entry. Alternatively, a dry-niche luminaire that is listed and not intended for use with an equipment grounding conductor shall be permitted.
Substantiation: Some new designs of dry-niche luminaires have no metal parts to ground. The requirements for listing in UL 676 allow for such designs.
Panel Meeting Action: Reject
Panel Statement: CMP-17 does not accept this proposal.
Substantiation was not provided to justify these new installation requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
BLEWITT, T.: We agree with the Panel's expressed concern that revised text allowing ungrounded luminaires might inadvertently allow constructions where their long-term suitability is unproven. We believe this concern is unwarranted concerning dry-niche luminaires. The new designs are essentially identical to previous ones except with both the niche and luminaire enclosure now being made of plastic. They have nothing to ground and pose no more electric shock risk than those that have been produced for many years. More specific substantiation will be provided during the Comment phase.

17-147 Log #2366 NEC-P17 **Final Action: Reject**
(680.23(D))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(D) No-Niche Luminaires.
(1) Wiring Method
(a) *Pool Water Filled Conduit* – Conduit extending to the luminaire shall be of the material and type specified in 680.23(B)(2) where the pool water enters the conduit.
(b) *Conduit Not Filled with Pool Water* - Conduit extending to the luminaire shall be of the material and type specified in 680.23(F)(1) where pool water does not enter the conduit.
(2) Luminaires With Immersed Cord – A no-niche luminaire with an immersed flexible cord shall be installed with a mounting bracket that complies with the requirements for forming shells specified in 680.23(B)(1). The luminaire and mounting bracket shall be constructed and installed in accordance with 680.23(B). Where a forming shell is specified, the requirement shall apply for the luminaire mounting bracket.
~~**(D) No-Niche Luminaires.** A no-niche luminaire shall meet the construction requirements of 680.23(B)(3) and be installed in accordance with the requirements of 680.23(B). Where connection to a forming shell is specified, the connection shall be to the mounting bracket.~~
Substantiation: The present text reflects designs needing to be removed for inspection and other maintenance. New LED designs not intended to be relamped, are such that the cord is not exposed to the pool water.
Panel Meeting Action: Reject
Panel Statement: CMP-17 does not accept this proposal.
Substantiation was not provided to justify the requirements for these new installation requirements.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
BLEWITT, T.: The proposed revisions were intended to allow the Code to reflect installation options not previously available for underwater luminaires, particularly plastic LED luminaires that are permanently factory sealed. These changes would help reduce confusion between installers and Inspection Authorities when dealing with advancing luminaire technologies. We are in agreement that the text of the proposal might inadvertently encompass unproven designs.

17-148 Log #2367 NEC-P17 **Final Action: Reject**
(680.23(E))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Delete text as follows:
~~**(E) Through-Wall Lighting Assembly.** A through-wall lighting assembly shall be equipped with a threaded entry or hub, or a nonmetallic hub, for the purpose of accommodating the termination of the supply conduit. A through-wall lighting assembly shall meet the construction requirements of 680.23(B)(3) and be installed in accordance with the requirements of 680.23. Where connection to a forming shell is specified, the connection shall be to the conduit termination point.~~
Substantiation: A through-wall lighting assembly is another type of no-niche luminaire design. If my proposal for the revision of Section 680.23(D) defining no-niche luminaires as being either with or without immersed cords, this section would no longer needed.
Panel Meeting Action: Reject
Panel Statement: As there are distinctions between the definitions of and the requirements for through-wall lighting assemblies and no-niche type luminaires, this section is still required. This term "through-wall lighting assemblies" is used five times in Article 680.
See action and substantiation on Proposal 17-147.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
BLEWITT, T.: See My Affirmative with Comment on 17-93 (Log #2358).

17-149 Log #4878 NEC-P17 **Final Action: Reject**
(680.23(E))

Submitter: L. Keith Lofland, IAEI
Recommendation: Revise text as follows:
680.23(E) Through-Wall Lighting Assembly. This section needs to be relocated to Part III of Article 680. Perhaps new 680.33(C).
Substantiation: When this section was introduced into the 2002 NEC, it was intended for Part III of Article 680 for storable pools. (see May 2001 ROP 20-115). In the reorganization of Article 680 for the 2002 NEC, this section was inadvertently placed in Part II for permanently installed pools. In discussions with the original submitter, it was the submitter's intent for this section on through-wall lighting assemblies to be associated with Part III and storable pools.
The substantiation in the May 2001 ROP 20-115 was to recognize changes to UL Standard 676 addressing the testing and listing of these types of lighting assemblies. If you look at UL Standard 676, this standard addresses through-wall lighting assemblies but only for aboveground storable pools.
When you go through Article 680 and in particular, Part II (permanently installed pools), this section on through-wall lighting assemblies has always been like a bump in the road and did not seem to fit in Part II.
Panel Meeting Action: Reject
Panel Statement: Through-wall lighting assembly requirements as described in 680.23(E) do not apply to storable pools.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-150 Log #915 NEC-P17 **Final Action: Reject**
(680.23(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Branch circuit wiring on the supply side of ~~enclosures and junction~~ boxes and other enclosures connected to conduits run to wet-niche and no-niche luminaires, and the field wiring compartments of no-niche luminaires shall be installed using rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, rigid polyvinyl chloride conduit, reinforced thermosetting resin conduit, or Type MI cable. Where installed in or on buildings or structures electrical metallic tubing shall be permitted, and where installed within buildings or structures, electrical nonmetallic tubing, Type MC cable or Type AC cable shall be permitted. ~~In all cases~~ All wiring methods shall contain an insulated copper equipment grounding conductor sized in accordance with Table 250.122, but not ~~less~~ smaller than 12AWG shall be required.
Exception: For one-family dwellings, 680.21(A)(4) shall apply.
Delete present exception.
Substantiation: Enclosures (transformers) are already permitted to be supplied by LFNMC by (F)(1). LFMC is sunlight resistant (350.2) and permitted for flexibility, and protection from liquids or vapors (350.10). Type MI cable (copper or stainless steel) is permitted in wet locations, exposed to oil or gasoline, embedded in concrete, exposed to non-damaging corrosive conditions and where protected from corrosion. Bare copper grounding and bonding conductors are permitted. LTFMC is permitted for motors by 680.21(A)(3) in the same environment without length restriction; what justifies a length restriction for transformers?
Panel Meeting Action: Reject
Panel Statement: MI cable has not been identified for pool use.
The wiring methods as described in the submitter's substantiation have not been evaluated for the environment.
CMP-17 refers the submitter to Proposal 17-104 and Comment 17-84 of the last cycle.
The exception for one-family dwellings is not acceptable.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-151 Log #998 NEC-P17 **Final Action: Reject**
(680.23(F)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as the proposal does comply with the NFPA Regulations Governing Committee Projects.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Branch circuit wiring on the supply side of ~~enclosures and~~ junction boxes and other enclosures connected to conduits run to wet-niche and no-niche luminaries, and the field wiring compartments of no-niche luminaries shall be installed using rigid metal conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, rigid polyvinyl chloride conduit, or reinforced thermostat thermosetting resin conduit. Where installed in or on buildings or structures electrical metallic tubing shall be permitted, and where installed within buildings or structures electrical nonmetallic tubing, Type MI cable, Type MC cable, electrical metallic tubing or Type AC cable shall be permitted. In all cases an insulated copper equipment grounding conductor sized in accordance with Table 250.122 but not less smaller than 12 AWG shall be ~~required~~ provided within the wiring method. For a one-family dwelling the provisions of 680.2(A) shall be permitted. Delete exception.
Substantiation: Section 350.10 permits LFMC where flexibility or protection from vapors or liquids is required and does not limit the vapors or liquids to corrosive types. It may be used for direct burial. LFMC is permitted for motors per 680.21(A)(3) in the same environment. Type MI cable is resistant to damage and the sheath (copper or stainless steel) is no more susceptible to corrosion than bare copper grounding/bonding conductors that are permitted.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
See panel action and statement on Proposal 17-150.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-152 Log #1051 NEC-P17 **Final Action: Reject**
(680.23(F)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as the proposal does comply with the NFPA Regulations Governing Committee Projects.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Branch circuit wiring on the supply side of enclosures junction boxes and other enclosures connected to conduits run to wet-niche and no-niche fixtures and the field wiring compartments of dry-niche luminaires shall be installed using rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, rigid polyvinyl chloride conduit, reinforced thermosetting resin conduit, or Type MI cable. Where installed in or on buildings or structures electrical metallic tubing shall be permitted and where installed within buildings or structures, electrical nonmetallic tubing Type MC cable, electrical metallic tubing, ~~or~~ and Type AC cable shall be permitted. ~~In all cases~~ All wiring methods shall contain an insulated copper equipment grounding conductor ~~sized in accordance with table 250.122 but~~ not ~~less~~ smaller than 12 AWG.
Exception: For one-family dwellings 680.21(A)(4) shall apply.
Delete present exception.
Substantiation: LFMC should be permitted since 350.10(1) permits use for protection from liquids or vapors whether or not corrosive. It may be listed for direct burial in earth or concrete per 350.10(3) which may be corrosive. LFMC is permitted for motors per 680.21(A)(3) in a pool environment, and in the present exception for 680.23(F). Since transformers are, LFMC should be permitted for other enclosures. Requirements for grounding conductors apply. Type MI cable is resistant to damage, permitted in wet locations, underground and in concrete, and the copper or stainless steel sheath appears just as suitable as bare copper permitted for grounding and bonding conductor in the pool area.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
See panel action and statement on Proposal 17-150.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-153 Log #1450 NEC-P17 **Final Action: Reject**
(680.23(F)(1)and Exception)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action and statement on this proposal as the proposal does comply with the NFPA Regulations Governing Committee Projects.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Branch circuit wiring on the supply side of junction boxes and other enclosures connected to conduits run to wet-niche and no-niche luminaries, and the fixed wiring compartments of dry-niche luminaries, shall be installed using rigid metal conduit identified for the use, intermediate metal conduit, Type PVC conduit, Type RTRC conduit, or Type MI cable identified for the use. Where installed within or on buildings or structures electrical metallic tubing shall be permitted, and where installed within buildings or structures, Type AC cable or Type MC cable shall be permitted. All wiring methods shall contain an insulated copper equipment grounding conductor sized in accordance with Table 250.122 but not smaller than 12 AWG.
FPN: For one-family dwellings see 680.21(A)(4).
Substantiation: Rigid metal conduit should be identified for the use [344.10(B)(2)]. Type MI cable suitable for the use should be permitted: bare copper is permitted for bonding. The exception appears to limit the use of flexible nonmetallic conduit and the proposal deletes it. Reference to 680.21 removes a perceived conflict.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
See panel action and statement on Proposal 17-150.
CMP-17 believes the exception is required.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-154 Log #4657 NEC-P17 **Final Action: Accept**
(680.23(F)(1) Exception)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete the phrase "or liquidtight flexible nonmetallic conduit" and the last sentence.
Substantiation: Liquidtight flexible nonmetallic conduit is permitted by right within the rule, and therefore does not need to be covered in the exception. The length allowance in the last sentence is superfluous as well, since it only parrots the provision in Chapter 3 [356.10(5)]. These provisions add nothing to the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-155 Log #2368 NEC-P17 **Final Action: Reject**
(680.23(F)(2))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
~~**(2) Equipment Grounding.** Through-wall lighting assemblies, wet-niche, dry-niche, or no-niche luminaires shall be connected to an insulated copper equipment grounding conductor installed with the circuit conductors. The equipment grounding conductor shall be installed without joint or splice except as permitted in (F)(2)(a) and (F)(2)(b). The equipment grounding conductor shall be sized in accordance with Table 250.122 but shall not be smaller than 12 AWG.~~
~~*Exception: An equipment grounding conductor between the wiring chamber of the secondary winding of a transformer and a junction box shall be sized in accordance with the overcurrent device in this circuit.*~~
~~(a) If more than one underwater luminaire is supplied by the same branch circuit, the equipment grounding conductor, installed between the junction boxes, transformer enclosures, or other enclosures in the supply circuit to wet-niche luminaires, or between the field-wiring compartments of dry-niche luminaires, shall be permitted to be terminated on grounding terminals.~~
~~(b) If the underwater luminaire is supplied from a transformer, ground-fault circuit interrupter, clock-operated switch, or a manual snap switch that is located between the panelboard and a junction box connected to the conduit that extends directly to the underwater luminaire, the equipment grounding conductor shall be permitted to terminate on grounding terminals on the transformer, ground-fault circuit interrupter, clock-operated switch enclosure, or an outlet box used to enclose a snap switch.~~
(F)(2) Equipment Grounding.
(a) Underwater Luminaires (lighting fixtures). Underwater luminaires (lighting fixtures) shall comply with (1) or (2):
(1) The luminaire shall be connected to an insulated copper equipment grounding conductor installed with the circuit conductors. The equipment grounding conductor shall be installed without joint or splice except as permitted in (F)(2)(b) and (F)(2)(c). The equipment grounding conductor shall be sized in accordance with Table 250.122 but shall not be smaller than 12 AWG
(2) The luminaire shall be listed as not requiring grounding,
Exception: An equipment grounding conductor between the wiring chamber of the secondary winding of a transformer and a junction box shall be sized in accordance with the overcurrent device in this circuit.
(b) Multiple Underwater Luminaires. If more than one underwater luminaire (lighting fixture) is supplied by the same branch circuit, the equipment grounding conductor, installed between the junction boxes, transformer or power supply enclosures, or other enclosures in the supply circuit to wet-niche luminaires (fixtures), or between the field wiring compartments of dry-niche luminaires (fixtures) shall be permitted to be terminated on grounding terminals.
(c) Enclosure Between Junction Box and Panelboard. If the underwater luminaire (lighting fixture) is supplied from a transformer, power supply, ground-fault circuit interrupter, clock-operated switch, or a manual snap switch that is located between the panelboard and a junction box connected to the conduit that extends directly to the underwater luminaire (lighting fixture); the equipment grounding conductor shall be permitted to terminate on grounding terminals on the transformer, power supply, ground-fault circuit interrupter, clock-operated switch enclosure, or an outlet box used to enclose a snap switch.
Substantiation: Existing text mentioning through-wall lighting assemblies, wet-niche, dry-niche and no-niche luminaires was replaced by the more generic "underwater luminaires".
The option in proposed in F(2)(a)(1) reflects constructions that do not require grounding. These options are being added to the standard used for the listing of underwater luminaires, UL 676.
Headings were added to b and c with no other changes except for adding references to the power supplies used for DC rated luminaires.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
BLEWITT, T.: The proposed revisions were intended to update the Code to address new technologies, particularly plastic LED luminaires that are permanently factory sealed. These changes would help reduce confusion between installers and Inspection Authorities when dealing with advanced luminaire technologies. We are in agreement that the text of the proposal was too broad and might encompass unproven designs. More focused text and specific substantiation will be provided during the Comment phase.

17-156 Log #513 NEC-P17 **Final Action: Reject**
(680.24)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "Circuit" and "Interrupter" in the title of the Section. Add a hyphen between "circuit" and "interrupter" in (B) and (E).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-157 Log #1481 NEC-P17 **Final Action: Reject**
(680.24(A)(1))

Submitter: Tony Perdue, Tee Pee Electric Inc.
Recommendation: Revise text as follows:
~~Swimming pool~~ U.L. Listed.
Substantiation: There are several manufactures of all plastic boxes that are watertight and corrosion-resistant, but because they do not have "swimming pool" listed on box, they are not allowed.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the submitter's proposal as a listed swimming pool box is the only acceptable box for this application.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-158 Log #1507 NEC-P17 **Final Action: Reject**
(680.24(A)(1))

Submitter: Tony Perdue, Tee Pee Electric Inc.
Recommendation: Revise text to read as follows:
~~Swimming pool~~ - Approved testing laboratory.
Substantiation: There are several manufactures of plastic boxes that are watertight and corrosion-resistant, but because they do not have "swimming pool" listed on the box, they are not allowed.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-157.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-159 Log #2369 NEC-P17 **Final Action: Accept in Principle**
(680.24(A)(2))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(2) Installation. Where the luminaire operates over the "where wet contact is likely to occur" voltage limit for a Class 2 circuit as specified in Table 11(A) ~~15 volts~~, the junction box location shall comply with (A)(2)(a) and (A)(2)(b). Where the luminaire operates at a voltage less than the Class 2 limit specified above ~~15 volts or less~~, the junction box location shall be permitted to comply with (A)(2)(c).
Substantiation: The present text assumes a luminaire used on an ac supply. LED luminaires are used on dc supplies. The proposed text also reflects the original rationale for the 15 volt limit.
Panel Meeting Action: Accept in Principle
Revise 680.24(A)(2) to read as follows:
(2) Installation. Where the luminaire operates over the voltage limit for a Class 2 circuit "where wet contact is likely to occur" as specified in Chapter 9, Tables 11(A) and 11(B) ~~15 volts~~, the junction box location shall comply with (A)(2)(a) and (A)(2)(b). Where the luminaire operates at a voltage at or less than the Class 2 limit specified above ~~15 volts or less~~, the junction box location shall be permitted to comply with (A)(2)(c).
680.24(A)(2)(c) to read as follows:
(c) Flush Deck Box. If used on a lighting system operating at or less than the voltage limit for a Class 2 circuit "where wet contact is likely to occur" as specified in Chapter 9, Tables 11(A) and 11(B) ~~15 volts or less~~, a flush deck box shall be permitted if both of the following apply:
(1) An approved potting compound is used to fill the box to prevent the entrance of moisture.
(2) The flush deck box is located not less than 1.2 m (4 ft) from the inside wall of the pool.

Panel Statement: CMP-17 adds reference to Chapter 9 and adds Table 11(B) to the submitter's proposal.
Additionally, CMP-17 modifies 680.24(A)(2)(c) to revise the requirement from 15 volts to Class 2 limits; the change meets the submitter's intent.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 8 Negative: 3
Explanation of Negative:
ROCK, B.: NEMA supports this Proposal's objective to allow energy-saving luminaires that operate from supplies of other than sinusoidal alternating current but opposes the wording replacing "15 volts" and "15 volts or less" in the Panel Action based on the following:
o Readability: The Panel's revisions of the Proposal's wording results in navigation to Tables 11(A) or 11(B) but fails to indicate the required values are NOT in the tabulations but are buried in portions of Note 2 and Note 4. Multiple and ambiguous pointers could add further confusion or misdirection to wrong voltage values. Just state outright what these 4 voltage limits are: 15 volts for sinusoidal ac, 21.2 volts peak for nonsinusoidal ac, 30 volts for continuous dc, and 12.4 volts peak for dc interrupted at a rate of 10 to 200 Hz.
o Installation requirement versus Listing reference: The subject matter involves installation requirements. The preamble to Table 11(A) and Table 11(B), however, indicates "For listing purposes, …" and "As part of the listing, …". The absence of definitive wording in the revision may cause misinterpretation that the installation requirements associated with the existing 15 volt (sinusoidal ac) limit, as well as the added voltage levels for nonsinusoidal ac, continuous dc and interrupted dc, would be no longer incumbent upon the installation, only the Listed equipment.
o NEC® Style Manual 3.3.4 (top of Page 16) violation: "specified above" referring to location of text.
SCHAPP, R.: I agree with the comment on vote submitted by Mr. Yasenchak.
YASENCHAK, R.: Referencing to the Tables 11(A) and (B) could be confusing to the installer. Simply listing the voltages in this section would add clarity and not cause confusion. I do believe that DC voltages should be included in the code to allow for new products which operate using DC.

17-160 Log #4658 NEC-P17 **Final Action: Reject**
(680.24(A)(2)(a))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete all wording after "ground level, or pool deck".
Substantiation: This removes the 8-in rise requirement above the maximum water level. The submitter is responsible for the current wording of this requirement. It was intended to create a more reasonable mounting height so compliance with 680.24(C) would be more easily accomplished, and so it did until CMP 17 imposed a definition of maximum water level that is completely unrealistic during almost all conditions. Since the panel refuses to modify that definition, the only alternative is to remove the water level reference. The presumed maximum water level is now tantamount to the level of the deck. Most diving boards will not accommodate a swimming pool junction box beneath them if it is mounted 8 in. to the bottom. Remember that the domed covers require another approximately 6 in. of clearance to lift the cover and work the connections; this was the reason for the current requirement when the skimmer defined the ware level. Relief is need now just as it was when this rule was changed. What loss experience suggests otherwise?
Panel Meeting Action: Reject
Panel Statement: The ground level could be significantly lower than the maximum water level.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-161 Log #2370 NEC-P17 **Final Action: Accept**
(680.24(D))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(D) Grounding Terminals. Junction boxes, transformer <u>and power supply</u> enclosures, and ground-fault circuit-interrupter enclosures connected to a conduit that extends directly to a forming shell or mounting bracket of a no-niche luminaire shall be provided with a number of grounding terminals that shall be no fewer than one more than the number of conduit entries.
Substantiation: The present text assumes only ac low-voltage luminaires using transformers. DC rated LED luminaires require dc swimming pool power supplies. The text is revised accordingly.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-162 Log #2371 NEC-P17 **Final Action: Accept**
(680.24(E))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
(E) Strain Relief. The termination of a flexible cord of an underwater luminaire within a junction box, transformer <u>or power supply</u> enclosure, ground-fault circuit interrupter, or other enclosure shall be provided with a strain relief.
Substantiation: The present text assumes only ac low-voltage luminaires using transformers. DC rated LED luminaires require dc swimming pool power supplies. The text is revised accordingly.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-163 Log #977 NEC-P17 **Final Action: Reject**
(680.24(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise the latter part of the sentence: "...shall be connected to the equipment grounding terminal of the panelboard <u>or to the grounded metal enclosure of an individual fused switch or circuit breaker where the circuit originates.</u>
Substantiation: Edit. All branch circuits do not originate from a panelboard.
Panel Meeting Action: Reject
Panel Statement: The box is not permitted to be used as a terminal.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-164 Log #1040 NEC-P17 **Final Action: Reject**
(680.25(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:
Feeders shall be installed in rigid metal conduit, intermediate metal conduit, intermediate metal conduit, <u>liquidtight flexible nonmetallic conduit,</u> liquidtight flexible metal conduit, rigid polyvinyl chloride conduit or reinforced thermosetting resin conduit <u>or Type MI cable</u>. Electrical metallic tubing shall be permitted where installed within a building <u>or structure</u>. Aluminum conduits shall not be permitted in the pool area where <u>likely to be</u> subject to corrosion.
Delete present exception and substitute:
Exception: In the interior of dwelling units or accessory buildings associated with a dwelling unit, any identified wiring method of Chapter 3 that contains a separate equipment grounding conductor shall be permitted.
Substantiation: LTFMC is permitted for protection from liquids or vapors (unspecified types) and is permitted in 680.21(A)(3), 680.42(A)(1), and the exception for 680.23(F)(1). All feeders are not exposed to liquids or vapors and the proposed exception does not diminish safety. Present exception has a retroactive aspect and is not needed for existing approved installations that do not constitute a hazard. Type MI cable is permitted underground, embedded in masonry, in wet locations, and a copper or stainless steel sheath is no more subject to destructive corrosion than bare copper grounding and bonding conductors used in a pool area.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-150.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-165 Log #2232 NEC-P17 **Final Action: Reject**
(680.25(A))

Submitter: Michael Dempsey, Municipal Code Inspections
Recommendation: Add to wiring methods, MC cable where listed for location and contains an insulated equipment ground.
Substantiation: MC cable would make the installation of feeders in existing buildings easier, MC cable is already an acceptable wiring method for branch circuits for underwater luminaires.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-166.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-166 Log #4571 NEC-P17 **Final Action: Reject**
(680.25(A))

Submitter: Phil Simmons, Simmons Electrical Services
Recommendation: Revise text to read as follows:
(A) Wiring Methods. Feeder~~s~~ wiring methods shall be shall be identified for the environmental condition where installed and shall be in rigid metal conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, rigid polyvinyl chloride conduit, ~~or~~ reinforced thermosetting resin conduit, or Type MC cable. Electrical metallic tubing shall be permitted if ~~where~~ installed on or within a building., ~~and~~ Electrical nonmetallic tubing shall be permitted if ~~where~~ installed within a building. Aluminum conduits shall not be permitted in the pool area where subject to corrosion.
Substantiation: Type MC cable provides excellent protection from physical damage in compliance with the UL Product Safety Standard. Specific tests the cable must pass that are related to protection against physical damage include:
Impact Test
Crushing Test – All Cable
Crushing Test – Cable Marked for Direct Burial
Type MC cable must also pass a Fault Current Test and an Overload Current Test.
Ordinary Type MC cable is suitable for a dry and damp location. Type MC cable is also produced with an impervious PVC outer jacket and is suitable for installation in wet locations, for direct earth burial and for installation in poured concrete.
Obviously, wire installed in conduit or tubing is not required to pass these tests. Type MC cable is a superior wiring method and is superbly suited for installation as a feeder for panelboards used for applications covered by this section.
In addition, Type MC cable contains an insulated equipment grounding conductor that is in compliance with Section 250.122. This ensures a reliable and low impedance ground fault current return path. As a result, Type MC cable is an excellent wiring method for feeders to panelboards for swimming pool equipment.
Section 3.3.4 of the NEC Style Manual states that "where" should not be used to mean "when" or "if." This proposal intends to use the word "if" where appropriate.
Panel Meeting Action: Reject
Panel Statement: The use of Type MC cable is not permitted as per 330.12.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
BLEWITT, T.: The UL Standard For Metal-Clad Cables, UL 1569, does permit metal-clad cables that are wet rated and have an overall PVC jacket to be marked "Suitable for use in swimming pool motor circuits."

17-167 Log #301 NEC-P17 **Final Action: Reject**
(680.25(A)(1))

Submitter: John W. Sheesley, Pinellas County Building Department
Recommendation: Add a new Section as follows:
680.25(A)(1) One-Family Dwellings. In the interior of dwelling units, or in the interior of accessory buildings associated with dwelling units, any of the wiring methods recognized in Chapter 3 of this code that comply with provisions of this section shall be permitted. Where run in cable assembly, the equipment grounding conductor shall be permitted to be uninsulated, but shall be enclosed within the outer sheath of the cable assembly.
Substantiation: This change would clarify the conflict in the code between wiring methods for feeders and branch circuits and follow the same wording and guidelines in 680.21(A)(4). Code-Making Panel 17, on previous occasions, has recognized one-family dwellings as a low risk area in their substantiation on submitted recommendations to Article 680.
Panel Meeting Action: Reject
Panel Statement: The proposal effectively permits interior building wiring but does not consider the corrosive effects of pool surroundings.
CMP-17 disagrees with the submitter's substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
SCHAPP, R.: The proposal should have been accepted. I agree with submitters substantiation. This will clear up confusion with 680.21(A)(4). The proposal states that only wiring methods that comply with the provisions of this section shall be permitted.

17-168 Log #4659 NEC-P17 **Final Action: Accept**
(680.25(B)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change "Table 250.66" to "250.30(A)(8)".
Substantiation: Although Table 250.66 will still be the usual reference, the technically correct citation is included in the proposal, because there are instances where the required size will exceed that given in Table 250.66.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-169 Log #156 NEC-P17 **Final Action: Reject**
(680.26)

Submitter: David Barrett, AAABAR Swimming Pools, Inc.
Recommendation: Does not work for pools.
Substantiation: This is not for swimming pools. It does nothing for pools, but add more cost on owner, taxes, and pool builder. Please remove this code from pools.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
CMP-17 does not agree with the submitter's proposal; it does apply to pools.
The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-170 Log #709 NEC-P17 **Final Action: Reject**
(680.26)

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Revise text to read as follows:
680.26 Equipotential ~~Bonding~~ Plane.
(A) Performance. The equipotential ~~bonding~~ plane required by this section shall be installed to reduce voltage gradients in the pool area.
(B)(2) Perimeter Surfaces. The perimeter surface shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces as well as poured concrete and other types of paving. Bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a) or (2)(b) and shall be attached to the pool reinforcing steel or copper conductor grid at a minimum of four (4) points uniformly spaced around the perimeter of the pool. For nonconductive pool shells, bonding at four points shall not be required.
(a) Conductive Structural Reinforcing Steel. Structural reinforcing steel installed in concrete walkways that extends a minimum of 1 m (3 ft) shall be bonded in accordance with 680.26(B)(1)(a).
(b) Alternate Means. Where ~~structural reinforcing steel is not available or is encapsulated in a nonconductive compound~~ a concrete 1 m (3 ft) concrete walkway containing conductive reinforcing steel is not installed, a copper conductor(s) shall be utilized where the following requirements are met:
(1) At least one minimum 8 AWG bare solid copper conductor shall be provided.
(2) The conductors shall follow the contour of the perimeter surface.
(3) Only listed splices shall be permitted.
(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.
(5) The required conductor shall be secured within or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below the subgrade.
Substantiation: Equipotential Plane is a term used in s 547 and 682 and has a definition. The use of a definable term allows for a more consistent enforcement of the NEC by the AHJ. These changes will eliminate current confusion about code enforcement or the equipotential bonding of the perimeter surfaces when a concrete walkway installed around a pool does not extend out to the horizontally required 3 ft.
Currently, the NEC does not include language as to whether the bonded structural reinforcing in the concrete can be used to extend the bonding to the unpaved portion when the concrete does not extend out horizontally 3 ft from the inside walls of the pool and this is requiring the AHJ to make an interpretation on whether the intent of 680.26(A) is complied with.
It could be debated that since the concrete only extends 2 ft and not the entire 3 ft of the required parameter surface, the structural reinforcing could not be used since the language in 680.26(B)(2) states that the parameter shall extend 3 ft from the inside walls of the pool and shall include unpaved as well as poured concrete and other types of paving and bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a) or (2)(b). The word OR gives an option depending on the construction method, but does not require that both have to be met.

680.26(B)(2)(b) is only applicable as an alternative method if structural reinforcing is not available. Structural reinforcing is available for the concrete 680.26(B)(2)(a), but this only extends 2 ft out from the pool. So now we have 12 in. of the 3-foot required parameter surface area of 680.26(B)(2) that does not have structural reinforcing. The AHJ will have to decide, is it the intent of 680.26(B)(2) to identify the 1 ft of unpaved surface area without steel reinforcement to require a bare #8 solid copper conductor buried below the concrete slab so that the equipotential bonding grid is extended out the additional 12 in. to cover the entire required area of 3 ft?

If structural reinforcing steel was not installed in the 2 ft area of concrete, 680.26(B)(2)(b) would be allowed to be the equipotential bonding grid for both the paved and unpaved surface simultaneously, and 680.26(B)(2)(b)(5) would allow it to be installed in or under the parameter surface. Therefore, a single #8 solid copper conductor installed within the 2-ft concrete walkway or under the 2-ft concrete walkway between 18 and 24 in. from the inside wall of the pool would meet the requirements of 680.26(B)(2).

Therefore, the AHJ will have to decide if the structural reinforcing embedded in the 2 ft of concrete walkway is equal to or better then a #8 solid copper conductor installed in or under the concrete as allowed by 680.26(B)(2)(b)(5). 680.26(B)(2)(a) has no prescriptive requirements for the structural steel, but 680.26(B)(2)(b) has very prescriptive requirements when structural steel is considered not available.

Panel Meeting Action: Reject

Panel Statement: The code does not require a 3 ft concrete walkway. The perimeter of the pool is not required to be concrete or paved.

Should the structural reinforced concrete material extend less than 3 ft of the required perimeter, an alternate means is provided in 680.26(B)(2)(b).

The use of the word "plane" is incorrect; equipotential bonding in Article 680 includes more than just the ground.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

Comment on Affirmative:

BLEWITT, T.: We agree the Panel Statement adequately addresses the Submitter's concerns. We believe for others to best benefit from this interpretation that its content should have been included in the text of Section 680.26.

17-171 Log #3917 NEC-P17 **Final Action: Reject**
(680.26(B)(1)(a))

Submitter: James Grant, Rochester, NH

Recommendation: Revise text as follows:

(a) Structural Reinforcing Steel <u>and Welded Wire Mesh</u>. Unencapsulated ~~structural~~ reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where ~~structural~~ reinforcing steel is encapsulated in a nonconductive compound, a copper conductor grid shall be installed in accordance with 680.26(B)(1)(b).

Substantiation: To clarify that welded wire mesh can be used and not that it "could be" included in the term "structural reinforcing steel" where acceptable to the authority having jurisdiction.

Panel Meeting Action: Reject

Panel Statement: Welded wire mesh embedded in concrete that meets the requirements for structural reinforcing steel as permitted by the building code is permitted.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-172 Log #2871 NEC-P17 **Final Action: Accept in Principle**
(680.26(B)(1)(b))

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

680.26 Equipotential Bonding.

(B) Bonded Parts. (1) Conductive Pool Shells. Bonding to conductive pool shells shall be provided as specified in 680.26(B)(1)(a) or (B)(1)(b). Poured concrete, pneumatically applied or sprayed concrete and concrete block with painted or plastered coatings shall all be considered conductive materials due to water permeability and porosity. Vinyl liners and fiberglass composite shells shall be considered to be nonconductive materials.

(a) Structural Reinforcing Steel. Unencapsulated structural reinforcing steel shall be bonded together by steel tie wires or the equivalent. Where structural reinforcing steel is encapsulated in a nonconductive compound, a copper conductor grid shall be installed in accordance with 680.26(B)(1)(b).

(b) Copper Conductor Grid. A copper conductor grid shall be provided and shall comply with (b)(1) through (b)(4).

(1) Be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing. <u>The bonding conductor shall be by exothermic welding, approved lugs, approved pressure connectors, approved clamps, or other approved means. Connections depending on solder shall not be used. Lugs, connectors or clamps shall be approved for the bonding electrode conductor material and shall be approved for direct soil burial or concrete encasement.</u>

Substantiation: At the present time there is no method provided for bonding conductors being bonded to each other "at all points of crossing." Also, there is no detail how the connections shall be made by the installer and being acceptable for the inspector. This change would provide a method for connections and what type of identified devices being acceptable for maintaining the continuity of the system. I do not believe the intent was to allow steel tie wires as an acceptable method of connecting bonding conductors.

Panel Meeting Action: Accept in Principle

Revise 680.26(B)(1)(b)(1) to read as follows:

(1) Be constructed of minimum 8 AWG bare solid copper conductors bonded to each other at all points of crossing. <u>The bonding shall be in accordance with 250.8 or other approved means.</u>

Panel Statement: CMP-17 edits the text for simplicity and clarity. The change meets the submitter's intent.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-173 Log #804 NEC-P17 **Final Action: Accept in Part**
(680.26(B)(1)(b)(2))

Submitter: Wayne Robinson, Lothian, MD

Recommendation: Revise text to read as follows:

680.26(B)(1)(b)(2) Conform to the contour of the pool ~~and the pool deck~~ <u>and the perimeter surfaces outlined in 680.26(B)(2).</u>

Substantiation: 680.26(B)(1)(b)(2) conflicts with 680.26(B)(2) perimeter surfaces. The installation of perimeter surfaces is outlined in 680.26(B)(2). Perimeter surfaces shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool, not to the contour of the pool deck.

Panel Meeting Action: Accept in Part

680.26(B(1)(b)(2) to read as follows:

(2) Conform to the contour of the pool.

Panel Statement: CMP-17 accepts removal of "and the pool deck."

CMP-17 does not accept the submitter's proposed new text.

The perimeter is covered in 680.26(B)(2).

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-174 Log #3741 NEC-P17 **Final Action: Accept in Principle**
(680.26(B)(1)(b)(2))

Submitter: Mike Weaver, C&M Enterprises

Recommendation: Revise text as follows:

(2) Conform to the contour of the pool ~~and the pool deck~~

Substantiation: Updated language (in the current format) for 680.26 reflects the best language to date for Code users to apply the minimum requirements for equipotential bonding necessary for permanently installed pools. Clear requirements are now detailed specifically for the conductive pool shell as well as the perimeter surfaces. Within 680.26(B)(1)(b) list item (2), the reader is instructed that the copper conductor grid (when installed) shall conform not only to the contour of the pool but also to the contour of the pool deck. No language currently exists for how far that grid is extended from the pool shell into the deck area. This leaves readers to question as to whether the grid should extend to the far reaches of the pool deck, (which could be 40 feet, deck size dependant more or less) when equipotential bonding for pool deck surfaces have never been required to extend beyond 3 feet from the inside wall of the pool in previous Code cycles. With clearly defined requirements for pool perimeter surfaces detailed within 680.26(B)(2), extending the grid into the perimeter deck areas is redundant and conflicting with 680.26(B)(2). It is additionally confusing when no dimensional requirements have been provided for extending the grid into the pool deck. The final litmus test for substantiation is that deletion of the last four words in list item (2) of 680.26(B)(1)(b) result in no changes to the equipotential bonding requirements of 680.26.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 17-173.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-175 Log #806 NEC-P17 **Final Action: Accept in Principle**
(680.26(B)(2))

TCC Action: The Technical Correlating Correlating directs that the action on this proposal be rewritten to comply with NEC Style Manual 3.1.1 regarding mandatory text "...will require...".

This action will be considered by the panel as a public comment.

Submitter: Wayne Robinson, Lothian, MD

Recommendation: Revise text to read as follows:

680.26(B)(2) Perimeter Surfaces. The perimeter surface shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces as well as poured concrete surfaces and other types of paving. Perimeter surfaces less than 1 m (3 ft) separated by a permanent wall or building 10 ft in height or more will require an equipotential bonding grid on the pool side of the permanent wall or building.

Substantiation: New text eliminates the need for additional equipotential bonding, when the pool is separated by a wall or building that is less than 1 m (3 ft) from the inside wall of the pool.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

680.26(B)(2) Perimeter Surfaces. The perimeter surface shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces as well as poured concrete surfaces and other types of paving. Perimeter surfaces less than 1 m (3 ft) separated by a permanent wall or building 1.5 m (5 ft) in height or more will require an equipotential bonding grid on the pool side of the permanent wall or building.

Panel Statement: CMP-17 believes the proposed 10 ft height requirement is not substantiated.

CMP-17 chooses to correlate the wall height with the 5 ft reach requirement of 680.12.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-176 Log #4775 NEC-P17 **Final Action: Reject**
(680.26(B)(2))

Submitter: Jeff Fitzloff, State of Idaho Division of Building Safety

Recommendation: Revise text to read as follows:

(2) Perimeter Surfaces. The perimeter surface shall extend for 1 m (3 ft) horizontally beyond the inside walls of the pool and shall include unpaved surfaces with direct contact to the earth as well as poured concrete and other types of paving. Bonding to perimeter surfaces shall be provided as specified in 680.26(B)(2)(a) or (2)(b) and shall be attached to the pool reinforcing steel or copper conductor grid at a minimum of four (4) points uniformly spaced around the perimeter of the pool. For nonconductive pool shells, bonding at four points shall not be required.

Substantiation: I have seen no documentation that wooden decks with hot tubs on the pools that are partially below grade and have a raised plastic catwalk around them are susceptible to voltages from the earth. It is very hard to defend a copper grid around these installations that are not at risk.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided adequate technical substantiation.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-177 Log #3084 NEC-P17 **Final Action: Reject**
(680.26(B)(2)(a))

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

(2) Text to remain unchanged.

(a) Structural Reinforcing Steel. Structural reinforcing steel arranged in a 450-mm (18-in.) by 450-mm (18-in.) grid shall be bonded in accordance with 680.26(B)(1)(a).

(b) Text to remain unchanged.

Substantiation: This proposal is simply intended to provide uniform enforcement of this provision. Without having a prescriptive requirement, inspectors and installers do not know how to install/inspect to this requirement.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided adequate technical substantiation.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-178 Log #3916 NEC-P17 **Final Action: Reject**
(680.26(B)(2)(a))

Submitter: James Grant, Rochester, NH

Recommendation: Revise text as follows:

(a) Structural Reinforcing Steel and Welded Wire Mesh. ~~Structural~~ Reinforcing steel shall be bonded in accordance with 680.26(B)(1)(a).

Substantiation: To clarify that welded wire mesh can be used and not that it "could be" included in the term "structural reinforcing steel" where acceptable to the authority having jurisdiction.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 17-171.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-179 Log #805 NEC-P17 **Final Action: Reject**
(680.26(B)(2)(b))

Submitter: Wayne Robinson, Lothian, MD

Recommendation: Revise text to read as follows:

680.26(B)(2)(b). Where structural reinforcing steel is not available or is encapsulated in a nonconductive compound, a copper ~~conductor(s)~~ grid shall be utilized where the following requirements are met: (1) ~~At least one minimum 8 AWG bare solid copper conductor shall be provided~~ Copper Conductor Grid. A copper conductor grid shall be utilized and shall comply with (b)(1) through (b)(5). (2) ~~The conductors shall follow the contour of the perimeter surface~~. The copper grid shall follow the contour of the perimeter surface extending 1 m (3ft) horizontally beyond the inside walls of the pool. ~~(3) Only listed splices shall be permitted.~~ (3) Only listed splices shall be permitted ~~(4) The required conductor shall be 450 to 600 mm (18 to 24 in.) from the inside walls of the pool.~~ (4) The copper grid shall be constructed of 8 AWG bare copper and be arranged in accordance with 690.26(B)(1)(b)(3). ~~(5) The required conductor shall be secured within or under the perimeter surface 100 mm to 150 mm (4 in. to 6 in.) below the subgrade.~~ (5) The copper grid shall be secured within or under the deck or unpaved surfaces no more than 150 mm (4 in. to 6 in.) from the underside of the deck.

Substantiation: Test data from NEETRAC refutes a single copper conductor application for decks, pavers, unpaved surfaces and supports an equipotential plane or copper grid system, as originally outlined in the 2005 Edition of the NEC. NEETRAC Test data reveals a 70 percent to 90 percent increase in step voltages, when comparing a single conductor installation over a copper grid system.

Note: Supporting Material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: CMP-17 does not accept the submitter's substantiation.

The present alternate means of perimeter bonding was not demonstrated to be unsafe.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-180 Log #2372 NEC-P17 **Final Action: Reject**
(680.26(B)(4))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.

Recommendation: Revise text to read as follows:

(4) Underwater Lighting. All metal forming shells and mounting brackets of no-niche luminaires shall be bonded.

Exception: Listed ~~low-voltage~~ lighting systems ~~with nonmetallic forming shells shall~~ that do not require bonding.

Substantiation: Some newer no-niche LED luminaires are such that the cord to the luminaire is not exposed to the pool water. Bonding of a mounting bracket may not be necessary. These designs can be listed under the updated requirements being proposed for UL 676.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided adequate technical substantiation.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

BLEWITT, T.: The proposed revisions were intended to update the Code to address new technologies, particularly plastic LED luminaires that are permanently factory sealed. These changes would help reduce confusion between installers and Inspection Authorities when dealing with advanced luminaire technologies. We are in agreement that the text of the proposal was too broad and might encompass unproven designs. More focused text and specific substantiation will be provided during the Comment phase.

17-181 Log #2350 NEC-P17 **Final Action: Reject**
(680.26(B)(5))

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text to read as follows:
All metal fittings within ~~or~~ attached or hinged to the pool structure shall be bonded.
Substantiation: The hinged metallic ladder was resting on an extension cord and the hinged connection to the pool structure could leave a potential difference between the ladder and the pool structure's handrails.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-182 Log #885 NEC-P17 **Final Action: Reject**
(680.26(B)(6)(a))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete.
Substantiation: Since 680.6(3), 680.21(A), and 680.62(D)(1) do not appear to exempt double-insulated pump motors from grounding, the bonding conductor should not be limited for use with a replacement motor which may or may not be double insulated.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.
Bonding and grounding provide two different purposes.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-183 Log #996 NEC-P17 **Final Action: Reject**
(680.26(B)(7))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Metal covered ~~sheathed~~ cables and metal raceways, metal piping, and all fixed metal parts shall be bonded and grounded.
Exception No. 1: Those not associated with the pool and separated by a permanent fixed barrier that prevents contact by persons in the pools hall not be required to be bonded.
Exception No. 2: Those not associated with the pool and ~~greater~~ more than 1.5 m (5 ft) horizontally outside of the pool shall not be required to comply with the bonding required by this section...~~be bonded~~.
Substantiation: Horizontal separation should be outside the pool and the barrier should be one that prevents contact by persons in the pool. Exception No. 2 should be limited to bonding required by this section; other bonding requirements in the Code may apply.
Panel Meeting Action: Reject
Panel Statement: The proposed text adds no clarity to the code. This adds additional requirements with no technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-184 Log #1708 NEC-P17 **Final Action: Accept in Principle**
(680.26(B)(7))

Submitter: David Barnhart, City of Portland
Recommendation: Revise text to read as follows:
Fixed Metal Parts, Wiring Methods and Equipment. Metal sheathed cables and raceways, metal piping and all fixed metal parts shall be bonded.
Substantiation: The heading for 680.26(B)(7) leads one to believe that it only covers installations that are part of "Wiring Methods and Equipment". This makes it difficult to include metal fences, awnings, door frames, etc. as referenced in the 2008 NEC Handbook.
Panel Meeting Action: Accept in Principle
Revise 680.26(B)(7) to read as follows:
(7) Fixed Metal Parts. All fixed metal parts shall be bonded, including, but not limited to, metal sheathed cables and raceways, metal piping, metal awnings, metal fences, and metal door and window frames.
Exceptions to be retained.
Panel Statement: CMP-17 edits the submitter's text to ensure that all fixed metal parts (e.g., electrical equipment, fences, lamp posts) are included.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-185 Log #3659 NEC-P17 **Final Action: Accept in Principle**
(680.26(B)(7) and (8) (New))

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
(7) Metal Wiring Methods and Electrical Equipment. Metal-sheathed cables and raceways, metal piping, and all fixed metal parts of the electrical system shall be bonded.
(8) Other Metal Parts. All other fixed metal parts shall be bonded.
Move the exceptions to after (8) and title them to apply to both items (7) and (8).
Substantiation: The current wording is not clear that this rule is intended to cover more than just electrical parts. Breaking the rule up into two sections will make it clear that both metal parts of non electrical equipment as well as the metal parts of the electrical equipment must be bonded.
Panel Meeting Action: Accept in Principle
Panel Statement: See action and statement on Proposal 17-184.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-186 Log #2541 NEC-P17 **Final Action: Reject**
(680.26(B)(7) Exception No. 2)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text as follows:
Those greater than 1.5 m (5 ft) horizontally of the inside walls of the pool or electrical equipment location(s) shall not be required to be bonded.
Substantiation: When a metallic receptacle box is used with a cord attachment plug. When it is unplugged there is no connection between the bonding grid and the equipment grounding system of the premises. A possible potential difference between the arms or a person can be available.
Panel Meeting Action: Reject
Panel Statement: Acceptance would not improve the clarity of the code.
The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-187 Log #4319 NEC-P17 **Final Action: Reject**
(680.26(C))

Submitter: Ray Cronise, PGN
Recommendation: Delete the following text:
~~(C) Pool Water. An intentional bond of a minimum conductive surface area of 5806 mm2 (9 in.2) shall be installed in contact with the pool water. This bond shall be permitted to consist of parts that are required to be bonded in 680.26(B).~~
Substantiation: When conductive vs. non conductive shell language was introduced via TIA 05-2 to correct for an unintended consequence of requiring a 12 x 12 bonding grid under pool shells that could not be bonded (vinyl lined and fiberglass), it was done so to point out that a steel reinforced concrete pool shell can act as a ground to conduct stray voltage into the water. If the deck is at a different potential this would allow the person to experience a shock. This has been seen and especially in regions where ground conditions are seasonally wet or dry. The fact remains that an insulated shell, like fiberglass, with no light, no handrail in the water and no other source of conductor CANNOT transmit these stray currents through the ¼-1/2 e-glass reinforced composite material.
The only source of the stray voltage can be the deck acting as a ground plane. If it is bonded to the equipment pad as called out in 680.26(b) then all of these components are at the same potential. In this case, the water is simple sitting in a nonconductive shell.
Further, the introduction of a 9 in2 metal actually creates a PATH for stray current to enter the water. Since water today with higher TDS can be more conductive (salt systems, etc…) this, with complex and difficult to calculate field lines of electricity could actually introduce a problem where none existed before.
As well Panel 17 17-122 Log#1894 voted:
Panel Meeting Action: Reject
Ballot Results: Affirmative: 10 Negative: 1
The submitter has not provided adequate substantiation.
There are issues such as conductivity of water, changes with water temperature, current flow, size of conductors, etc. that need to be addressed.
Later in The ROC, by accepting 17-98, this language was once again placed back into the code. "Bonding water" in principle would be a very complex task to undertake since there are many paths stray voltage/current can take. Arbitrarily introducing a metal bonding element into the water, where none existed before creates an unevenly distributed electric field in the water. The vast majorities of the issues found in the field are introduced by potential differences between the water (introduced by lights, handrails, and other submerged metal shell penetrations), and a deck which does not have adequate bonding (no steel or wire mesh), but can act as a ground plane when wet. When the deck is properly bonded, the problem goes away. When no light, handrail, or other metal is in the pool and the deck is bonded to the equipment pad, the problem goes away. Introducing some sort of sacrificial anode of arbitrary size at an arbitrary location into the pool water is not going to solve this problem and it CAN exacerbate the issue to a problem where none existed.
Panel Meeting Action: Reject
Panel Statement: Not all non-conductive pools are electrically isolated.
CMP-17 disagrees with the removal of this requirement as it would result in a reduction of safety.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:
WEST, L.: I agree with the Submitter's Substantiation, and believe that by Bonding the Water in an insulated Pool, you are Increasing the risk rather than Decreasing the risk. Also, the study associated with the Action is not scientifically supportable.

17-188 Log #4660 NEC-P17 **Final Action: Reject**
(680.26(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Revise to read as follows:
(C) Pool Water. Pool water shall have an electrical connection to one or more of the bonded parts described in 680.26(B). Where none of the bonded parts is in direct connection with the pool water, the pool water shall be in direct contact with an approved corrosion-resistant conductive surface that exposes not less than 5800 mm2 (9 in.2) of surface area to the pool water at all times. The conductive surface shall be located where it is not exposed to physical damage or dislodgement during usual pool activities, and it shall be bonded in accordance with 680.26(B).
Substantiation: This wording avoids the word "bond" entirely, which for water is close enough to the Article 100 definition to merit inclusion in 680.26, but which most installers have problems visualizing with repect to a liquid. In addition, it includes enforceable requirements for protection and corrosion resistance of the added surface. The standard of product acceptance chosen here is "approved". Although this should eventually probably be "listed", such a standard may be premature at this time. In addition, one of the better ways to achieve this connection is through the installation of a short, bonded nipple in the drain piping comprised of stainless steel or brass (depending in part on the pool chemicals intended to be used). This nipple functions as a current collector and does not require any penetrations of the pool wall, but would not be generally listed for this purpose. This wording also uses a hard metric conversion; the use of the soft conversion now in the NEC is plainly at odds with 90.9(C) and should be discontinued.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation has been provided to make this change.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-189 Log #514 NEC-P17 **Final Action: Reject**
(680.27(B)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "circuit" and "interrupter".
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-190 Log #515 NEC-P17 **Final Action: Reject**
(680.31)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Insert a hyphen between "circuit" and "interrupter" in the third paragraph.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-191 Log #3686 NEC-P17 **Final Action: Reject**
(680.31)

Submitter: Gary L. Lawson, General Foam Plastics Corp.
Recommendation: Delete this part of the requirement:
~~Cord Connected pool filter pumps shall be provided with a ground-fault circuit-interrupter that is an integral part of the attachment plug or located in the power supply cord within 300 mm (12 in.) of the attachment plug.~~
Substantiation: 680.32 addresses the GFCI requirement by requiring a GFCI protected circuit. Having an integral GFCI in the power cord and then requiring it to be plugged into a GFCI protected receptacle is not adding any safety benefit. UL 1081 for Storable Pool Pumps does not require a integral GFCI in the power cord.
See the safety information I have provided.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Often, a permit may not be required for the installation of a storable pool; a GFCI receptacle may not be available for such an installation.
CMP-17 disagrees with the removal of this requirement as it would result in a reduction of safety.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
HIRSCH, B.: It is the Edison Electric Institute's position that the requirements for end-use electrical devices that are not installed as part of the permanent premises wiring system are best covered by the appropriate product standards. It is not the National Electrical Code's intent or scope to set requirements for end use electrical devices that would typically be purchased by the aftermarket consumer.
The Edison Electric Institute supports the entire electrical safety system that integrates product standards, installation standards, product testing and evaluation, electrical inspection, manufacturer's products, qualified electrical installation and maintenance, electric supply system characteristics, and the owner's use and operation. Covering product standards in the National Electrical Code installation standard could negate the responsibility of the appropriate product standard and adversely impact the entire process.
The integrity of the electrical safety system is anchored in the systematic integration of the National Electrical Code, installation inspection, product safety standard and product testing. If non-premises end-use product safety issues are usurped by the National Electrical Code, the product safety standard process will be weakened resulting in the entire process being weakened. In addition since non-premises, end-use products are not normally in place during the inspection process, enforcement of such requirements under the NEC would be impossible.
Comment on Affirmative:
BLEWITT, T.: We disagree with the Submitter's comment that UL 1081 does not require a GFCI in the power cord of a pump for storable swimming pools. This construction requirement was proposed to be added to UL 1081. This requirement has been adopted and will be published in the next set of revisions.

17-192 Log #516 NEC-P17 **Final Action: Reject**
(680.32)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in the first paragraph. Add a hyphen between "circuit" and "interrupter" in the second paragraph.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-193 Log #2453 NEC-P17 **Final Action: Reject**
(680.32)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
680.32 ~~Ground-Fault Circuit-Interrupters~~ Power Safe Protectors Required.
All electrical equipment, including power-supply cords, used with storable pools shall be protected by ~~ground-fault circuit-interrupters~~ power safe protectors.
All 125-volt receptacles located within 6.0 m (20 ft) of the inside walls of a storable pool shall be protected by ~~ground-fault circuit-interrupter~~ power safe protector. In determining these dimensions, the distance to be measured shall be the shortest path the supply cord of an appliance connected to the receptacle would follow without piercing a floor, wall, ceiling, doorway with hinged or sliding door, window opening, or other effective permanent barrier.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.

Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 17-30.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-194 Log #4661 NEC-P17 **Final Action: Accept**

(680.32)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Revise the first sentence of the second paragraph to read: "All 125-volt, 15- and 20-ampere receptacles located within 6.0 m (20 ft)...". (remainder unchanged).

Substantiation: This section needs an amperage parameter comparable to 680.22(A)(4).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-195 Log #2373 NEC-P17 **Final Action: Accept in Part**

(680.33(A))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.

Recommendation: Revise text to read as follows:

680.33 Luminaires. An underwater luminaire, if installed, shall be installed in or on the wall of the storable pool. It shall comply with either 680.33(A) or (B).

(A) **Units connected to isolated supplies** ~~**15 Volts or Less.**~~ A luminaire shall be part of a cord-and-plug-connected lighting assembly. This assembly shall be listed as ~~an assembly for the purpose~~ a luminaire for storable pools and have the following construction features:

~~(1) No exposed metal parts~~

~~(2) A luminaire lamp that operates at 15 volts or less~~ (1) A luminaire lamp that operates at a voltage not exceeding the Class 2 voltage limits "where wet contact is likely to occur" as specified in Table II(A).

~~(3) An impact-resistant polymeric lens, luminaire body, and transformer enclosure~~

~~(4)~~ (2)A transformer or power supply meeting the requirements of 680.23(A)(2) with a primary rating not over 150 volts

Substantiation: The phrase "listed as an assembly for the purpose" is vague and difficult to enforce. It is proposed to be changed to be more specific.

Existing text assumes the luminaire is connected to a 60Hz AC source. LED luminaires require DC sources. A reference to "power supplies" is therefore necessary. The existing 15 volt voltage limit is to address the risk of electric shock during relamping with the luminaire inadvertently left on. A specific voltage limit is not needed. A reference to Table II(A) will allow the voltage limits to evolve with updates to the Class 2 voltage limits. The features specified in Items 1 and 3 reflect the design of the first luminaire of this type. These features are not necessary in all designs to be listed. The only key construction feature is the special isolation needed for the transformer or power supply.

Panel Meeting Action: Accept in Part

Revise 680.33(A)(4) to read as follows:

(4) A transformer or power supply meeting the requirements of 680.23(A)(2) with a primary rating not over 150 volts

Panel Statement: CMP-17 accepts "or power supply" in 680.33(A)(4).

CMP-17 does not accept the remainder of the submitter's proposal.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-196 Log #2374 NEC-P17 **Final Action: Accept in Part**

(680.33(A))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.

Recommendation: Revise text to read as follows:

(B) **Units not powered by an isolated source** ~~**Over 15 Volts But Not over 150 Volts.**~~ A lighting assembly without a transformer or power supply and with the luminaire lamp(s) operating at not over 150 volts shall be permitted to be cord-and-plug-connected where the assembly is listed as ~~an assembly for the purpose~~ a luminaire for storable pools. The installation shall comply with 680.23(A)(5), and the assembly shall have the following construction features:

~~(1) No exposed metal parts~~

~~(2) An impact-resistant polymeric lens and luminaire body~~

(1) ~~(3)~~ A ground-fault circuit interrupter with open neutral conductor protection as an integral part of the assembly

(2) ~~(4)~~ The luminaire lamp permanently connected to the ground-fault circuit interrupter with open-neutral protection

(3) ~~(5)~~ Compliance with the requirements of 680.23(A)

Substantiation: The phrase "listed as an assembly for the purpose" is vague and difficult to enforce. It is proposed to be changed to be more specific. The reference to voltage in the **(B)** heading is not necessary, the maximum 150 volt limit is specified in the first sentence. The luminaire is either powered by a "swimming pool" isolated source or it is not. The 15 volt limit is not needed. The requirements should be used at any voltage if the luminaire assembly is not covered by 680.33(A).

The features specified in Items 1 and 2 reflect the design of the first luminaire of this type. These features are not necessary in all designs to be listed. The only key construction features are those in existing Items 3, 4 and 5 (now 1, 2 and 3).

Panel Meeting Action: Accept in Part

Revise 680.33(B) to read as follows:

(B) Over 15 Volts But Not over 150 Volts. A lighting assembly without a transformer or power supply and with the luminaire lamp(s) operating at not over 150 volts shall be permitted to be cord-and-plug-connected where the assembly is listed as an assembly for the purpose. The installation shall comply with 680.23(A)(5), and the assembly shall have the following construction features:

Panel Statement: CMP-17 notes the submitter's incorrect reference; it should be 680.33(B).

CMP-17 accepts "or power supply" in 680.33(B).

CMP-17 does not accept the remainder of the submitter's proposal.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-197 Log #517 NEC-P17 **Final Action: Reject**

(680.33(B))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Add a hyphen between "circuit" and "interrupter" in (3) and (4).

Substantiation: The addition of the hyphen will provide consistency throughout the Code.

Additional proposals are being submitted to make similar corrections throughout the Code.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 17-29.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-198 Log #2229 NEC-P17 **Final Action: Reject**

(680.34)

Submitter: Michael Dempsey, Municipal Code Inspections

Recommendation: Revise text to read as follows:

Receptacles shall not be located less than 10 ft from the inside walls of a pool.

Substantiation: The change to 6 ft in the 2008 NEC, increases electrical hazards around the pool. Under the 2008 NEC, a radio with a 6 ft cord would be able to be at the edge of the pool, allowing somebody in the pool to come in contact with an electrical appliance, the change to 6 ft does not comply with 90.1.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 17-119.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-199 Log #4662 NEC-P17 **Final Action: Reject**

(680.34)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Add the following sentence: "The installation directions for storable pools shall include a prominent mention of this requirement, written in terms of the locations that are acceptable for pool placements as a consequence of its provisions."

Substantiation: No one installs a receptacle for a storable pool, or certainly only very rarely. Storable pools are appliances, and untrained persons take them home from the store and set them up, taking care to find level ground and deciding which plot of grass will be killed this summer. The proximity of a receptacle in terms of the Code requirements is never considered, and no electrical permits and inspections enforce these rules as a practical matter. This proposal does all that the NEC can do, namely, mandate a clearly worded instruction to the end user, and then we hope for the best. Without this proposal, compliance with this rule will be strictly accidental as a practical matter.

Panel Meeting Action: Reject

Panel Statement: The proposed text is not enforceable.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-200 Log #4710 NEC-P17 **Final Action: Reject**
(680.42)

Submitter: Robert P. McGann, City of Cambridge
Recommendation: Revise text as follows:
A spa or hot tub installed outdoors shall comply with the provisions of Part I and II of this article, except where voltage gradients cannot be encountered and as permitted in 680.42(A) and (B)
Substantiation: Clarity is needed that 680.26(B)(2) need not apply when the tub is sitting on a wooden deck over 6 ft above grade.
Panel Meeting Action: Reject
Panel Statement: The proposed text is not enforceable.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
WEST, L.: I agree with the Submitter's Substantiation, and believe that a Wood Deck above grade does not need to be Bonded when a Spa is sitting on that Deck. Also, Reference 17-203.

17-201 Log #3919 NEC-P17 **Final Action: Reject**
(680.42(A)(1))

Submitter: Michael R. Fisher, Bluhm Electric Inc.
Recommendation: Revise text as follows:
(1) Flexible Conduit. Liquidtight flexible metal conduit or liquidtight nonmetallic conduit shall be permitted. ~~in lengths of not more than 1.8 m (6 ft).~~
Substantiation: Liquidtight metal conduit and nonmetallic conduit uses are permitted for protection from liquids and flexibility. It is approved for feeders to swimming pools. When installing a Spa or Hot Tub, it does not allow the use of more than 1.8 m (6 ft) of liquidtight metal conduit which requires the conduit to the Spa or Hot Tub. Which requires a fitting to attach to the sealtight to the conduit, a point that can become separated creating a possible hazard. The uses of Liquidtight metal conduit would create a safer installation if one length was used. We have to pull a ground wire in the liquidtight as per code anyway.
Panel Meeting Action: Reject
Panel Statement: CMP-17 rejects the proposal as the use of unspecified lengths of LFNC may cause significant problems and damage.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-202 Log #518 NEC-P17 **Final Action: Reject**
(680.42(A)(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter".
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-203 Log #4332 NEC-P17 **Final Action: Reject**
(680.42(B))

Submitter: Carvin DiGiovanni, Association of Pool & Spa Professionals
Recommendation: Revise as follows:
(B) Bonding. Bonding by metal-to-metal mounting on a common frame or base shall be permitted. The metal bands or hoops used to secure wooden staves shall not be required to be bonded as required in 680.26. The equipotential bonding requirements for perimeter surfaces in 680.26 (B)(2) shall not apply to listed portable spas and hot tub packaged units, and insulating mats shall not be required in lieu of equipotential bonding of perimeter surfaces for these portable units.
Substantiation: This proposal eliminates confusion regarding bonding of listed, packaged portable spas and hot tubs located outdoors, and is being submitted concurrent with a similar proposal to clarify language in 680.43 regarding indoor portable spas and hot tubs. Some AHJs recently have begun requiring existing patios, floors and other surfaces (including grass yards) to be torn up and rebuilt with an equipotential bonding grid, or have required the installation of rubber "insulating" mats of unknown quality and questionable dielectric standoff characteristics under and around the spa or hot tub when the property owner purchases and installs a portable spa or hot tub. This is being done on the premise that the reference to Part II in Article 680.42 requires such arrangements. The author has seen no evidence that the CMP ever intended that the surrounding perimeter surfaces associated with these portable devices be incorporated into the equipotential bonding grid or insulated, and there is no similar perimeter bonding requirement for storable (i.e., portable) pools, although the equipotential bonding issues are identical. Such a perimeter bonding requirement (indoors or outdoors) is impractical and cost-prohibitive for portable spas and hot tubs, as the whole point of a portable spa is that it can readily be moved or relocated, and is integrally bonded, grounded and GFCI-protected under other sections of Article 680 and UL 1563. A perimeter surface bonding requirement requires demolition and rebuilding of any and all patio or yard area(s) where a portable spa or hot tub is located any time it is installed or moved, with no concurrent improvement in safety. There are no known reported shock or electrocution incidents associated with step potentials or touch potentials associated with persons making contact with the spa or hot tub and the surrounding perimeter surface that could be attributed to failure to bond the perimeter surface. REQUEST FOR INTERPRETATION???]
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation for this change.
There is no definition for portable spas and hot tub packaged units.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
WEST, L.: I agree with the Submitter's Substantiation, and believe that a Wood Deck above grade does not need to be Bonded when a Spa is sitting on that Deck. Also, Reference 17-203.

17-204 Log #580 NEC-P17 **Final Action: Reject**
(680.42(C))

Submitter: Mitch Feininger, North Dakota State Electrical Board
Recommendation: Revise text to read as follows:
One-Family Dwelling or Structure Associated with a One-Family Dwelling. Any of the wiring methods recognized in Chapter 3 of this code that...". (Leave as is for the remainder of Section).
Substantiation: The reference to the interior of dwelling or associated structure misleads NEC users and enforcers to deduce that once wiring is outside of this zone, the wiring must be changed to include an insulated EGC but goes on to allow an uninsulated EGC to be used for the connection to the motor, heating...".
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(c) of the Regulations Governing Committee Projects in that it does not contain proposed text, including the wording to be added, revised (and how revised), or deleted.
The intent of the code is to have an insulated ground at the outdoor location where the branch circuit exits the dwelling.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-205 Log #4411 NEC-P17 **Final Action: Reject**
(680.42(D))

Submitter: Dean Hunter, Hunter Electric
Recommendation: Add the following new text:
680.42(D) Equipotential Bonding. The requirements of 680.26(B)(2) for equipotential bonding shall not be required for a listed spa or hot tub assembly installed outdoors with minimum 1 meter (3 foot) of totally non-conductive perimeter surface, such as a wooden deck.
Substantiation: This is identification used for equipment grounding conductors and commonly used to identify grounding electrode conductors - though it is not required. With the great work done in the 2008 cycle to "clean up" not only the language of grounding but to eliminate the inappropriate (and inadvertent) re-grounding the neutral conductor a requirement to identify the grounding electrode conductor is necessary.
Panel Meeting Action: Reject
Panel Statement: See panel action and substantiation on Proposal 17-203.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
WEST, L.: I agree with the Submitter's Substantiation, and believe that a Wood Deck or Nonconductive Surface does not need to be Bonded when a Spa is sitting on that Deck. Also Reference 17-203.

17-206 Log #519 NEC-P17 **Final Action: Reject**
(680.43)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in (A)(2) and (B)(1)(c).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-207 Log #4333 NEC-P17 **Final Action: Accept in Principle in Part**
(680.43)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal concerning the use of the word "when" since the NEC Style Manual considers "when" as a condition of time.

This action will be considered by the panel as a public comment.

Submitter: Carvin DiGiovanni, Association of Pool & Spa Professionals
Recommendation: Revise as follows:

680.43 Indoor Installations. A spa or hot tub installed indoors shall comply with the provisions of Parts I and II of this article except as modified by this section and shall be connected by the wiring methods of Chapter 3.
Exception: Listed spa and hot tub packaged units rated 20 amperes or less shall be permitted to be cord-and-plug connected to facilitate the removal or disconnection of the unit for maintenance and repair.
Exception: The equipotential bonding requirements for perimeter surfaces in 680.26 (B)(2) shall not apply to listed portable spas and hot tub packaged units, and insulating mats shall not be required in lieu of equipotential bonding of perimeter surfaces for these portable units.

Substantiation: This proposal eliminates confusion regarding bonding of listed, packaged portable spas and hot tubs located indoors, and is being submitted concurrent with a similar proposal to clarify language in 680.42(B) regarding outdoor portable spas and hot tubs. Some AHJs have recently begun requiring existing patios, floors and other surfaces (including grass yards) to be torn up and rebuilt with an equipotential bonding grid, or have required the installation of rubber "insulating" mats of unknown quality and questionable dielectric standoff characteristics under and around the unit when the property owner purchases and installs a portable spa or hot tub. This is being done on the stated premise that the reference to Part II in Article 680.43 requires such arrangements. The author has seen no evidence that the CMP ever intended that the surrounding perimeter surfaces associated with these devices be incorporated into the equipotential bonding grid or insulated, and there is no similar perimeter bonding requirement for storable (i.e., portable) pools, although the issues are identical. Such a perimeter bonding requirement (indoors or outdoors) is impractical and cost-prohibitive, as the whole point of a portable spa is that it can readily be moved or relocated, and is integrally bonded, grounded and GFCI-protected under other sections of Article 680 and UL 1563. A perimeter surface bonding requirement requires demolition and reconstruction of any and all floor area(s) where a portable spa or hot tub is located any time it is installed or moved, with no concurrent improvement in safety. Further, conductive floors in buildings are generally steel-reinforced, integral to the building steel, and are required to be bonded to the grounding system, creating an equipotential surface independent of any spa-related bonding grid. There are no known reported shock or electrocution incidents associated with step potentials or touch potentials associated with persons making contact with the spa or hot tub and the surrounding perimeter surface that could be attributed to failure to bond the perimeter surface. [REQUEST FOR INTERPRETATION???]

Panel Meeting Action: Accept in Principle in Part
Existing exception to be renumbered as Exception No. 1.
New exception to read as follows:
Exception No 2: The equipotential bonding requirements for perimeter surfaces in 680.26 (B)(2) shall not apply to a listed ~~portable spas and hot tub packaged units~~ self-contained spa or hot tub ~~and~~ when installed above the finished floor. ~~insulating mats shall not be required in lieu of equipotential bonding of perimeter surfaces for these portable units.~~

Panel Statement: CMP-17 accepts the addition of an exception to the beginning of 680.43.

CMP-17 does not accept "portable spas and hot tub packaged units" and uses "self-contained spa or hot tub," as these are the correct definitions. CMP-17 deletes the submitter's inclusion of insulating mats as these are not required.

CMP-17 also edits the submitter's text to convey that these units are installed above the finished floor and not embedded in the floor.

Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-208 Log #2192 NEC-P17 **Final Action: Accept**
(680.43(C))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete text as follows:

(C) ~~Wall~~ Switches. Switches shall be located at least 1.5 m (5 ft), measured horizontally, from the inside walls of the spa or hot tub.

Substantiation: The title of this subsection makes it appear that a safety switch installed in a cabinet or cutout box need not comply with the separation requirement. The term "wall switch" would imply a general use snap switch to most code users.

Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-209 Log #3024 NEC-P17 **Final Action: Accept in Principle**
(680.43(C))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

(C) ~~Wall~~ Switches. Switches shall be located at least 1.5 m (5 ft), measured horizontally, from the inside walls of the spa or hot tub.

Substantiation: The title of this subsection makes it appear that a safety switch installed in a cabinet or cutout box need not comply with the separation requirement. The term "wall switch" would imply a general use snap switch to most code users.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-208.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-210 Log #4663 NEC-P17 **Final Action: Reject**
(680.43(D) Exception No. 2)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the clause "shall be permitted to differ from the provisions of (1)and (2)."

Substantiation: This makes the exception into a complete sentence, thereby coming into compliance with 3.1.4.1 of the NEC Style Manual. If CMP 17 or UL has more specific information about exactly what variances are being sought under this new exception, feel free to specify them in acting on this proposal. Items (3) and (4) are omitted from this proposal because they are field bonding requirements to conductive items well removed from the listed assembly in the form the testing laboratory would have seen it. This entire lack of clarity, after all, is exactly why exceptions are required to be complete sentences; they are supposed to convey a complete thought. This exception, as presently written, could be rewritten as "listed self-contained spas or hot tubs can be have whatever parts bonded the test lab feels are appropriate, and don't bother with nearby metal piping and surfaces either." This is an extremely irresponsible way to go about writing an exception.

Panel Meeting Action: Reject
Panel Statement: The submitter's recommended text is very confusing and does not add clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-211 Log #1602 NEC-P17 **Final Action: Accept in Principle**
(680.43(D)(5))

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Revise text to read as follows:

(5) Electrical devices and controls that are not associated with the spas or hot tubs (~~and that are~~) (shall be) located not less than 1.5 m (5 ft) from such units; otherwise, they shall be bonded to the spa or hot tub system.

Substantiation: I have read this section over and over and over and it just does NOT make sense. I had to go back several code books (1999 NEC section 680.41(D)(5)) to find the wording that makes sense and meets the intent of this section. The present wording would literally require bonding for ALL devices and controls not associated with the spa or hot tub, those NOT less than 5 ft away, and those within 5 ft. I believe the intent is to require bonding ONLY for the equipment within 5 ft of the spa or hot tub, not equipment located MORE than 5 ft from the spa or hot tub.

Panel Meeting Action: Accept in Principle
Revise 680.43(D)(5) to read as follows:
(5) Electrical devices and controls that are not associated with the spas or hot tubs and that are located less than 1.5 m (5 ft) from such units

Panel Statement: CMP-17 edits the submitter's text for clarity.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-212 Log #520 NEC-P17 **Final Action: Reject**
(680.44)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in the first paragraph, (B) and (C).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.

Additional proposals are being submitted to make similar corrections throughout the Code.

Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-213 Log #3216 NEC-P17 **Final Action: Accept**
(680.44(C))

Submitter: John I. Williamson, Maple Grove, MN
Recommendation: Delete all of 680.44(C).
Substantiation: 680.44(C) is not correlated with 680.22(B). The 2008 NEC requires ground-fault circuit-interrupter (GFCI) protection for personnel for all 15 or 20 ampere, 125 volts or 240 volt, single phase outlets for pool pump motors, whether the motor connection is by cord and attachment plug into a receptacle outlet or direct (hard-wired) connection. The allowance in 680.44(C) to omit GFCI protection for a combination pool and spa or hot tub installation is no longer permitted because 680.22(B) requires GFCI protection for the pool pump motors.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-214 Log #521 NEC-P17 **Final Action: Reject**
(680.51(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in the title and in the text.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.
Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-215 Log #2375 NEC-P17 **Final Action: Accept in Part**
(680.51(A))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
680.51 Luminaires, Submersible Pumps, and Other Submersible Equipment.
(A) Ground-Fault Circuit Interrupter. Luminaires, submersible pumps, and other submersible equipment, unless listed for operation at <u>a voltage that complies with the limits specified in 680.23A)(8)</u> ~~15 volts or less~~ and supplied by a transformer <u>or power supply</u> that complies with 680.23(A)(2), shall be protected by a ground-fault circuit interrupter.
Substantiation: Present text assumes ac units only. The proposed revision adds the option of dc rated unit.
Panel Meeting Action: Accept in Part
Revise 680.51 to read as follows:
(A) Ground-Fault Circuit Interrupter. Luminaires, submersible pumps, and other submersible equipment, unless listed for operation at 15 volts or less and supplied by a transformer or power supply that complies with 680.23(A)(2), shall be protected by a ground-fault circuit interrupter.
Panel Statement: CMP-17 accepts "or power supply."
CMP-17 does not accept the remainder of the submitter's text.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-216 Log #2376 NEC-P17 **Final Action: Reject**
(680.51(F))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Add new text as follows:
(F) Servicing. All equipment shall be removable from the water for relamping or normal maintenance. Luminaires shall not be permanently embedded into the fountain structure such that the water level must be reduced or the fountain drained for relamping, maintenance, or inspection. <u>Alternatively, a luminaire that is listed and not requiring user maintenance shall be permitted.</u>
Substantiation: The present text reflects designs that require periodic relamping as well as seals and gaskets that could fail. Some newer LED luminaire constructions are such that they do not require relamping. They also are permanently sealed so there is no periodic maintenance anticipated.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
BLEWITT, T.: The proposed revisions were intended to update the Code to address new technologies, particularly plastic LED luminaires that are permanently factory sealed. These changes would help reduce confusion between installers and Inspection Authorities when dealing with advanced luminaire technologies. We are in agreement that the text of the proposal was too broad and might encompass unproven designs. More focused text and specific substantiation will be provided during the Comment phase.

17-217 Log #3300 NEC-P17 **Final Action: Reject**
(680.52(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence: Where the box is ~~fed by~~ <u>connected only to</u> nonmetallic conduit(s) it shall have addition supports and fasteners of copper, brass, or other ~~approved~~ <u>identified</u> corrosion-resistant material <u>unless embedded in the pool structure</u>.
Substantiation: The provision should apply where 314.23 is not applicable, since a box may be "fed" by nonmetallic conduit and also connected to conduits specified in 314.23 which may suffice and make additional support unnecessary. Embedment in pool structure makes additional support unnecessary.
Panel Meeting Action: Reject
Panel Statement: This proposal would change the intent of the current Code text. A combination of PVC and metallic conduit that does not meet the requirements of 314.23 would not require additional support.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-218 Log #2377 NEC-P17 **Final Action: Reject**
(680.54)

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
680.54 Grounding. The following equipment shall be grounded:
(1) All electrical equipment located within the fountain or within 1.5 m (5 ft) of the inside wall of the fountain, <u>unless listed as not requiring grounding.</u>
(2) All electrical equipment associated with the recirculating system of the fountain
(3) Panelboards that are not part of the service equipment and that supply any electrical equipment associated with the fountain
Substantiation: Proposed revisions to the requirements for underwater luminaries in UL 676 allow for units that do not require grounding in order to address the risks of electric shock and fire.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
BLEWITT, T.: See My Explanation of Negative on 17-216 (Log #2376).

17-219 Log #2378 NEC-P17 **Final Action: Accept in Part**
(680.55(B))

Submitter: Gary L. Siggins, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
~~**(B) Supplied by a Flexible Cord.** Electrical equipment that is supplied by a flexible cord shall have all exposed non–current-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of this cord. The equipment grounding conductor shall be connected to an equipment grounding terminal in the supply junction box, transformer enclosure, or other enclosure~~.
<u>**(B) Supplied by a Flexible Cord.** Electrical equipment that is supplied by a flexible cord shall comply with (1) or (2):</u>
<u>(1) The electrical equipment shall have all exposed non-current-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of this cord. The grounding conductor shall be connected to a grounding terminal in the supply junction box, transformer or power supply enclosure, or other enclosure.</u>
<u>(2) The electrical equipment shall be listed as not requiring grounding.</u>
Substantiation: The reference to "transformers" assumes ac luminaires only. "Power supplies" was added to reflect DC rated LED luminaires. Item 2 is proposed as it is possible to list units that do not require grounding. The revisions being proposed to the standard for underwater luminaires, UL 676, allow for such designs.
Panel Meeting Action: Accept in Part
Revise 680.55(B) to read as follows:
(B) Supplied by a Flexible Cord. Electrical equipment that is supplied by a flexible cord shall have all exposed non–current-carrying metal parts grounded by an insulated copper equipment grounding conductor that is an integral part of this cord. The equipment grounding conductor shall be connected to an equipment grounding terminal in the supply junction box, transformer enclosure, power supply enclosure, or other enclosure.
Panel Statement: CMP-17 accepts the addition of "power supply enclosure."
CMP-17 does not accept the remainder of the submitter's text.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1

Explanation of Negative:

BLEWITT, T.: UL agrees with the Panel Action to include "power supply enclosure." The proposed revisions were intended to update the Code to address new technologies, particularly plastic LED luminaires that are permanently factory sealed. These changes would help reduce confusion between installers and Inspection Authorities when dealing with advanced luminaire technologies. We are in agreement that the text of the proposal was too broad and might encompass unproven designs. More focused text and specific substantiation will be provided during the Comment phase.

17-220 Log #522 NEC-P17 **Final Action: Reject**
(680.56(A))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "Circuit" and "Interrupter" in the title. Add a hyphen between "circuit" and "interrupters" in the last phrase.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.

Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-221 Log #995 NEC-P17 **Final Action: Reject**
(680.56(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

Connections with flexible cord shall be permitted, except that grounding-type attachment plugs and receptacles, <u>cord connectors and flanged surface devices</u> shall be permitted...". (remainder unchanged).
Substantiation: Edit. Cord connectors and flanged surface devices should be included.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-222 Log #523 NEC-P17 **Final Action: Reject**
(680.62)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in (A), (A)(2), and (E).
Substantiation: The addition of the hyphen will provide consistency throughout the Code.

Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-223 Log #4664 NEC-P17 **Final Action: Reject**
(680.62(B) Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Insert the following exception at the end:

Exception: Small conductive surfaces not likely to become energized, such as air and water jets and drain fittings where not connected to metallic piping, towel bars, mirror frames, and similar nonelectrical equipment, shall not be required to be bonded.

Note: also delete the comma after "drain fittings" in 680.43(D) Exception No. 1.
Substantiation: This part of the article needs a small parts exception just as for the case of conventional spas and hot tubs. This wording tracks the text of 680.43(D) Exception No. 1 with the exception that the comma after "drain fittings" is omitted in order to make the next six words make sense. In transferring this material, the submitter realized that the comma should be removed from the spa and hot tub exception, hence the additional note.
Panel Meeting Action: Reject
Panel Statement: The submitter's text is vague and not readily enforceable. The requirement does not address conductive surfaces that may become energized but create a conductive path.

Although not connected to piping, these items may contact metal studs and the like.

The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 9 Negative: 2
Explanation of Negative:

BLEWITT, T.: UL disagrees that this proposal should have been rejected. It is essentially the identical "small parts" exception that is allowed for spas in Section 680.42(D)(4) Exception No. 1. This should have been accepted in Accepted in Principle in Part, with the text adjusted to address concerns with mirrors and the like being secured to metal wall studs.

HIRSCH, B.: This proposal extends the exception for bonding for items such as air and water jets, towel bars, mirror frames and drains not connected to metal piping which exists for spas and hot tubs (680.43(D)Exception !, to therapeutic tubs. The proposer suggests that the same wording be used. There is nothing about therapeutic tubs that would make them any different from spas and hot tubs. As such, the proposer is correct in his analysis and the proposal should have been accepted. <u>The panel failed to recognize that the proposal merely extends the bonding exception given to spas and hot tubs to therapeutic tubs. The wording currently exists in the Code and has been previously approved by the Panel.</u>

17-224 Log #1333 NEC-P17 **Final Action: Reject**
(680.70)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise last sentence:

They shall ~~not be required~~ to comply with other ~~parts~~ <u>applicable provisions</u> of this article.
Substantiation: Present wording exempts provisions for grounding, GFCI protection and other pertinent provisions.
Panel Meeting Action: Reject
Panel Statement: The provisions are provided in 680-71.

CMP-17 does not agree with the submitter's substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-225 Log #1958 NEC-P17 **Final Action: Reject**
(680.70)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence: They shall ~~not~~ be required to comply with other <u>applicable</u> parts of this article.
Substantiation: Present wording removes provisions necessary for safety such as grounding, bonding, luminaries, GFCI protection, wall switches, etc.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-224.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-226 Log #524 NEC-P17 **Final Action: Reject**
(680.71)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Add a hyphen between "circuit" and "interrupter" in two places.
Substantiation: The addition of the hyphen will provide consistency throughout the Code.

Additional proposals are being submitted to make similar corrections throughout the Code.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-29.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-227 Log #4824 NEC-P17 **Final Action: Reject**
(680.71)

Submitter: David Zinck, Newburyport, MA Wiring Inspector
Recommendation: Revise text to read as follows:

680.71 Protection

Hydromassage bathtubs and their associated electrical components shall be ~~on an individual branch circuit(s) and~~ protected by a ~~readily accessible~~ ground-fault circuit interrupter.
Substantiation: 210.23 already tells us what is acceptable for branch circuit loading. There are tubs available that use very little electricity. Some have only bubbles; some have very small pump motors. Most electricians during the rough wiring stage of the house do not know exactly which unit the home owners are going to get so the vast majority get separate circuits anyway. And most electricians would not do it any other way.

I hate to close the door on the electrician and homeowner who are doing a renovation in an existing house where snaking down to the basement panel is prohibitively expensive. If they are just removing an existing tub and installing a hydromassage tub with a low current draw, than the electrician should be able to apply 210.23 to see if he can feed it from an existing circuit.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided adequate technical substantiation.

This change would reduce the level of safety that this requirement provides.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-228 Log #4900 NEC-P17 **Final Action: Reject**
(680.71)

Submitter: James Grant, Rochester, NH
Recommendation: Revise text as follows:
680.71 Protection. Hydromassage bathtubs and their associated electrical components shall be on an individual branch circuit(s) and protected by a ~~readily~~ accessible ground-fault circuit interrupter. All 125-volt, single-phase receptacles not exceeding 30 amperes and located within 1.83 m (6 ft) measured horizontally of the inside walls of a hydromassage tub shall be protected by a ground-fault circuit interrupter.
Substantiation: The addition of the words “readily accessible” placed an unnecessary role pertaining to the placement of the ground-fault circuit interrupter. With the definition of readily accessible in mind, allowing the word “readily” to remain would not allow a ground-fault interrupter device to be placed in the bathtub’s motor compartment that had a door that was removable via Velcro or pressure clips. Would it permit one if the door was hinged? Do we need to be able to push the test button in a panic? If anything should be “readily accessible” shouldn’t it be a disconnect to shut off the motor that is within sight of the occupants of the tub?
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-227.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-229 Log #4665 NEC-P17 **Final Action: Reject**
(680.73)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Add the following sentence to 680.73 at the end: “Where the hydromassage bathtub is cord- and plug-connected with the supply receptacle accessible only through a service access opening, the receptacle shall be installed so that its face is within direct view and not more than 300 mm (1 ft) of the opening.”
Substantiation: The required GFCI protection for hydromassage bathtubs (see 680.71) is now required to be “readily accessible.” This new rule is aimed at making the monthly test feature on the device more likely to be implemented, and, in the case of a receptacle GFCI, would make this proposal unnecessary. However, an “individual branch circuit” must only supply a single receptacle in the case of a cord- and plug-connected load with only a single supply cord. This effectively precludes the use of a GFCI configured as a duplex receptacle, and since single-receptacle GFCIs are no longer manufactured, the GFCI protection will always be elsewhere, such as in the case of a GFCI circuit breaker or a “faceless” GFCI. In such instances this single receptacle should located so as to provide reasonable access for those maintaining the equipment. We routinely see devices so well concealed that two flashlights and a mirror are needed to find them, and a contortionist is required to disconnect the tub. This proposal assures easy access to the receptacles when the access cover is open, while still allowing them to be cosmetically concealed.
Panel Meeting Action: Reject
Panel Statement: The current text of the code requires GFCIs to be readily accessible.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-230 Log #530 NEC-P17 **Final Action: Accept in Principle in Part**
(680.74)

Submitter: George H. Little, Little Enterprises
Recommendation: Revise text as follows:
Bonding. All metal piping systems and all grounded metal parts in contact with the circulating water shall be bonded together using a solid copper bonding jumper, not smaller than 8 AWG. The bonding jumper shall be connected to the terminal on the circulating pump motor that is intended for this purpose. The bonding jumper shall not be required to be connected to a double insulated circulating pump motor. The 8 AWG or larger solid copper bonding jumper shall be required for equipotential bonding in the area of the hydromassage bathtub ~~and shall not be extended or attached to any remote panel board, service equipment, or electrode~~. <u>The 8 AWG shall be long enough to terminate on a replacement non-double insulated pump motor that would require bonding. The 8 AWG shall be terminated to the equipment grounding conductor of the branch circuit of the motor when a double insulated circulating pump motor is used.</u>
Substantiation: Adding the wording that would provide a longer 8 AWG for connection of a replacement of a double-insulated pump with a non-double insulated unit and having the bonding conductor terminate with the equipment grounding conductor would mirror what is done in 680.26(B)(6)(a).
Panel Meeting Action: Accept in Principle in Part
Revise 680.74 to read as follows:
All metal piping systems and all grounded metal parts in contact with the circulating water shall be bonded together using a solid copper bonding jumper, insulated, covered, or bare, not smaller than 8 AWG. The bonding jumper shall be connected to the terminal on the circulating pump motor that is intended for this purpose. The bonding jumper shall not be required to be connected to a double insulated circulating pump motor. The 8 AWG or larger solid copper bonding jumper shall be required for equipotential bonding in the area of the hydromassage bathtub and shall not be required to be extended or attached to any remote panelboard, service equipment, or any electrode. <u>The 8 AWG or larger solid copper bonding jumper shall be long enough to terminate on a replacement non-double insulated pump motor, and shall be terminated to the equipment grounding conductor of the branch circuit of the motor when a double insulated circulating pump motor is used.</u>
Panel Statement: CMP-17 accepts the submitter’s text relative to the length of the bonding conductor and the connection of the 8 AWG or larger solid copper bonding jumper to the equipment grounding conductor of the circuit supplying the double insulated pump motor.
CMP-17 does not accept the remainder of the submitter’s text.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11
Comment on Affirmative:
JHONSON, D.: I agree with the requirement “The 8 AWG shall be terminated to the equipment grounding conductor of the branch circuit of the motor when a double insulated circulating pump motor is being used”.
However, confusion still exist on what the other end of the #8 AWG should be bonded to. The current text only requires bonding the metal piping systems and grounded metal parts “in contact with the circulating water”.
Hydromassage bathtubs typically use nonmetallic piping for water circulation. Copper water piping supplying a deck mount faucet would not be bonded, as it is not “in contact with the circulating water”. Someone using the Hydromassage tub may contact a potential difference between the metal water piping connected to the faucet and the circulating water in contact with other grounded metal parts of a non-double insulated motor.
In the 2002 NEC, 680.74 required double insulated motors to provide a means for grounding internal non-accessible, non-current carrying metal parts. This was in conflict with the UL Standard for double insulated motors.
In 2005, the NEC was changed by removing text “to provide a means for grounding internal non-accessible, non-current carrying metal parts” which accommodated the UL Standard conflict and in addition resulted in removing text requiring all metal piping systems “associated with a Hydromassage tub” to be bonded with the 8 AWG (weather or not in contact with the circulating water). As proposal 17-230 is addressing an issue of bonding in 680.74 relating to double insulated motors, I am of the opinion it is appropriate for CMP-17 to resolve this issue with revised text clarifying the intent to bond all metal piping systems supplying a Hydromassage bath tub.

17-231 Log #1048 NEC-P17 **Final Action: Reject**
(680.74)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete:
The bonding jumper shall not be required to be connected to a double insulated circulating pump motor.
Substantiation: Section 680.6(3) requires grounding of pool pump motors as does 680.21(A) which do not exempt double insulated motors. 680.62(D)(1)(b) requires a pump motor to be grounded; the last sentence of 680.26(B)(6)(a) indicates an EGC for double insulated motors. Ungrounded double insulated motors do not provide protection where an ungrounded supply conductor shorts to a metal terminal enclosure or the motor frames.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-230.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 682 — NATURAL AND ARTIFICALLY MADE BODIES OF WATER

17-232 Log #708b NEC-P17 **Final Action: Reject**
(682.2.Equipotential Plane)

Submitter: Teri Dwyer, Wyoming, MN
Recommendation: Delete text to follows:
~~682.2 Equipotential Plane. An area where wire mesh or other conductive elements are on, embedded in, or placed under the walk surface within 75 mm (3 in.), bonded to all metal structures and fixed nonelectrical equipment that may become energized, and connected to the electrical grounding system to prevent a difference in voltage from developing within the plane.~~
Substantiation: There are currently two definitions of Equipotential Plane in the NEC that contain slightly different terminology. 547.2 allow wire mesh or other conductive elements to be embedded in or placed under concrete without any dimensions as to where the conductive elements are to be placed and is only applicable if concrete is present. How far below the concrete is still going to create a safe equipotential plane? Where 680.2 will allow wire mesh or other conductive elements to be on, embedded in, or placed under the walking surface within 3 in. This definition is not specific to concrete as a walking surface and provides a prescriptive depth that it is to be installed below the area requiring the equipotential plane.

A common definition would not effect the location where the equipotential plane is required to be installed, because 547.10 and 682.33 still identify the required locations. It would benefit the AHJ by creating one definition for a common term.

I have also submitted proposals to delete this definition from 547.2. (CMP-19) and add it to Article 100 (CMP-5).

Panel Meeting Action: Reject

Panel Statement: The equipotential plane definitions of the two articles differ. CMP-17 chooses to retain the definition as written in 682.2 because of the differences of location.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-233 Log #2454 NEC-P17 **Final Action: Reject**
(682.2.Power Safe Protector (PSP))

Submitter: Michael Baxter, Energy Safe Technologies Inc.

Recommendation: Add new text to read as follows:

Article 100

DEFINITION: <u>Power Safe Protector (PSP). A device intended to keep the power off until a circuit check can assure that any equipment or other items connected are free of any line to ground faults, neutral to ground faults, or short circuits, before the device can be energized. It will protect from ground faults, and overheating of the device associated with glowing connections, or series arc faults while energized by turning the device off when there is a problem causing an audible sound and a red indicator light to notify where there is a problem. This device will automatically reset only after it has verified that the problem is cleared. This protection is provided independently on each receptacle outlet. It will illuminate a green indicator light when energizing any equipment or other items connected.</u>

Substantiation: If proposal 682.15 for PSP is accepted, a definition may be required. A proposal is also being sent to Article 100.

Panel Meeting Action: Reject

Panel Statement: See panel action and statement on Proposal 17-30.

Article 100 is beyond the purview of this panel. CMP-17 refers this proposal to the TCC for correlation if needed.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-234 Log #2809 NEC-P17 **Final Action: Accept**
(682.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

682.3 Other Articles.

~~Wiring and equipment in or adjacent to natural or artificially made bodies of water shall comply with the applicable provisions of other articles of this Code, except as modified by this article.~~ If the water is subject to boat traffic, the wiring shall comply with 555.13(B).

Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 682.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other “Special” articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-235 Log #4293 NEC-P17 **Final Action: Accept in Principle**
(682.3)

Submitter: Donald R. Cook, Shelby County Development Services

Recommendation: Delete text as follows:

682.3 Other Articles.

~~Wiring and equipment in or adjacent to natural or artificially made bodies of water shall comply with the applicable provisions of other articles of this Code, except as modified by this article.~~ If the water is subject to boat traffic, the wiring shall comply with 555.13(B).

Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The stricken text in 682.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other “Special” articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 17-234.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-236 Log #1957 NEC-P17 **Final Action: Reject**
(682.13)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change “listed” to “identified”.

Substantiation: Edit. Article 400 does not specify listing.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided adequate technical substantiation.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-237 Log #69 NEC-P17 **Final Action: Accept in Principle**
(682.14)

Note: This Proposal appeared as Comment 17-111 on Proposal 17-176 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 17-176 was:

Revise as follows:

Submersible or Floating Equipment Power Connection(s). Submersible or floating equipment shall be cord- and plug-connected, using extra hard usage cord, as designated in Table 400.4 and listed with a “W” suffix. The plug and receptacle combination shall be arranged to be suitable for the location while in use. Disconnecting means shall be provided to isolate each submersible or floating electrical equipment from its supply connection(s) without requiring the plug to be removed from the receptacle.

(A) Type. The disconnecting means shall consist of a circuit breaker, switch, or both, or molded case switch, and shall be specifically marked todesignate which receptacle it controls.

(B) Location. The disconnecting means shall be readily accessible on land, located not more than 750 mm (30 in.) from the receptacle it controls, and shall be located in the supply circuit ahead of the receptacle. The disconnecting means shall be located within sight but not closer than 1.5 m (5 ft) from the shoreline. Uninsulated live parts shall be elevated not less than 300 mm (12 in.) above the datum plane.

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Accept the proposal in principle. Accept the text as proposed, but insert the phrase “or other outlet” after “marked to designate which receptacle” in proposed (A), and insert an exception ahead of (A) as follows:

Exception: Equipment listed for direct connection and equipment anchored in place and incapable of routine movement caused by water currents or wind shall be permitted to be connected using wiring methods covered in 682.13.

Substantiation: This comment addresses equipment that might not be connected by flexible cord, as was pointed out in the panel statement. It also puts the live parts issue back on the table, as identified in the comment in the voting. The substantiation for the proposal as originally submitted remains valid.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement in Proposal 17-238.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

17-238 Log #4666 NEC-P17 **Final Action: Accept in Part**
(682.14)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee

Recommendation: Revise to read as follows:

<u>682.14 Submersible or Floating Equipment Power Connection(s).</u> Submersible or floating equipment shall be cord- and plug-connected, using extra hard usage cord, as designated in Table 400.4 and listed with a “W” suffix. The plug and receptacle combination shall be arranged to be suitable for the location while in use. Disconnecting means shall be provided to isolate each submersible or floating electrical equipment from its supply connection(s) without requiring the plug to be removed from the receptacle.

<u>Exception:</u> Equipment listed for direct connection and equipment anchored in place and incapable of routine movement caused by water currents or wind shall be permitted to be connected using wiring methods covered in 682.13.

<u>(A) Type and Marking.</u> The disconnecting means shall consist of a circuit breaker, switch, or both, or molded case switch, and shall be specifically marked to designate which receptacle or other outlet it controls.

<u>(B) Location.</u> The disconnecting means shall be readily accessible on land, located not more than 750 mm (30 in.) from the receptacle it controls, and shall be located in the supply circuit ahead of the receptacle. The disconnecting means shall be located within sight but not closer than 1.5 m (5 ft) from the shoreline. Uninsulated live parts shall be elevated not less than 300 mm (12 in.) above the datum plane.

Substantiation: This proposal provides affirmative commentary on the wording that resulted from 2008 Proposal 17-176 and Comment 17-111 that are now held at the direction of the TCC for lack of sufficient public review. The panel's intended action to create connection rules for submersible and floating equipment is appropriate. By this proposal, we hereby advise CMP 17 that we have implemented the wording now on hold, as of January 1, 2008, without difficulty or adverse public report over the intervening months.
Panel Meeting Action: Accept in Part
Revise 682.14 B to read as follows:
(B) Location. The disconnecting means shall be readily accessible on land, located not more than 750 mm (30 in.) from the receptacle it controls, and shall be located in the supply circuit ahead of the receptacle. The disconnecting means shall be located within sight but not closer than 1.5 m (5 ft) from the shoreline and shall be elevated not less than 300 mm (12 in.) above the datum plane.
Panel Statement: CMP-17 deletes the reference to uninsulated live parts in the last sentence in (B). This addresses the editorial comments from the ROC. CMP-17 accepts the remainder of the proposal.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-239 Log #1468 NEC-P17 **Final Action: Accept in Principle**
(682.14(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
The disconnecting means shall ~~be permitted to~~ consist of a circuit breaker(s), switch(es), or both or other identified means and shall be ~~properly~~ durably identified as to which structure or equipment it controls.
Substantiation: "Permitted" does not impose any requirement per 90.5(B). Permitted wiring methods of Articles 553 and 555 include portable cords and cables for which a plug/receptacle may be a disconnecting means.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-238.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-240 Log #1956 NEC-P17 **Final Action: Accept in Principle**
(682.14(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The disconnecting means shall be ~~permitted to be~~ a circuit breaker, switch, or both, and shall simultaneously disconnect all ungrounded conductors of the circuit it controls and shall be ~~properly~~ durably marked ~~identified~~ as to which structure or equipment it controls.
Substantiation: "Permitted" does not impose any requirement (90.5(B). The Style Manual states "permitted to be" indicates actions that are not required. Simultaneous disconnection of ungrounded conductors should be specified.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-238.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-241 Log #1300 NEC-P17 **Final Action: Accept in Principle**
(682.14(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete first sentence and substitute:
The disconnecting means shall be readily accessible on land and shall simultaneously disconnect all ungrounded conductors of the circuit it controls.
Substantiation: Edit. The common requirement for simultaneous disconnection of ungrounded conductors should be specified.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 17-238.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-242 Log #2455 NEC-P17 **Final Action: Reject**
(682.15)

Submitter: Michael Baxter, Energy Safe Technologies Inc.
Recommendation: Revise text to read as follows:
~~682.15 Ground-Fault Circuit-Interrupter (GFCI) Protection. Fifteen- and 20-ampere single-phase, 125 volt through 250 volt receptacles installed outdoors and in or on floating buildings or structures within the electrical datum plane area that are used for storage, maintenance, or repair where portable electric hand tools, electrical diagnostic equipment, or portable lighting equipment are to be less than 300 mm (12 in.) above the established electrical datum plane.~~
682.15 Power Safe Protector (PSP) Protection.
(1) 120V circuits. Fifteen- and 20-ampere single-phase, 125-volt receptacles installed outdoors and in or on floating buildings or structures within the electrical datum plane area that are used for storage, maintenance, or repair where portable electric hand tools, electric diagnostic equipment, or portable lighting equipment are to be used shall be provided with power safe protector protection. The power safe protector device shall be located not less than 300 mm (12 in.) above the established electrical datum plane.
(2) 240V circuits. Fifteen- and 20-ampere single-phase 250-volt receptacles installed outdoors and in or on floating buildings or structures within the electrical datum plane area that are used for storage, maintenance, or repair where portable electric hand tools, electrical diagnostic equipment, or portable lighting equipment are to be used shall be provided with GFCI protection. The GFCI protection device shall be located not less than 300 mm (12 in.) above the established electrical datum plane.
Substantiation: Serious shocks can occur in the time it takes a GFCI device to trip because they are designed to trip only after a fault has occurred. Additionally, GFCI devices also do not prevent fires caused by loose connecting wires that overheat and ignite nearby flammable material.
The Power Safe Protector (PSP) device overcomes these limitations in three ways:
1. The PSP receptacle uses a "Power Off" safety paradigm that supplies power only for the duration that an appliance is actually using it. Before it supplies power to a connected appliance it performs several safety checks to detect unsafe conditions *before* they can cause injury. These safety checks happen each time an attached appliance is switched on prior to supplying power to the appliance. When the PSP receptacle has energized an appliance, it provides traditional GFCI protection.
2. A PSP receptacle monitors the temperature of supply wire connections to recognize unsafe heating associated with glowing connections or series arc faults.
3. A PSP receptacle calls immediate attention to any problems by blinking a red warning lamp and sounding an alarm. A green light illuminates while the PSP receptacle supplies power to an appliance.
Please see the document I have provided titled *Power Safe Protector Receptacles* for more detail.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 17-30.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-243 Log #1910 NEC-P17 **Final Action: Reject**
(682.31)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (B), delete "remote".
Revise: (A) TYPE. Equipment grounding conductors and equipment bonding jumpers shall be insulated copper conductors sized in accordance with 250.122 but not smaller than 12 AWG.
Delete (B,) (C), and (D) and substitute: (B) FEEDERS. Feeders shall contain an equipment grounding conductor connected to a grounding terminal in the equipment where the feeder originates and terminates.
(C) BRANCH CIRCUITS. Branch circuits shall contain an equipment grounding conductor connected to a grounding terminal in the equipment where the branch circuits originates.
(D) CORD-and PLUG-CONNECTED EQUIPMENT. Grounding of cord-and-plug-connected equipment shall be by means of an equipment grounding conductor in the cord and a grounding type attachment plug.
Substantiation: Equipment bonding jumpers (see definition) should be included in (A).
In (B), "remote" is not defined and is irrelevant. A feeder may supply equipment other than a panelboard, such as individual fused switches or circuit breakers.
In (C), branch circuits may originate from equipment other than a panelboard or service equipment such as an individual fused switch or circuit breaker.
In (D), the provision should also apply to equipment other than appliances.
Panel Meeting Action: Reject
Panel Statement: The submitter has not substantiated a problem with this section of the code.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-244 Log #1469 NEC-P17 **Final Action: Accept in Part**
(682.31(B) and (C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
(B) Where a feeder supplies a ~~remote~~ panelboard or other distribution equipment an insulated equipment grounding conductor shall extend from the grounding terminal in the service equipment to a grounding terminal ~~and busbar~~ in the panelboard or other distribution equipment.
(C) The insulated equipment grounding conductor for branch circuits shall terminate at a grounding terminal in a ~~remote~~ panelboard or other distribution equipment, or a grounding terminal in the main service equipment.
Substantiation: A feeder may supply equipment other than a panelboard such as individual fused switches or circuit breakers. "Remote" is not defined and immaterial to the provision, and a limiting condition. In (B), "service" includes more than service equipment, which is a switch or circuit breaker.
Panel Meeting Action: Accept in Part
Panel Statement: CMP-17 only accepts the words "or other distribution equipment" in three places.
CMP-17 does not accept other changes as proposed by the submitter.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-245 Log #1953 NEC-P17 **Final Action: Reject**
(682.31(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The insulated equipment grounding conductor shall be connected to a grounding terminal in the distribution equipment where the branch circuit originates. ~~terminate in a remote panelboard or the grounding terminal in the main service equipment.~~
Substantiation: All branch circuits do not originate in panelboards (682.14).
Panel Meeting Action: Reject
Panel Statement: This is already covered in 682.31(B). The proposed change does not add clarity.
The submitter has not provided adequate technical substantiation.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

17-246 Log #1967 NEC-P17 **Final Action: Accept in Part**
(682.32)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: All metal parts in contact with the water, all metal piping, tanks, and noncurrent-carrying metal parts that ~~may~~ are likely to become energized shall be bonded to the grounding ~~bus~~ terminal in the distribution equipment ~~panelboard~~. The bonding means, if a wire-type conductor, shall be solid copper and sized in accordance with Table 250.122.
Substantiation: "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections. All branch circuits may not originate in a panelboard (682.14). There are no specific provisions where the bonding means is a wire. A bonding wire should be solid copper to deter corrosion. (See 682.33(C)).
Panel Meeting Action: Accept in Part
Revise 682.32 to read as follows:
All metal parts in contact with the water, all metal piping, tanks, and noncurrent-carrying metal parts that ~~may~~ are likely to become energized shall be bonded to the grounding ~~bus~~ terminal in the distribution equipment ~~panelboard~~.
Panel Statement: CMP-17 does not accept the submitter's last sentence. CMP-17 accepts the remainder of the submitter's text.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 685 — INTEGRATED ELECTRICAL SYSTEMS

12-178 Log #1952 NEC-P12 **Final Action: Reject**
(685.1(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (1) An orderly shutdown is required to minimize personnel hazard ~~and~~ or equipment damage or malfunction.
Substantiation: Edit. An orderly shutdown may be required due to malfunction even if such condition does not create a hazard or damage.
Panel Meeting Action: Reject
Panel Statement: The scope of Article 685 is to make certain an orderly shutdown is accomplished to ensure safe operation, which is contrary to the substantiation provided, suggesting an orderly shutdown may be required due to malfunction even if such condition does not create a hazard or damage.
The submitter did not provide definitive substantiation that a problem exists in the field or with this requirement. The existing wording is adequate.
The proposed change is not editorial in nature.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-179 Log #455a NEC-P12 **Final Action: Accept**
(Table 685.3)

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Revise text to read as follows:
Change the text "50 Volts to less than 1000 Volts" in the Table noted above.
Substantiation: In Article 250, the grounding provisions for these two code sections currently mention "50 Volts to 1000 Volts". Other Article 250 code sections mention 1 kV and Over. Although minor, the code text as noted can create a code requirement conflict when working on systems of 1000 volts or 1 kV. What code sections apply for these systems? This code change is simply a correlation issues. Sections 200.2(A); 250.21(A)(3); 250.24(C); 250.170, Exception 1; and, 250.174 all mention circuits of less than 100 volts. Table 685.3 references Section 250.21. Therefore, in the interest of consistency and to eliminate conflicting code text, this change should be in order.
I have also submitted a proposal to make the same change in 250.20(B) and 250.21.
Panel Meeting Action: Accept
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-180 Log #2810 NEC-P12 **Final Action: Reject**
(685.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and Table.
~~685.3 Application of Other Articles.~~
~~The articles/sections in Table 685.3 apply to particular cases of installation of conductors and equipment, where there are orderly shutdown requirements that are in addition to those of this article or are modifications of them.~~
~~Table 685.3 Application of Other Articles~~
~~Conductor/Equipment Section~~
~~More than one building or other structure 225, Part II~~
~~Ground fault protection of equipment 240.13(1)~~
~~Grounding ac systems of 50 volts to 1000 volts 250.21~~
~~Equipment protection 427.22~~
~~Orderly shutdown 430.44~~
~~Disconnection 430.74, Exception Nos. 1 and 2~~
~~Disconnecting means in sight from controller 430.102(A), Exception No. 2~~
~~Energy from more than one source 430.113, Exception Nos. 1 and 2~~
~~Disconnecting means 645.10, Exception~~
~~Uninterruptible power supplies (UPS) 645.11(1)~~
~~Point of connection 705.12(A)~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 685.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Reject
Panel Statement: CMP-12 chooses to retain 685.3 and Table 685.3.
The information in this section and table provide detailed references to other specific sections in the NEC and improves the usability of Article 685.
Section 90.3 is silent on how Chapters 5, 6, and 7 modify each other.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 12 Negative: 1
Explanation of Negative:
MCCLINTOCK, T.: The majority of Table 685.3 references sections found in Chapters 2 and 4, thus repeating the requirement found in 90.3. However, I agree with the Panel's conclusion that 90.3 is silent on how Chapters 5, 6, and 7 modify each other.

12-181 Log #4285 NEC-P12 **Final Action: Reject**
(685.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section and Table.
685.3 Application of Other Articles.
The articles/sections in Table 685.3 apply to particular cases of installation of conductors and equipment, where there are orderly shutdown requirements that are in addition to those of this article or are modifications of them.

~~**Table 685.3 Application of Other Articles**~~

~~**Conductor/Equipment**~~	~~**Section**~~
~~More than one building or other structure~~	~~225, Part II~~
~~Ground-fault protection of equipment~~	~~230.95, Exception~~
~~Protection of conductors~~	~~240.4~~
~~Electrical system coordination~~	~~240.12~~
~~Ground-fault protection of equipment~~	~~240.13(1)~~
~~Grounding ac systems of 50 volts to 1000 volts~~	~~250.21~~
~~Equipment protection~~	~~427.22~~
~~Orderly shutdown~~	~~430.44~~
~~Disconnection~~	~~430.74, Exception Nos. 1 and 2~~
~~Disconnecting means in sight from controller~~	~~430.102(A), Exception No. 2~~
~~Energy from more than one source~~	~~430.113, Exception Nos. 1 and 2~~
~~Disconnecting means~~	~~645.10, Exception~~
~~Uninterruptible power supplies (UPS)~~	~~645.11(1)~~
~~Point of connection~~	~~705.12(A)~~

Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 685.3 partially repeats the requirement previously expressed in 90.3 and serves no additional purpose. Providing an incomplete list of applicable requirements from the general rules could lead users to believe that other requirements were not applicable. It should also be noted that other “Special” articles do not include partial list of applicable general requirements which could also lead to confusion.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 12-180.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

12-182 Log #1968 NEC-P12 **Final Action: Reject**
(685.10)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Location of overcurrent devices <u>and disconnecting means</u> that are critical to integrated electrical systems shall be permitted to be accessible, with mounting heights permitted ~~to ensure security from~~ <u>deter</u> operation by unqualified personnel.
Alternatively, delete this section.
Substantiation: Disconnecting means should be included. Elevated mounting height cannot ensure, only deter operation by unqualified personnel. This section could be deleted since locking can accomplish the same thing and be safer due to lower mounting height and ready access.
Panel Meeting Action: Reject
Panel Statement: Not all disconnecting devices include overcurrent functions, and the requirements in 685.10 focus on location of overcurrent protection.
CMP-12 believes that the text of 685.10 is adequate and is needed for proper application of a safe electrical system.
Number Eligible to Vote: 13
Ballot Results: Affirmative: 13

ARTICLE 690 — SOLAR PHOTOVOLTAIC SYSTEMS

4-174 Log #2471 NEC-P04 **Final Action: Accept**
(690.2.Monopole Subarray)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following definition to 690.2
<u>**Monopole Subarray**. A PV subarray that has two conductors in the output circuit, one positive (+) and one negative(-). Two monopole PV subarrays are used to form a Bipolar PV array.</u>
Substantiation: This definition is needed to support new system topologies and their configuration requirements.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-175 Log #2476 NEC-P04 **Final Action: Reject**
(690.2.Photovoltaic System)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following definition to 690.2.
<u>**Photovoltaic System.** One or more PV modules connected as a PV source or output circuit either independently or in combination with other devices supplying ac or dc power to utilization equipment. In utility-interactive PV systems, the utility electrical production and distribution network is the utilization equipment. The system devices can include equipment such as inverters, charge controllers, current boosters, and energy storage systems. One or more PV source or PV output circuits can supply power to single utilization equipment.</u>
Substantiation: This definition is needed to clarify the elements of a PV system and to describe how the system relates to other electrical power production sources in terms of the number and grouping of disconnects and the requirements for safely disconnecting all sources of power from a building or structure.
Panel Meeting Action: Reject
Panel Statement: A definition exists in 690.2. The list of devices included is difficult to maintain and is unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-176 Log #2472 NEC-P04 **Final Action: Reject**
(690.2.Photovoltaic System Disconnecting Means)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following definition to 690.2
<u>**Photovoltaic System Disconnecting Means.** A system disconnecting means on the dc photovoltaic output circuit.</u>
Substantiation: Photovoltaic systems can be quite complex in terms of the number of photovoltaic source and output circuits (dc) and the location of the inverters. Many systems have inverters mounted inside the building with the PV disconnecting means on the dc circuit as it penetrates the building. Others have the inverters outside with only ac circuits penetrating the building. A definition of the PV system disconnecting means is needed to support the requirements for this disconnecting means established in 690.13 and 690.14. See related proposals for 690.13 and 690.14.
Panel Meeting Action: Reject
Panel Statement: The definition is self describing and is unnecessary. The term “photovoltaic output circuit disconnecting means” will be used, which contains all defined terms. Proposals that relied on this definition have been changed accordingly.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-177 Log #2473 NEC-P04 **Final Action: Accept in Principle**
(690.2.PV)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following definition to Section 690.2
<u>**PV.** The Abbreviation for photovoltaic in this Code</u>
Substantiation: This abbreviation, PV, is needed to reduce the use of the long and sometimes difficult-to-pronounce term “photovoltaic”. The use of the abbreviation will shorten the Code. The term “PV” should be substituted for “photovoltaic” in the second and subsequent uses in each section.
Panel Meeting Action: Accept in Principle
The Abbreviation for photovoltaic (PV) is to be added after the first occurrence of photovoltaic in Section 690.1.
Panel Statement: The panel recognizes that the scope is under the purview of the TCC. The panel requests that the TCC review the proposed change to the scope of Article 690. Use of acronyms per 3.2.3 is defined in the style manual.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-178 Log #2474 NEC-P04 **Final Action: Reject**
(690.2.Stand-Alone Inverter Output Circuit)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the new definition to 690.2
Stand-alone Inverter Output Circuit. Conductors between the output of an inverter in a stand-alone PV power system(s) and the utilization equipment. Also applies to the output conductors (not connected to a utility) of a utility-interactive inverter operating in off-grid stand-alone mode. The circuit can be and is normally energized independent of any utilization equipment.
Substantiation: This definition is needed to support the understanding of stand-alone system requirements. New inverters have been introduced which can include both utility-interactive and stand alone outputs. The stand alone outputs of these utility-interactive inverters do not include anti-islanding circuitry and are designed to remain energized during utility outages or when disconnected from the utility source. This definition, and the companion definition for Utility-interactive Inverter Output Circuit, are added to help clarify the different requirements which pertain to Stand-alone Inverter Output versus Utility-interactive Inverter Output of these multi mode devices. These new definitions also help to differentiate requirements of the utility-interactive inverter ac output connections, which are now covered by the requirements of Article 705 from stand-alone ac output connections, which are covered by Articles 690 and 702.
Panel Meeting Action: Reject
Panel Statement: The term is self defining.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-179 Log #2477 NEC-P04 **Final Action: Accept in Principle**
(690.2.Subarray)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following definition to 690.2
<u>**Subarray.** An electrical subset of a PV array consisting of any connected configuration of PV modules, interconnect devices, wired circuits and protection.</u>
Substantiation: The definition of subarray is needed to support requirements elsewhere in Article 690.
Panel Meeting Action: Accept in Principle
Revise the text in the definition of Subarray as follows: An electrical subset of a PV array. ~~consisting of any connected configuration of PV modules, interconnect devices, wired circuits and protection.~~
Panel Statement: Simplify and remove the list in the definition that may change over time.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-180 Log #2475 NEC-P04 **Final Action: Reject**
(690.2.Utility-Interactive Inverter Output Circuit)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the new definition to 690.2
<u>**Utility-interactive Inverter Output Circuit**. Conductors between the output of a utility-interactive inverter and the utilization equipment including the utility or other power production sources. The circuit is normally de-energized when the external source is disconnected.</u>
Substantiation: This definition is needed to provide a better understanding of Code requirements. New inverters have been introduced, which can include both utility-interactive and stand-alone outputs. The stand-alone outputs of these utility-interactive inverters do not include anti-islanding circuitry and are designed to remain energized during utility outages or when disconnected from the utility source. This definition, and the companion definition for Stand-alone Inverter Output Circuit, are added to help clarify the different requirements which pertain to Stand-alone Inverter Output versus Utility-interactive Inverter Output of these multi mode devices. These new definitions also help to differentiate the requirements of the utility-interactive inverter ac output connections, which are now covered by Article 705, from stand-alone ac output connections, which are now covered by Articles 690 and 702.
Panel Meeting Action: Reject
Panel Statement: The term is self defining.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BOWER, W.: Although the term is self defining, it clarifies often misinterpreted language in Article 690 and language now appearing in Article 705 associated with PV systems.

4-181 Log #597 NEC-P04 **Final Action: Accept in Principle**
(690.4(A))

Submitter: Mike Kunkel, Kunkel Electric, Inc.
Recommendation: Revise text as follows:
~~A~~ <u>One or more</u> solar photovoltaic system<u>(s)</u> shall be permitted to supply a building or other structure in addition to any service(s) of another electricity supply system(s).
Substantiation: Some inspectors are interpreting the “A” in the current NEC to mean that we are limited to one system on a building. This becomes a problem on large multi-tenant buildings.
230.2(A) allows “additional services”, and (5) addresses “parallel power production systems”.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 4-182.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-182 Log #2478 NEC-P04 **Final Action: Accept**
(690.4(A))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise 690.4(A) as follows:
690.4 Installation
(A) ~~Solar~~ Photovoltaic Systems. ~~A solar photovoltaic~~ Photovoltaic system<u>(s)</u> shall be permitted to supply a building or other structure in addition to any other electricity supply system(s).
Substantiation: The term “Solar” is deleted because it shortens the Code and does not need to be used throughout article 690 for clarity or understanding. The (s) is added to the word “system” to indicate that one or more PV systems may be added to a building that has other sources of supply. Many buildings such as malls and apartment houses now have a requirement that multiple individual PV systems be installed on a single building and connected to the utility service.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-183 Log #2479 NEC-P04 **Final Action: Accept in Principle**
(690.4(B))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the existing section 690.4(B) and add the new paragraphs.
(B) Conductors of Different Systems. Photovoltaic source circuits and ~~photovoltaic~~ <u>PV</u> output circuits shall not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as conductors, feeders or branch circuits of other <u>non-PV</u> systems, unless the conductors of the different systems are separated by a partition<u>.</u> ~~or are connected together.~~
<u>**1) Identification and Grouping.** PV system conductors shall be identified and grouped as required in 690.4 (B)(1) (A) through (D). The means of identification shall be permitted by separate color coding, marking tape, tagging, or other approved means.</u>
<u>**(A) Photovoltaic Source Circuits.** Where a PV system has more than one source or output circuit connected in parallel, either directly or through overcurrent protective devices, the parallel-connected conductors shall be identified at all points of termination, connection, and splices.</u>
<u>**(B) Photovoltaic Output and Inverter Circuits.** The conductors of PV output circuits and inverter input and output circuits shall be identified at all points of termination, connection, and splices.</u>
<u>**(C) Conductors of Multiple Systems.** Where the conductors of more than one PV system (subarray or inverter) occupy the same junction box, raceway, or equipment, the conductors of each system shall be identified at all termination, connection, and splice points.</u>
<u>*Exception: Where the identification of the conductors is evident by spacing or arrangement, further identification is not required.*</u>
<u>**(D) Grouping.** Where the conductors of more than one PV system (subarray or inverter) occupy the same junction box or raceway with removable cover(s), the ac and dc conductors of each system shall be grouped separately by wire ties or similar means at least once, and then shall be grouped at intervals not to exceed 1.8 m (6 ft).</u>
Exception: Where the association with and function within each system is evident by the spacing or arrangement, further grouping is not required.

Substantiation: The intent of this requirement is to minimize potentially hazardous contact with energized PV dc source and output conductors that are energized whenever the PV array is illuminated. The existing wording of this section is vague in that it is not clear that conductors connected together through an inverter are considered to be part of the same system. Current language could also be misconstrued in that lighting and other loads connected to the output of a PV system are indeed "connected together" with the PV source and input circuits by means of the inverter.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action on Proposal 4-184.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-184 Log #2480 NEC-P04 **Final Action: Accept in Principle**

(690.4(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by revising the numbering and lettering of (B) since there is only a (1) and no (2). Mandatory text must be used in the text in each exception to comply with the NEC Style Manual 2.6.1.

This action will be considered by the panel as a public comment.

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise the existing section 690.4(B) and add the new paragraphs.

(B) Conductors of Different Systems. Photovoltaic source circuits and ~~photovoltaic~~ PV output circuits shall not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as conductors, feeders or branch circuits of other non-PV systems, unless the conductors of the different systems are separated by a partition. ~~or are connected together.~~

1) Identification and Grouping. PV system conductors shall be identified and grouped as required in 690.4 (B)(1) (A) through (D). The means of identification shall be permitted by separate color coding, marking tape, tagging, or other approved means.

(A) Photovoltaic Source Circuits. Where a PV system has more than one source or output circuit connected in parallel, either directly or through overcurrent protective devices, the parallel-connected conductors shall be identified at all points of termination, connection, and splices.

(B) Photovoltaic Output and Inverter Circuits. The conductors of PV output circuits and inverter input and output circuits shall be identified at all points of termination, connection, and splices.

(C) Conductors of Multiple Systems. Where the conductors of more than one PV system (subarray or inverter) occupy the same junction box, raceway, or equipment, the conductors of each system shall be identified at all termination, connection, and splice points.

Exception: Where the identification of the conductors is evident by spacing or arrangement, further identification is not required.

(D) Grouping. Where the conductors of more than one PV system (subarray or inverter) occupy the same junction box or raceway with removable cover(s), the ac and dc conductors of each system shall be grouped separately by wire ties or similar means at least once, and then shall be grouped at intervals not to exceed 1.8 m (6 ft).

Exception: Where the association with and function within each system is evident by the spacing or arrangement, further grouping is not required.

Substantiation: The intent of this requirement is to minimize potentially hazardous contact with energized PV dc source and output conductors that are energized whenever the PV array is illuminated. The existing wording of this section is vague in that it is not clear that conductors connected together through an inverter are considered to be part of the same system. Current language could also be misconstrued in that lighting and other loads connected to the output of a PV system are indeed "connected together" with the PV source and input circuits by means of the inverter.

The additional requirements for grouping the conductors of each system will help service personnel distinguish the conductors of different systems. DC systems present some unique problems for service in that non-contact voltage testers, which can identify energized dc conductors, are not readily available for dc voltages. Distinguishing markings or groupings of circuit conductors for branch circuits and feeders in distribution systems is well-established and already required elsewhere in the *NEC* and can be accomplished simply using readily available means such as tags, ties, and tape. Identification of circuit conductors in power-distribution circuits is common practice and is required for multi-wire branch circuits and feeders. This provision would extend the same means of identification to the conductors of PV systems while being slightly more stringent when dc and ac conductors are accessible within the same raceway. (See 210.4, 210.5, and 215.12.)

Panel Meeting Action: Accept in Principle

Revise (A) as follows:

(A) Photovoltaic Source Circuits. Photovoltaic Source Circuits ~~Where a PV system has more than one source or output circuit connected in parallel, either directly or through overcurrent protective devices, the parallel-connected conductors~~ shall be identified at all points of termination, connection, and splices.

Revise (B) as follows:

(B) Conductors of Different Systems. Photovoltaic source circuits and ~~photovoltaic~~ PV output circuits shall not be contained in the same raceway, cable tray, cable, outlet box, junction box, or similar fitting as conductors, feeders, or branch circuits of other non-PV systems, unless the conductors of the different systems are separated by a partition.

(1) Identification and Grouping. PV system conductors shall be identified and grouped as required in 690.4 (B)(1) (a) through (d). The means of identification shall be permitted by separate color coding, marking tape, tagging, or other approved means.

(a) Photovoltaic Source Circuits. Photovoltaic source circuits shall be identified at all points of termination, connection, and splices.

(b) Photovoltaic Output and Inverter Circuits. The conductors of PV output circuits and inverter input and output circuits shall be identified at all points of termination, connection, and splices.

(c) Conductors of Multiple Systems. Where the conductors of more than one PV system (subarray or inverter) occupy the same junction box, raceway, or equipment, the conductors of each system shall be identified at all termination, connection, and splice points.

Exception: When the identification of the conductors is evident by spacing or arrangement, further identification is not required.

(d) Grouping. Where the conductors of more than one PV system (subarray or inverter) occupy the same junction box or raceway with removable cover(s), the ac and dc conductors of each system shall be grouped separately by wire ties or similar means at least once, and then shall be grouped at intervals not to exceed 1.8 m (6 ft).

Exception: When the association with and function within each system is evident by the spacing or arrangement, further grouping is not required.

Panel Statement: The panel clarified section (A), removing redundant language.

As per the NEC Style Manual subdivision example, subsection letters were changed from capital to lower case.

Where changed to when as appropriate in the exceptions.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-185 Log #2481 NEC-P04 **Final Action: Accept**

(690.4(C))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise the section as follows:

(C) Module Connection Arrangement. The connection to a module or panel shall be arranged so that removal of a module or panel from a photovoltaic source circuit does not interrupt a grounded conductor to ~~an~~other PV source circuits. ~~Sets of modules interconnected as systems rated at 50 volts or less, with or without blocking diodes, and having a single overcurrent device shall be considered as a single source circuit. Supplementary overcurrent devices used for the exclusive protection of the photovoltaic modules are not considered as overcurrent devices for the purposes of this section.~~

Substantiation: "Source circuits" are pluralized as this is the more general case. The following sentence "Sets of modules interconnected as systems rated at 50 volts or less, with or without blocking diodes, and having a single overcurrent device shall be considered as a single source circuit." is deleted because it no longer applies to today's installed PV systems where every string of photovoltaic modules must have overcurrent protection where subjected to external sources of overcurrent. This sentence was added to the Code when blocking diodes were in common use and were used in place of overcurrent devices. Parallel connections of modules without overcurrent protection was common on 12, 24, and 48-volt systems, but is no longer considered safe, nor Code compliant.

The sentence "Supplementary overcurrent devices used for the exclusive protection of the photovoltaic modules are not considered as overcurrent devices for the purposes of this section." is deleted because it is not technically correct (both conductors and PV modules may be protected by a single, properly rated, overcurrent device) and belongs in Section 690.9 where a proposal for a modified version of this requirement is being submitted.

The nearly universal use of modules with permanently attached wire leads and connectors makes it unlikely that this situation will occur. However, a few PV module manufacturers have modules with conduit-ready junction boxes still available on special order.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-186 Log #3662 NEC-P04 **Final Action: Reject**
(690.4(D))

Submitter: Keith W. Brand, Baton Rouge Area Electrical JATC
Recommendation: Add new text as follows:

690.4(D) Equipment. Inverters, motor generators, photovoltaic modules, photovoltaic panels, ac photovoltaic modules, source-circuit combiners, and charge controllers intended for use in photovoltaic power systems shall be identified and listed for the application and be installed by qualified persons with documented training and experience in the installation of and NEC requirements applicable to such equipment. The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation. Records of qualified persons must be furnished upon request to the local authority having jurisdiction.

Substantiation: Increasing numbers of Photovoltaic (PV) installations are becoming a hazard to the safety of the general populace and the durability of PV systems that are not correctly installed are also creating a hazard, i.e. according to the National Electrical Code specifications. Present day requirements and mandates to adhere to NEC specifications are not available from the Photovoltaics Industry. To require extensive knowledge of electrical systems and associated National Electrical Code specifications would undoubtedly increase the safety level for PV installations across the country; providing a service to the populace that wish to purchase and have installed for them, Photovoltaic Systems. Therefore it is proposed that extensive knowledge of training within the electrical safety codes and standards must be put in place to protect the people and property in which Photovoltaic systems are installed. The following excerpts and complete articles I have provided as references to support this proposal. The following information is provided by members of the Photovoltaics industry in which they recognize potential safety issues.

Perspectives on PV

Why Inspect PV Systems? Link: http://www.iaei.org/subscriber/magazine/07_f/wiles.html

From excerpt of article written by John Wiles for the IAEI Magazine.

...**But Not All Systems Are Code-Compliant and Durable**

Unfortunately, we are still a long way from that ideal scenario. While there are a few PV systems integrators (the larger companies) and other PV installers who have done dozens and possibly hundreds of PV installation, they are not common. PV installers, normally with little electrical installation experience, abound. They are familiar with neither Article 690 in the *NEC* covering PV systems nor the first four chapters of the Code that deal with the basics. On the other side of the installation/inspection equation, inspectors and plan reviewers have had little experience with the unique nature of PV systems and have not worked extensively with these new PV companies. new equipment (inverters and PV modules) is being introduced continually, and all involved with PV systems are hard-pressed to keep up with the ever-changing installation requirements due to the unique nature of each piece of equipment. Unfortunately, even a PV installer who has obtained the NABCEP (North American Board of Certified Energy Practitioners, www.nabcep.org) certificate by passing a 60-question written examination may not have extensive experience installing conventional residential or commercial electrical systems...

I have also provided a complete Article and following excerpt from:

PV INSTALLATIONS, A PROGRESS REPORT

John C. Wiles1, Bill Brooks2, Bob-O Schultze3

Southwest Technology Development Institute, Box 30001/MSC3SOL, Las Cruces, NM 88003, 2. Endecon Engineering, 873 Kells Circle, Vacaville, CA 95688, 3. Electron Connection, POB 203, Hornbrook, CA 96044

"...well-trained and experienced PV designers and installers following the best available information and codes are providing PV electrical power systems that are safe, durable, reliable, and well performing. About 50% of the surveyed installations met this goal [1,7,8,9]. However, the remaining 50% of the installed systems had deficiencies in these same areas of safety, reliability, durability, and performance...".

Additionally, the inclusion of the wording "qualified persons" does have precedence in the NEC.

See: 685.1 Scope.

This article covers integrated electrical systems, other than unit equipment, in which orderly shutdown is necessary to ensure safe operation. An integrated electrical system as used in this article is a unitized segment of an industrial wiring system where all of the following conditions are met:

(1) An orderly shutdown is required to minimize personnel hazard and electrical damage.

(2) The conditions of maintenance and supervision ensure that qualified persons service the system. **The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.**

A person designated as a qualified person shall possess the skills and knowledge related to the construction and operation of the electrical equipment and installation and shall have received documented safety training on the hazards involved. **Documentation of their qualifications shall be on file with the office of the establishment in charge of the completed installation.**

(3) Effective safeguards acceptable to the authority having jurisdiction are established and maintained.

Also:

215.2(B)(3) Supervised Installations. For supervised installations, feeder conductor sizing shall be permitted to be determined by qualified persons under engineering supervision. Supervised installations are defined as those portions of a facility where all of the following conditions are met:

(1) Conditions of design and installation are provided under engineering supervision.

(2) **Qualified persons with documented training and experience** in over 600-volt systems provide maintenance, monitoring, and servicing of the system. 215.2

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel supports installation of these systems by qualified persons. However, the NEC cannot contain requirements relative to the qualifications of installers for any electrical system, these requirements need to be handled by local or state qualification committees or licensing boards. See Annex H of the NEC for recommendations on establishing such bodies.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

STAFFORD, T.: This Panel Member has determined that extensive training is required for emerging technologies. Increasingly, documented evidence supports the claim for training and proof thereof as there are no license requirements in place for all personnel performing installations of PV. In the period of time between the ROP meeting and the panel voting it was discovered two additional concerns directly related to training with resulting injuries and fire damage. Such accidents occur directly as a result of lack of knowledge and understanding of electrical installation requirements. A large percentage of installers of PV have no electrical background and/or training and there is no license requirement in place to mandate this requirement. The panel statement "The NEC cannot contain requirements relative to the qualifications of the installers for any electrical system, these requirements need to be handled by local state qualification committees or licensing boards" is ineffective for the following reasons.

First, the NEC does contain requirements for qualifications of installers and maintaining documentation thereof, see Article 685 and substantiation provided in the original proposal by submitter. Article 685 describes industrial wiring system and details the importance of necessary training for the personnel involved. The same concerns are present for parallel energy sources. Specifically, an orderly shutdown of the PV system is required upon certain conditions, service of equipment requires someone knowledgeable in the functions and electrical characteristic thereof, and effective safeguards should be in place acceptable to the AHJ. The original proposal attempts to provide the safeguards that are critically needed by a growing industry. The panel may decide that article 685 is not relevant when determining if like requirements should be in place for article 690, but the panel cannot claim the affects are as critical to personnel and equipment.

Second, local license boards are not addressing the issue at a pace to insure safety for the consumer/user of Photovoltaic systems and for the personnel involved. There are several locations within the U.S that does not have any license or qualifications for those installing PV systems. Again, see substantiation provided by submitter.

TOOMER, R.: I realize the NEC can not mandate all electrical installations be installed by qualified persons, however in the NEC now there are exceptions to the NEC requirements if "qualified persons" maintain the systems in at least five locations, 250.52(1) Exception, 250.184(1) Exception 3, 250.186, 280.11, and 685.1(2).

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, however, the submitter is correct in his concern relative to requiring "qualified persons" to install these systems. This is extremely important for these systems to assure the safety or persons and property where these systems are utilized. Unfortunately the NEC is an installation document and not a qualification document. Any areas of the country that utilize any type of electrical licensing laws should be sure that their laws extend to these installations. Any areas of the country that do not have electrical licensing laws should refer to Annex H of the NEC and consider adopting it as a guide for qualified personnel performing electrical installations.

4-187 Log #2482 NEC-P04 **Final Action: Accept**
(690.4(E))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the new Section 690.4(E) as follows:
690.4(E) Circuit Routing. Photovoltaic source and PV output conductors, in and out of conduit, and inside of a building or structure, shall be routed along building structural members such as beams, rafters, trusses, and columns where the location of those structural members can be determined by observation. Where circuits are imbedded in built-up, laminate, or membrane roofing materials in roof areas not covered by PV modules and associated equipment, the location of circuits shall be clearly marked.
Substantiation: This proposal is derived from on-going discussions with firefighters throughout the country who have expressed concern about the safety of ventilating roofs where PV circuits are present. By routing these circuits along building structural elements, there is a lower probability that they will be contacted by the firefighters. This will increase safety for these personnel. Several PV module systems are integrated into the roof and the circuits associated with these must be marked on the surface of the roof. This circuit-routing requirement should appear in the *NEC* since building codes do not generally address electrical circuit routing.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ROGERS, J.: This proposal should have been rejected if for not other reason other than the fact that it does not meet the requirements for submitting an actual requirement. The portion referencing how to install wiring methods inside of buildings or structures is already covered in Chapter 3 of the NEC. The portion relative to marking is nondescript and unenforceable, there is no description as to what the marking is to state, how it is going to be applied or where it is going to be applied. If the issue is concern relative to firefighters encountering energized conductors and the concern is real then the original requirement for a disconnecting means located at a readily accessible location either inside or outside nearest the point of entrance of the conductors should be restored. The real problem here is that in recent code cycles this requirement has been lessened to the point that these conductors can be installed in unlimited lengths provided they are in metallic wiring methods. Having a disconnecting means in a readily accessible location remedies that problem as emergency response personnel could open that disconnect and then be assured that they would not have to deal with energized conductors running throughout the building.
ZINNANTE, V.: While I wholeheartedly support the safety and well-being of fire-fighting personnel, I am concerned on how this proposal is going to be enforced. Are the circuits going to be clearly marked on the roof, inside the membrane, inside the structure? What happens if the conductors are not run on the roof? It was not demonstrated to me how this “clearly marked” circuit will be visible and apparent to fire-fighting personnel or others trying to identify the PV circuit in an emergency.

4-188 Log #2483 NEC-P04 **Final Action: Accept in Principle**
(690.4(F))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the New paragraph and Exception to 690.4
690.4(F) Bipolar PV Systems. Where the sum, without consideration of polarity, of the PV system voltages of the two monopole subarrays exceeds the rating of the conductors and connected equipment, monopole subarrays in a bipolar PV system shall be physically separated, and the electrical output circuits from each monopole subarray shall be installed in separate raceways until connected to the inverter. The disconnecting means and overcurrent protective devices for each monopole subarray output shall be in separate enclosures. All conductors from each separate monopole subarray shall be routed in the same raceway.
Exception: Listed switchgear containing a physical barrier separating the disconnecting means for each monopole subarray shall be permitted to be used instead of disconnecting means in separate enclosures.
Substantiation: See related proposal for 690.2 defining a monopole subarray. It is imperative that the positive and negative conductors of a bipolar PV array not come into contact with each other. If they come into contact, the sum of the open-circuit monopole subarray voltages (usually between 800 and 1200 volts) may be applied to switchgear, conductors, PV modules, and other equipment listed for 600 volts. Series-circuit breaks, line-to-line faults, and line-to-ground faults must be avoided. Equipment has been damaged and fires started in the past when faults of these types have occurred on bipolar PV systems.
Underwriters Laboratories is revising UL 1741 to address similar requirements in the bipolar inverter where physically separate subarray inputs will be required as well as internal partitions that keep these circuit conductors apart until they are connected to the internal wiring of the inverter.
Panel Meeting Action: Accept in Principle
Revise the exception to begin: Listed switchgear rated for the maximum voltage between circuits containing a physical barrier separating the disconnecting means for each monopole subarray shall be permitted to be used instead of disconnecting means in separate enclosures.
Revise the Exception to read:
Exception: Listed switchgear rated for the maximum voltage between circuits containing a physical barrier separating the disconnecting means for each monopole subarray shall be permitted to be used instead of disconnecting means in separate enclosures.
Panel Statement: The panel clarified by revising the wording that the switchgear needs to be rated for the voltages involved.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BOWER, W.: The language “circuits containing a physical barrier....” does not make sense. I suggest a better change would be to read “circuit wiring and hardware using a physical barrier that separates.....”.

4-189 Log #2484 NEC-P04 **Final Action: Accept**
(690.4(G))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following new paragraph and exception to 690.4:
690.4 Installations
(G) Multiple Inverters. A PV system shall be permitted to have multiple utility-interactive inverters installed in or on a single building or structure. Where the inverters are remotely located from each other, a directory in accordance with 705.10 shall be installed at each dc PV system disconnecting means, each ac disconnecting means and at the main service disconnecting means showing the location of all ac and dc PV system disconnecting means in the building.
Exception: A directory shall not be required where all inverters and PV dc disconnecting means are grouped at the main service disconnecting means.
Substantiation: PV installations may consist of a number of small (1-7 kW) utility-interactive inverters installed on a building or structure. These multiple inverters are connected in parallel with the existing utility service following the requirements of this Code as allowed by 690.64, 705.12 and 230.2. They operate independently and are designed to operate safely in this manner. There is no safety or operational reason that would preclude the installation of multiple inverters on a single building or connected to a single utility feeder.
Where these inverters are not co-located, a directory shall be required at each dc PV disconnecting means to identify the location of all PV disconnecting means. This directory will facilitate the rapid disconnect of all energized conductors from the PV array(s).
In some cases, all inverters and their associated dc PV disconnecting means are located at the service disconnect, and no directory would be required.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
DEATON, R.: The term “utility” refers to a utility supplying electrical power.

4-190 Log #2485 NEC-P04 **Final Action: Reject**
(690.4(H))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following new section to 690.4
690.4 Installation.
(H). Multiple Inverter Input Circuits. Each utility-interactive inverter shall be permitted to have multiple PV source or PV output circuits connected to the inverter input circuit(s) where the inverter is identified and labeled to accommodate multiple inputs.
Substantiation: Small PV systems with 1-3 kW inverters may have only a single string of PV modules and a single PV output circuit connected to the utility-interactive inverter, particularly when large, high-wattage PV modules are used. However, many inverters have combining circuits or bus bars at their inputs that accept and properly combine multiple PV output circuits into a single inverter. Instructions and labels on appropriately identified inverters show how these inputs are to be connected.
Panel Meeting Action: Reject
Panel Statement: The panel agrees that this is unnecessary additional code language. No problem statement to substantiate was provided.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-191 Log #26 NEC-P04 **Final Action: Reject**
(690.5)

NOTE: This proposal appeared as Comment 13-28 on Proposal 13-22 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-22 was:

Revise the section as follows:

690.5 Ground-Fault Protection. ~~Roof-mounted dc photovoltaic arrays located on dwellings shall be provided with dc ground-fault protection to reduce fire hazards.~~
Grounded dc photovoltaic arrays shall be provided with dc ground-fault protection meeting the requirements of 690.5 (A) through (C) to reduce fire hazards. Ungrounded dc photovoltaic arrays shall comply with 690.35.
Exception 1: Ground-mounted or pole-mounted photovoltaic arrays with not more than two paralleled source circuits and with all dc source and dc output circuits isolated from buildings shall be permitted without ground-fault protection.
Exception 2: PV arrays mounted on other than dwelling units shall be permitted without ground-fault protection if each equipment-grounding conductor has an ampacity of at least two (2) times the temperature and conduit fill corrected circuit conductor ampacity.
Submitter: John C. Wiles, Southwest Technology Development Institute, New Mexico State University / Rep. PV Industry Forum
Recommendation: The original Proposal should be accepted as the Panel Action indicates. A revision is made to EX 2 as follows and a FPN is added for clarity:
Exception 2: PV arrays mounted on other than dwelling units shall be permitted without ground-fault protection if each equipment-grounding conductor, the grounded circuit conductor, and the dc grounded conductor-to-ground bonding conductor has an ampacity of at least 2.8 times the module rated short-circuit current. The ampacity in the equipment-grounding conductors shall be adjusted for the conditions of use including temperature and conduit fill where applicable. No increase in size is required if circuit conductors are oversized.
FPN to EX 2. Where the system and equipment does not employ a ground fault detection device that interrupts the fault current, the equipment-grounding conductors, grounded circuit conductors and the dc grounded conductor-to-ground bonding conductor can carry ground-fault currents continuously, and these currents can be insufficient to cause operation of any overcurrent devices. The equipment-grounding conductors should have conditions-of-use adjustment factors applied.
Substantiation: Many systems will employ equipment that meets the basic requirements of 690.5. See attached explanatory materials.
The revision to EX 2 clarifies the exact ampacity requirement of the equipment grounding conductors, grounded circuit conductors, and the dc system ground-bonding conductor as 2.8 times the module rated short-circuit current and points out that the ampacity should be adjusted for conditions of use, since, under fault conditions, they may have to carry the fault currents continuously where the fault currents are insufficient to operate any overcurrent devices. All conductors that may be subject to these higher ground fault currents are required to be oversized. Note this is not an issue of voltage drop or conductor size limiting the operation of overcurrent devices, it is a problem of insufficient, although somewhat larger than normal, over currents. The FPN is added for clarity.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: This has already has been addressed in the 2008 NEC in 690.45. No further action is necessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-192 Log #1966 NEC-P04 **Final Action: Reject**
(690.5(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Insert “durable” between “a: and :warning”.
Substantiation: Edit. The label should be suitable for the enviroment.
Panel Meeting Action: Reject
Panel Statement: This is a general requirement of all labels and will overly clutter the code by adding “durable” in front of every reference to a label.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-193 Log #2486 NEC-P04 **Final Action: Accept**
(690.7(A), FPN)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add this FPN:
690.7(A) FPN
FPN: One source for statistically valid, lowest-expected, ambient temperature design data for various locations is the Extreme Annual Mean Minimum Design Dry Bulb Temperature found in the *ASHRAE Handbook — Fundamentals*. These temperature data can be used to calculate maximum voltage using the manufacturer’s temperature coefficients relative to the rating temperature of 25°C.
Substantiation: This FPN provides clarity to the ambiguous requirement of “lowest-expected temperature” in 690.7(A). The design of PV systems is heavily reliant on an accurate estimate of maximum voltage since it limits the operating voltage at high temperatures. An overly-conservative, lowest-expected temperature (e.g., all-time record low) will yield an overly-conservative estimate of maximum voltage resulting in a lower-than necessary operating voltage on hot summer days. Of all the data provided by the tables in the *ASHRAE Handbook—Fundamentals*, the “Extreme Annual Mean Minimum Design Dry Bulb Temperature” most closely matches the concerns of the *National Electrical Code* by establishing a statistically valid, lowest-expected operating temperature value to use for any table that establishes low-temperature correction factors. These extreme temperature values provide a probability of occurrence that is sufficiently low. Table 690.7 assumes that irradiance is at 1000 W/m2. The most likely scenario for highest voltage will occur on cold mornings at the end of an extreme nighttime temperature when the irradiance is likely to be 200-300 W/m2 before heating of the module reduces voltage. For representative crystalline silicon products, the open-circuit voltage under these extreme conditions will be 90% of the 1000 W/m2 values providing an additional safety factor in the use of the “Extreme Annual” temperature value from ASHRAE. This safety factor is useful because the actual module temperatures may be a few degrees lower than the ambient temperatures due to night-sky radiation effects.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-193a Log #CP400 NEC-P04 **Final Action: Accept**
(690.7(C))

Submitter: Code-Making Panel 4,
Recommendation: Change Part roman numeral I to IX in the last sentence of 690.7(C) to resolve a typographical error.
Substantiation: Correct typographical error.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-194 Log #2487 NEC-P04 **Final Action: Accept in Principle**
(690.7(E)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with the NEC Style Manual 3.1 and use the term “shall be permitted” instead of “may”.
This action will be considered by the panel as a public comment.
Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the section as follows and add the exception:
(1) One conductor of each circuit of a bipolar subarray is solidly grounded.
Exception: The operation of ground-fault or arc-fault devices (abnormal operation) may interrupt this connection to ground where the entire bipolar array becomes two distinct arrays isolated from each other and the utilization equipment.
Substantiation: The phrase “of a bipolar subarray” is added for clarity because the entire section is referring to bipolar systems.

Exception: Ground-fault equipment (690.5) may activate switchgear that automatically separates the bipolar array into two isolated monopole arrays that cannot combine to produce voltages that exceeds wiring and switchgear ratings.
Panel Meeting Action: Accept in Principle

Revise text to read:
(1) One conductor of each circuit of a bipolar subarray is solidly grounded.
Exception: The operation of ground-fault or arc-fault devices (abnormal operation) may interrupt this connection to ground when the entire bipolar array becomes two distinct arrays isolated from each other and the utilization equipment.
Panel Statement: The word “where” was changed to “when” to comply with the NFPA Manual of Style.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-195 Log #2488 NEC-P04 **Final Action: Accept in Principle**
(690.8(B))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise as shown
(B) Ampacity and Overcurrent Device Ratings. Photovoltaic system currents shall be considered to be continuous.
~~(1) Sizing of Conductors and Overcurrent Devices. The circuit conductors and overcurrent devices shall be sized~~
(1) Overcurrent Devices. Overcurrent devices, where required, shall be rated as required by 690.8(B)(1)(a) through 690.8(B)(1)(d).
(a) To carry not less than 125% of the maximum currents calculated in 690.8(A).
Exception: Circuits containing an assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be ~~utilized~~ used at 100 percent of its rating.
(b) Terminal temperature limits shall be in accordance with 110.3(B) and 110.14(C).
(c) Where operated at temperatures greater than 40°C, manufacturer's temperature correction factors shall apply.
(d) The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B), 240.4(C), and 240.4(D).
(2) Internal Current Limitation. Overcurrent protection for photovoltaic output circuits with devices that internally limit the current from the photovoltaic output circuit shall be permitted to be rated at less than the value calculated in 690.8(B)(1). This reduced rating shall be at least 125 percent of the limited current value. Photovoltaic output conductors shall be sized in accordance with 690.8(B)(1).
(2) Conductor ampacity. Circuit conductors shall be sized to carry not less than the larger of 690.8(B)(2)(a) or 690.8(B)(2)(b).
(a) One hundred and twenty-five percent of the maximum currents calculated in 690.8(A) without any additional correction factors for conditions of use.
~~*Exception: Circuits containing an assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be utilized at 100 percent of its rating.*~~
(b) The maximum currents calculated in 690.8(A) after conditions of use have been applied.
(c) The conductor selected, after application of conditions of use, shall be protected by the overcurrent protective device, where required.
Substantiation: The proposed changes align the rating of overcurrent devices and the sizing of conductors for PV system circuits with the rating and sizing of overcurrent devices and conductors in other electrical power systems as required in Chapter 2 of the Code. This section in the *2008 NEC* was not specific and did not adequately define the requirements as they apply to common PV installations.
The second Exception is deleted because it applies only to the rating of overcurrent devices and not to sizing conductors.
The previous (2) is deleted because this was applied to PV charge controllers and is now covered by a proposal for 690.72(C).
The word "utilized" is replaced by the more correct term "use" and minimizes the unnecessary use of verbose words.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(c) ~~Where~~ When operated at temperatures greater than 40°C, manufacturer's temperature correction factors shall apply.
(d) The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B), 240.4(C), and 240.4(D).
(2) Conductor Ampacity. Circuit conductors shall be sized to carry not less than the larger of 690.8(B)(2)(a) or 690.8(B)(2)(b).
(a) One hundred and twenty-five percent of the maximum currents calculated in 690.8(A) without any additional correction factors for conditions of use.
Panel Statement: The word "where" was changed to "when" to comply with the NFPA Manual of Style.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
WILLS, R.: I agree with the changes in general, however there was no substantiation for the deletion of 690.8(B).. the section beginning "Internal Current Limitation". There are circumstances where this allowance is necessary for equipment design. For example, a charge controller that internally limits to 3A would be fine on a 5 A fuse even though the 690.8(A) calculated current could be higher. This is akin to allowing load overcurrent protection to be smaller than the source maximum, as is allowed in other parts of the code.

4-196 Log #2489 NEC-P04 **Final Action: Accept**
(690.9(A) Exception)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the section as follows:
Exception: An overcurrent device shall not be required for PV modules or PV source circuit conductors sized in accordance with 690.8(B), where one of the following apply:
(a) There are no external sources such as parallel-connected source circuits, batteries, or backfeed from inverters.
(b) The short-circuit currents from all sources do not exceed the ampacity of the conductors or the maximum overcurrent protective device size specified on the PV module nameplate.
Substantiation: Where there are no overcurrents that can damage either a conductor or a PV module, there is no requirement to protect that conductor or PV module with an overcurrent protective device. Module output currents are inherently current limited and, under the very worst-case conditions, are unlikely to exceed 1.25 times the rated short-circuit current (Isc) from the module. All interconnecting conductors are rated for 1.56 Isc (1.25 x 1.25 Isc) or greater. Only external sources can provide significant overcurrents, and if those sources do not exist or are lower in value than the conductor ampacity or the maximum module reverse current (specified by the size of the overcurrent device on the module label), then no overcurrent device is needed.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-197 Log #2490 NEC-P04 **Final Action: Accept**
(690.9(B) Exception)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the Exception as shown:
690.9(B) Power Transformers.
Exception: A power transformer with a current rating on the side connected toward the ~~PV power source~~ utility-interactive inverter output, not less than the ~~short-circuit~~ rated continuous output current of the inverter, shall be permitted without overcurrent protection from ~~that source~~ the inverter.
Substantiation: Under short-circuit conditions, the anti-islanding circuits required by UL Standard 1741 in all utility-interactive inverters, sense the near zero voltage and cause the inverters to shut down within 0.1 seconds. These inverters cannot operate when connected to a short circuit. Transformer protection is more properly afforded by comparing the transformer rating to the continuous rated output of the inverter.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-198 Log #3635 NEC-P04 **Final Action: Reject**
(690.9(C))

Submitter: Greg Chontow, Hopatcong, NJ
Recommendation: Revise text to read as follows:
"...shall be ~~accessible but not required to be~~ readily accessible.
Substantiation: Overcurrent devices that are not readily accessible may be difficult and labor intensive if servicing is required.
Panel Meeting Action: Reject
Panel Statement: Ready access will rule out more than half of the PV systems being installed. A commercial rooftop is not readily accessible.
PV often is installed on rooftops where ladders or other means are required for access. Rooftops are usually not readily accessible per the definition in Article 100. Fuses and overcurrent devices included in combiner boxes on the roof seldom fail and are not required to be operated in an emergency. The proposal as submitted is too restrictive, and the submitter has not presented any technical data to support the requirement that these supplemental overcurrent devices be readily accessible.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-199 Log #1965 NEC-P04 **Final Action: Reject**
(690.9(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Fuses and circuit breakers used in any portion of a photovoltaic power system shall be listed for use in dc circuits, have voltage ratings not less than the circuit voltage, and current ratings in accordance with 690.8.
(B) Interrupting ratings shall not be less than the available fault current at their terminals.
Substantiation: Edit. "Appropriate " is subjective and a term to be avoided per the Style Manual. Proposal is more specific.
Panel Meeting Action: Reject
Panel Statement: The proposal as submitted does not add any clarity to the existing language. The submitter has not presented any technical data to support the change. The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-200 Log #2491 NEC-P04 **Final Action: Accept in Part**
(690.9(E))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the section as follows:
(E) Series Overcurrent Protection. In ~~series-connected strings of two or more modules~~ PV source circuits, a single overcurrent device shall be permitted to protect the PV modules and the interconnecting conductors.
FPN: Fuses and circuit breakers are equivalent forms of overcurrent protection in this application.
Substantiation: Some electrical inspectors have not been accepting a single, properly rated overcurrent device to protect both the conductor and the PV modules in a series-connected source circuit. This revision clarifies that intent.
The FPN addresses the fact that a few inspectors in major jurisdictions are taking the fuse requirement marking on the back of the modules literally and are not allowing the use of circuit breakers that provide equivalent protection. They use 110.3(B) as justification, and the requirement on certain control equipment that a fuse must be used.
UL is changing the marking requirements in UL 1703 to require that the module label specify a "maximum overcurrent device."
Panel Meeting Action: Accept in Part
The panel accepts the revisions to (E). The panel does not accept the addition of the fine print note.
Panel Statement: The FPN is not necessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-201 Log #4143 NEC-P04 **Final Action: Reject**
(690.10)

Submitter: Robert H. Wills, Intergrid, LLC / Rep. American Wind Energy Association
Recommendation: Revise text to read as follows:
690.10 Stand-Alone Systems.
The premises wiring system shall be adequate to meet the requirements of this Code for a similar installation connected to a service. The wiring on the supply side of the building or structure disconnecting means shall comply with the requirements of Article xxx. ~~this Code except as modified by 690.10(A) through (D).~~
~~(A) Inverter Output. The ac output from a stand-alone inverter(s) shall be permitted to supply ac power to the building or structure disconnecting means at current levels less than the calculated load connected to that disconnect. The inverter output rating or the rating of an alternate energy source shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.~~
~~A stand-alone residential or commercial PV installation may have an ac output and be connected to a building wired in full compliance with all articles of this Code. Even though such an installation may have service-entrance equipment rated at 100 or 200 amperes at 120/240 volts, there is no requirement that the PV source provide either the rated full current or the dual voltages of the service equipment. While safety requirements dictate full compliance with the ac wiring sections of the Code, a PV installation is usually designed so that the actual ac demands on the system are sized to the output rating of the PV system. The inverter output is required to have sufficient capacity to power the largest single piece of utilization equipment to be supplied by the PV system, but the inverter output does not have to be sized for the potential multiple loads to be simultaneously connected to it. Lighting loads are managed by the user based on the available energy from the PV system.~~
~~(B) Sizing and Protection. The circuit conductors between the inverter output and the building or structure disconnecting means shall be sized based on the output rating of the inverter. These conductors shall be protected from overcurrents in accordance with Article 240. The overcurrent protection shall be located at the output of the inverter.~~
~~(C) Single 120-Volt Supply. The inverter output of a stand-alone solar photovoltaic system shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the rating of the overcurrent device connected to the output of the inverter shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:~~
~~WARNING~~
~~SINGLE 120-VOLT SUPPLY. DO NOT CONNECT~~
~~MULTIWIRE BRANCH CIRCUITS!~~
~~Multiwire branch circuits are common in one- and two-family dwelling units. When connected to a normal 120/240-volt ac service, the currents in the neutral conductors of these multiwire branch circuits (typically 14-3 AWG) subtract or are, at most, no larger than the rating of the branch-circuit overcurrent device. When these electrical systems are connected to a single 120-volt PV power system inverter by paralleling the two ungrounded conductors in the service entrance load center, the currents in the neutral conductor for each multiwire branch circuit add rather than subtract. The currents in the neutral conductor may be as high as twice the rating of the branch-circuit overcurrent device. With this configuration, neutral conductor overloading is possible.~~
~~(D) Energy Storage or Backup Power System Requirements. Energy storage or backup power supplies are not required.~~
Article 70X – Stand-Alone Electric Systems
Scope: This Article covers electric systems that supply power independently of the electric production and distribution network.
70X.1 Stand-Alone Systems.
The premises wiring system shall be adequate to meet the requirements of this Code for a similar installation connected to a service. The wiring on the supply side of the building or structure disconnecting means shall comply with this Code except as modified by 690.10(A) through (D).
(A) Inverter Output. The ac output from a stand-alone inverter(s) shall be permitted to supply ac power to the building or structure disconnecting means at current levels less than the calculated load connected to that disconnect. The inverter output rating or the rating of an alternate energy source shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.
A stand-alone residential or commercial PV installation may have an ac output and be connected to a building wired in full compliance with all articles of this Code. Even though such an installation may have service-entrance equipment rated at 100 or 200 amperes at 120/240 volts, there is no requirement that the PV source provide either the rated full current or the dual voltages of the service equipment. While safety requirements dictate full compliance with the ac wiring sections of the Code, a PV installation is usually designed so that the actual ac demands on the system are sized to the output rating of the PV system. The inverter output is required to have sufficient capacity to power the largest single piece of utilization equipment to be supplied by the PV system, but the inverter output does not have to be sized for the potential multiple loads to be simultaneously connected to it. Lighting loads are managed by the user based on the available energy from the PV system.
(B) Sizing and Protection. The circuit conductors between the inverter output and the building or structure disconnecting means shall be sized based on the output rating of the inverter. These conductors shall be protected from overcurrents in accordance with Article 240. The overcurrent protection shall be located at the output of the inverter.
(C) Single 120-Volt Supply. The inverter output of a stand-alone solar photovoltaic system shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the rating of the overcurrent device connected to the output of the inverter shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:
WARNING
SINGLE 120-VOLT SUPPLY. DO NOT CONNECT
MULTIWIRE BRANCH CIRCUITS!
Multiwire branch circuits are common in one- and two-family dwelling units. When connected to a normal 120/240-volt ac service, the currents in the neutral conductors of these multiwire branch circuits (typically 14-3 AWG) subtract or are, at most, no larger than the rating of the branch-circuit overcurrent device. When these electrical systems are connected to a single 120-volt PV power system inverter by paralleling the two ungrounded conductors in the service entrance load center, the currents in the neutral conductor for each multiwire branch circuit add rather than subtract. The currents in the neutral conductor may be as high as twice the rating of the branch-circuit overcurrent device. With this configuration, neutral conductor overloading is possible.
(D) Energy Storage or Backup Power System Requirements. Energy storage or backup power supplies are not required.

Substantiation: The section on the application of inverters in stand-alone systems Article 690 is applicable to systems other than photovoltaics. In writing the new proposed article for Small Wind Electric Systems, we copied this language verbatim. These requirements should apply to any stand-alone system, and thus should be moved to a general section of the code.

The problem — language duplicated in several articles, and not being applied for other situations where it is relevant — e.g. small wind, hydro, and something that will be important in the near future — electric vehicles as a power source.

The solution — Create a new article. I believe that this language belongs along side Article 705. If so moved, the same language in the proposed small wind electric system article could be deleted.

Panel Meeting Action: Reject

Panel Statement: The new article is incomplete as proposed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

WILLS, R.: The committee rejected this proposals more due to lack of time than lack of substantiation.This issue of moving common language to a suitable common article should be addressed at the ROC meeting. There is also the procedural question as to whether a CMP can create a new article. (Note that I am the author of this proposal).

Stand-alone power systems are essentially a missing section of the code. We have 705 - Interconnected Electric Power Production Sources, and 702 Optional Standby Systems, but there is no section for non-interconnected prime-power systems. Such systems are relatively common, in the form of hybrid battery/inverter/generator systems often powered by solar PV or Wind. There are an estimated 100,000 such systems in the USA. They cannot be classed as standby systems as they do not run in standby service.

There should be an article between 702 and 705 that deals with the specifics of stand-alone power systems (TCC please take note). This new article needs to encompass the needs of small off-grid house power systems and also prime-power off-grid generator sites. To this end, I will communicate with members of CMP13 (Article 445 generators) and provide a draft for a complete “Article 70x Stand-Alone Power Systems” article during the comment period.

4-202 Log #1456 NEC-P04 **Final Action: Reject**
(690.10(E))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Change “panels” to “equipment”.

Substantiation: Edit. The provision should apply where the distribution equipment is a switch(es) or circuit breaker(s) not part of a panelboard.

Panel Meeting Action: Reject

Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-203 Log #2492 NEC-P04 **Final Action: Accept in Principle**
(690.10(E))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Add the following new section:

690.10(E) Backfed Circuit Breakers. Backfed circuit breakers connected to a stand-alone inverter output in either stand-alone or utility-interactive systems shall be identified and listed for backfeeding and shall be secured in accordance with 408.36(D).

Substantiation: More than 95% of the PV installations are accomplished with utility-interactive inverters that are exempt from having the output back-fed circuit breakers clamped to the panel busbar as permitted by 690.64(B)(5) and (6) and 705.12(D)(5) and (6). Inverters in stand-alone systems and the stand-alone outputs of utility-interactive inverters act as voltage sources without anti-islanding circuits. The stand-alone output circuit does not shut down when the utility-interactive output circuits are disconnected. Installers familiar with utility-interactive systems may fail to clamp the back fed circuit breaker connected to output of a stand-alone inverter or the output of an inverter in a utility-interactive system. Such a circuit breaker represents a safety hazard if inadvertently unplugged from a panel board when energized.

Panel Meeting Action: Accept in Principle

Revise the wording as follows:

690.10(E) Backfed Circuit Breakers. Plug-in type backfed ~~Backfed~~ circuit breakers connected to a stand-alone inverter output in either stand-alone or utility-interactive systems ~~shall be identified and listed for backfeeding and~~ shall be secured in accordance with 408.36(D). Circuit breakers that are marked line and load shall not be backfed.

Panel Statement: Circuit breakers are not “identified” for back feed use. The only identification is that the circuit breaker would not be marked Line and Load. The requirement is only applicable to plug-in breakers and all breakers are not plug in. The referenced Section – 408.36 – clearly only has the requirement for plug-in circuit breakers.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

DEATON, R.: The term “utility” refers to a utility supplying electrical power.

STAFFORD, T.: This panel member has a concern that by having the terms backfed circuit breaker and utility-interactive system in the same sentence it could be confusing to installers and inspectors as to what breaker we are talking about. A breaker that is connected to the stand alone output of a utility-interactive inverter is feeding a critical load panel and not backfeeding a panel unless it is attached to the side terminals of a subpanel that it is feeding. It is already required under 408.36(D) to secure the feed or supply to that sub-panel’s bus.

4-204 Log #2493 NEC-P04 **Final Action: Accept in Principle**
(690.11)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Add the following new section to Article 690.

690.11. DC Arc-fault Circuit Protection. PV systems with dc source and/or output circuits on or penetrating a building operating at a system voltage of 80 volts or greater shall be protected with a listed direct-current, arc-fault circuit interrupter (DCAFCI), PV Type, or other system components listed to provide equivalent protection. The PV Arc-Fault Protection System shall comply with 690.11 (A) through 690.11(D).

(A). The system shall detect series arcing faults in the direct current PV source and output circuits.

(B). The system shall interrupt the arc-fault currents.

(C). The system shall disable or disconnect inverters or charge controllers connected to the faulted circuit when a fault is detected. The system shall require that the disabled or disconnected equipment be manually reconnected and restarted.

(D). The system shall have an annunciator that must be manually disabled.

Exception: Complete, listed PV systems with no accessible dc circuits or components.

Substantiation: PV systems are subjected to extreme environmental conditions including wind, rain, snow, ice, UV radiation, and temperature extremes. The systems are installed in dwellings and commercial locations and are not routinely inspected or maintained by qualified people. These systems, as they deteriorate over time, will eventually develop insulation failures or internal PV module conductor faults. Even new modules with manufacturing defects have faulted and caught fire. These failures will result in fault currents and/or series arcing faults. These fault currents and any arcs are direct current (dc) and are far more difficult to deal with since the arcs are not self extinguishing 120 times per second as are alternating current (ac) arcs. These faults may occur anywhere in the dc system. A voltage of 50V was selected since it applies to nearly all PV systems on buildings that could pose hazards. This would exempt 12V and most 24V PV systems and other similar systems at these operating voltages powered by PV modules

The proposal is written to require that the series arcs be detected and the connected equipment turned off. Audible and visual alarms must manually be turned off to ensure that attention is paid to the faults. It would be premature, at the time this requirement will be enacted, to direct the location of the interruption device or the means of achieving that interruption. It is anticipated that a low cost integrated circuit will be developed that will go into utility-interactive inverters and charge controllers that will sense the series arc fault and turn off the inverter which will interrupt the series arc fault current.

The *Exception* is included to allow for newly developed and evolving complete systems that use highly integrated circuits imbedded in PV modules or packaged systems. These systems will be listed for safety, hence no requirements are needed in the *NEC*.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action on Proposal 4-205.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1

Explanation of Negative:

YOUNG, J.: See comment on 4-205.

Explanation of Abstention:

BOWER, W.: Although I agree that arc faults must be addressed, I am very concerned that this is mandatory language for devices that do not exist and for which there are no set points to address a wide variety of PV system sizes ranging from less than 100 watts to hundreds of kilowatts. Arc fault studies must be completed and device performance verified. I believe the public comment period will provide updates on device availability.

Comment on Affirmative:

ZINNANTE, V.: This proposal was accepted in principal and referenced to proposal 4-205 which states that while products are not available presently, the standards for a commercial product would be developed by the ROP in December 2009 and ultimately a commercial product would be available by the time of publication of the 2011 NEC. If this is not the case, then serious consideration should be taken at the ROP to reject this proposal as written because there will be no commercial product readily available at the time of publication.

4-205 Log #2748 NEC-P04 **Final Action: Accept**
(690.11 (New))

Submitter: Timothy P. Zgonena, Underwriters Laboratories Inc.
Recommendation: Add new text to read as follows:
690.11 Arc-Fault Circuit Protection (DC). PV systems with dc source and/or output circuits on or penetrating a building operating at a PV system maximum system voltage of 80 volts or greater shall be protected by a listed (DC) arc-fault circuit interrupter, PV type, or other system components listed to provide equivalent protection. The PV arc-fault protection means shall comply with the following requirements:
(1) The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the direct current PV source and output circuits.
(2) The system shall disable or disconnect one of the following:
a. Inverters or charge controllers connected to the fault circuit when the fault is detected
b. The system components within the arcing circuit
(3) The system shall require that the disabled or disconnected equipment be manually restarted.
(4) The system shall have an annunciator that must be manually disabled.
Substantiation: PV systems may be subjected to extreme environmental conditions including wind, rain, snow, ice, dirt, and temperature extremes. The systems are installed on or near dwellings and commercial locations where they may not be routinely inspected or maintained by qualified people. These systems, can deteriorate over time, and eventually develop insulation failures or internal PV module conductor faults. Under rare occasions, new modules with manufacturing defects have faulted and caught fire. These failures will result in fault currents and/or arcing faults. These fault currents, including arcing faults, are direct current (dc) and are far more difficult to interrupt than ac faults because of the non-time varying (non-zero crossing) nature of dc. Series arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component are most prevalent and may occur anywhere in the dc system. Fault currents to ground will be detected by the ground-fault protection required by Sec. 690.5(A).

Drawing on the success of arc-fault circuit interrupter protection for dwelling unit branch circuits as described in Sec. 210.12, UL has formed a PV AFCI Ad Hoc Working Group. This group, which consists of AFCI manufacturers and PV experts and system manufacturers, is assisting UL with the research and standards development activities related to requirements for arc-fault circuit interrupter protection for PV system applications. The goal of this effort is to have requirements for a PV AFCI developed by 2009 to enable the Listing of PV AFCIs in 2010 prior to the Publication of the 2011 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 1 Abstain: 1
Explanation of Negative:
YOUNG, J.: There are no dc rated AFCI devices available and there are no requirements developed for such devices. While there may be a need for such a device it is too early to put a requirement in the Code.
Explanation of Abstention:
BOWER, W.: Although I agree that arc faults must be addressed, I am very concerned that this is mandatory language for devices that do not exist and for which there are no set points to address a wide variety of PV system sizes ranging from less than 100 watts to hundreds of kilowatts. Arc fault studies must be completed and device performance verified. I believe the public comment period will provide updates on device availability.
Comment on Affirmative:
STAFFORD, T.: This panel member recognizes the need for DC arc fault detection and encourages the implementation of such devices when available. It is understood by the panel that testing agencies are to have devices in place, for use; by the time the panel meets for the ROC. At that time, technical substantiation and availability will be reviewed as to performance and installation requirements and listing.
ZGONENA, T.: I would like to thank the panel for its support of this proposal. UL has scheduled a three-day PV AFCI Ad Hoc meeting starting on April 7, 2009 to quickly develop safety requirements for PV AFCI products. These published requirements will allow for the Listing of PV AFCI products as well as PV products that include PV AFCI protection. It is expected that these PV AFCI safety requirements will be published and Listed products will be commercially available by the time that the 2011 NEC is published. In the event that this process encounters delays, the proposal should be modified to allow for a future effective date so this crucial safety technology can be implemented as soon as the industry is ready.

4-206 Log #27 NEC-P04 **Final Action: Accept in Principle**
(690.13)

NOTE: This proposal appeared as Comment 13-38 on Proposal 13-22 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-22 was:
Revise the section as follows:
690.5 Ground-Fault Protection. ~~Roof-mounted dc photovoltaic arrays located on dwellings shall be provided with dc ground-fault protection to reduce fire hazards.~~
Grounded dc photovoltaic arrays shall be provided with dc ground-fault protection meeting the requirements of 690.5 (A) through (C) to reduce fire hazards. Ungrounded dc photovoltaic arrays shall comply with 690.35.
Exception 1: Ground-mounted or pole-mounted photovoltaic arrays with not more than two paralleled source circuits and with all dc source and dc output circuits isolated from buildings shall be permitted without ground-fault protection.
Exception 2: PV arrays mounted on other than dwelling units shall be permitted without ground-fault protection if each equipment-grounding conductor has an ampacity of at least two (2) times the temperature and conduit fill corrected circuit conductor ampacity.
Submitter: John C. Wiles, Southwest Technology Development Institute, New Mexico State University / Rep. PV Industry Forum
Recommendation: The PV Industry Forum agrees with and supports the Panel Action without the change suggested by the TCC in 13-31a Log CP 1301. An additional Exception #2 is proposed as follows:
Exception 2: A disconnecting switch shall be permitted in a grounded conductor if it is:
a. used only for PV array maintenance, and
b. accessible only by qualified persons.
Substantiation: The location and correction of ground faults in PV arrays may require that the ungrounded conductor be disconnected from the system and from ground during maintenance operations. This permissive allowance provides that a maintenance-only switch can be added to the system to facilitate such operations.
Panel Meeting Action: Accept in Principle
Revise the language in the proposal as follows:
Exception No. 2 is proposed as follows:
Exception No. 2: A disconnecting switch shall be permitted in a grounded conductor providing the following conditions are met:
a. The switch is used only for PV array maintenance, and
b. The switch is accessible only by qualified persons.
c. The switch is rated for the maximum dc voltage and current that could be present during any operation including ground fault conditions.
Panel Statement: The panel revised the wording in Proposal 4-206. Additionally, some of the text from the original proposal was not in the travel file recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ROGERS, J.: The proposal as submitted presents enforcement problems relative to access limitations. Allowing a switch in the grounded conductor should also mandate simultaneous opening of all circuit conductors.
Comment on Affirmative:
WILLS, R.: This was a badly needed provision in 690 that is now accepted. Allowing a disconnect switch in the grounded conductor for maintenance will ultimately save lives in the field. Hooray!

4-207 Log #1455 NEC-P04 **Final Action: Reject**
(690.13)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
An identified means shall be provided to simultaneously disconnect...". (remainder unchanged)
Substantiation: Edit. The means should be identified as suitable for the use.
Panel Meeting Action: Reject
Panel Statement: It is not clear what use would be identified as suitable for. It should be obvious that all conductors would be opened simultaneously.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this, however, the submitter is correct that the existing requirement does not require simultaneous opening and the panel should review that in the comment period.

4-208 Log #2494 NEC-P04 **Final Action: Accept**
(690.13)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise 690.13 as follows:
690.13 All Conductors. Means shall be provided to disconnect all current-carrying dc conductors of a photovoltaic system ~~power source~~ from all other conductors in a building or other structure.
A switch, circuit breaker, or other device, ~~either ac or dc~~, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves, the marked, grounded conductor in an ungrounded and energized state.
Exception: A switch or circuit breaker that is part of a ground-fault detection system required by 690.5 or that is part of an arc-fault detection/interruption system required by 690.11 shall be permitted to open the grounded conductor when that switch or circuit breaker is automatically opened as a normal function of the device in responding to ground faults. ~~The switch or circuit breaker shall indicate the presence of a ground fault.~~
Substantiation: The revision clarifies the intent of the Code that the dc conductors of a PV system, as an energy source, must have provisions to allow them to be disconnected from all other (non PV) conductors in a building or structure.
The ac circuits from a utility-interactive PV system are very much like branch circuits and become de-energized when disconnected from the utility supply—just like other branch circuits—and they are disconnected by the disconnecting means required by 690.64(B) and 705.12(D)(2).
The second sentence is moved to a second paragraph because it is a related, but separate, requirement.
The Exception and Fine Print Note remain the same except for the addition of the proposed arc-fault circuit detector/interrupter requirement and assumes that a separate proposal for 690.11 DC Arc Fault Circuit Detection/Interruption Device is approved. The last line of the exception is a requirement (found elsewhere in the Code) and does not pertain to this section of the Code.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:
BOWER, W.: I agree with the panel's accept for the changes in 690.13 but question the inclusion of the arc-fault detection/interruption because the arc fault devices are not commercially available. If included this proposal will need coordination with 4-205.

4-209 Log #4331 NEC-P04 **Final Action: Accept in Principle**
(690.13)

Submitter: Jim Eichner, Xantrex Technology, Inc.
Recommendation: Revise wording to:
690.13 All Conductors. Means shall be provided to disconnect all current-carrying conductors of a photovoltaic power source from all other conductors in a building or other structure. A switch, circuit breaker, or other device, either ac or dc, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the marked, grounded conductor in an ungrounded and energized state.
Exception: A switch or circuit breaker that is part of a ground-fault detection system required by 690.5 shall be permitted to open or unground the grounded conductor when that switch or circuit breaker is automatically opened as a normal function of the device in responding to ground faults, or is opened as a result of some other fault or service condition, such as disconnection of the AC supply circuit. The marking of 690.5(C) shall be revised, or an additional marking added, to list all conditions in which the normally grounded conductor is ungrounded. ~~The switch or circuit breaker shall indicate the presence of a ground fault~~.
Substantiation: Problem: The Exception's restriction to only unground the array during ground faults is overly-restrictive. While fuses are an option for the array grounding and ground-fault system, they can be prone to nuisance tripping and to other problems, so in some systems a relay or contactor is preferable. However allowing ungrounding only as the result of a ground-fault means that normally-open contactors energized with power derived from the AC grid cannot be used, because the contactors would open during loss or disconnection of AC power. The remaining options are not desirable. Normally-closed contactors are inherently less safe because they would re-ground the array if a ground fault trip was accompanied by, or followed by, loss of AC or control power. Providing power to the contactors from the PV array causes increased tare loss and lowered efficiency, and has an undesirable effect on safety because it requires placing connections for that power supply on the array side of the disconnect (so that it has power when the PV disconnect is operated, since that too is not allowed to unground the array) which means with the PV disconnect open, part of the product is still energized.
Proposed Solution:
1. The existing Code allows the grounded conductor to be ungrounded under one abnormal condition (ground fault trip). Extend that to other abnormal conditions such as other faults, disconnection or blackout of the AC grid, and servicing operations. In a typical inverter with integral PV ground fault protection, removing the inverter for servicing leaves the array ungrounded, and in any system during installation the installers are working with energized and ungrounded arrays, so safe working practices have already been established, and the markings make personnel aware of the conditions under which the array is ungrounded. Furthermore, a fully floating array is safer from a fire- and shock-hazard point of view than one with one conductor grounded. From a fire hazard perspective it takes 2 simultaneous ground faults for PV current to flow through an unintentional conducting path. From a shock hazard perspective, the floating array can source only leakage current to ground, while a the ungrounded conductor of a grounded array can source the full array short-circuit current to ground.
2. The sentence "The switch or circuit breaker shall indicate the presence of a ground fault". is proposed to be deleted because it is not appropriate if a fault condition other than ground fault has resulted in the switch or breaker opening, and because the sentence is redundant with the indication requirement in 690.5(A), which already requires this indication, if the ground fault detection is tripped.
Panel Meeting Action: Accept in Principle
Revise the wording of the proposal as follows:
690.13 All Conductors. Means shall be provided to disconnect all current-carrying conductors of a photovoltaic power source from all other conductors in a building or other structure. A switch, circuit breaker, or other device, either ac or dc, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the marked, grounded conductor in an ungrounded and energized state.
Exception: A switch or circuit breaker that is part of a ground-fault detection system required by 690.5 shall be permitted to open (unground) the grounded conductor when that switch or circuit breaker is automatically opened as a normal function of the device in responding to ground faults, or is opened as a result of some other fault or service condition, such as disconnection of the AC supply circuit. Labeling and marking of the inverter in accordance with 690.5(C) shall be added to list all operating conditions in which the normally grounded conductor may become ungrounded. ~~The switch or circuit breaker shall indicate the presence of a ground fault~~.
Panel Statement: The wording in the proposal is changed to improve readability and clarification.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BOWER, W.: I realize there is a need to unground the the grounded conductors with some inverter topologies, but the acceptance of this without specifying the requirement to provide added marking to the system creates potentially unsafe conditions. The proposal does not provide that marking language and should be rejected until such language is approved. The substantiation and proposal must also provide language covering the conditions under which the grounded conductors are ungrounded.

4-210 Log #2499 NEC-P04 **Final Action: Reject**
(690.14)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: It is proposed that Section 690.14 be restructured and revised to improve clarity and intent. This proposal is an overview proposal. The original section and the revised, integrated proposal are shown together in this submittal with substantiations. Additional proposals are provided on a subsection-by-subsection basis to allow comparisons with proposals submitted by others.
***2008 NEC* Original:**
690.14 Additional Provisions. Photovoltaic disconnecting means shall comply with 690.14(A) through (D).
(A) Disconnecting Means. The disconnecting means shall not be required to be suitable as service equipment and shall comply with 690.17.
(B) Equipment. Equipment such as photovoltaic source circuit isolating switches, overcurrent devices, and blocking diodes shall be permitted on the photovoltaic side of the photovoltaic disconnecting means.
(C) Requirements for Disconnecting Means. Means shall be provided to disconnect all conductors in a building or other structure from the photovoltaic system conductors.
(1) Location. The photovoltaic disconnecting means shall be installed at a readily accessible location either on the outside of a building or structure or inside nearest the point of entrance of the system conductors.
Exception: Installations that comply with 690.31(E) shall be permitted to have the disconnecting means located remote from the point of entry of the system conductors.
The photovoltaic system disconnecting means shall not be installed in bathrooms.
(2) Marking. Each photovoltaic system disconnecting means shall be permanently marked to identify it as a photovoltaic system disconnect.
(3) Suitable for Use. Each photovoltaic system disconnecting means shall be suitable for the prevailing conditions. Equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.

(4) Maximum Number of Disconnects. The photovoltaic system disconnecting means shall consist of not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard.

(5) Grouping. The photovoltaic system disconnecting means shall be grouped with other disconnecting means for the system to comply with 690.14(C)(4). A photovoltaic disconnecting means shall not be required at the photovoltaic module or array location.

(D) Utility-Interactive Inverters Mounted in Not-Readily-Accessible Locations. Utility-interactive inverters shall be permitted to be mounted on roofs or other exterior areas that are not readily accessible. These installations shall comply with (1) through (4):

(1) A direct-current photovoltaic disconnecting means shall be mounted within sight of or in the inverter.

(2) An ac disconnecting means shall be mounted within sight of or in the inverter.

The requirements in 690.14(D)(1) and (D)(2) provide for servicing disconnects at the inverter.

(3) The ac output conductors from the inverter and an additional ac disconnecting means for the inverter shall comply with 690.14(C)(1).

(4) A plaque shall be installed in accordance with 705.10.

Proposed Reorganized and Revised: Only additions are shown. Deletions and renumbering (where changed) not shown

690.14 Additional Provisions. The direct current (dc) PV system disconnecting means shall comply with (A) through **(**H**)**. AC PV disconnecting means for PV systems or AC PV modules shall comply with (H) and (I**).**

(A) Disconnecting Means. The disconnecting means shall not be required to be suitable as service equipment and shall comply with 690.17.

(B) Equipment. Equipment such as PV source circuit isolating switches, overcurrent devices and blocking diodes shall be permitted on the PV side of the dc PV disconnecting means.

(C) Location. The dc PV system disconnecting means shall be installed at a readily accessible location either ~~on the~~ outside of a building or structure or inside nearest the point of entrance of the system conductors.

Exception: The location of the PV system disconnecting means for the dc PV source and output circuits that comply with 690.31(E) shall be permitted to be in a location that is remote from the point of entry of the system conductors.

The PV disconnecting means shall not be installed in bathrooms

FPN #1: The readily accessible location requirement for the dc PV system disconnecting means and the requirement that it be at the point of entry of the conductors implies that the PV system conductors remain outside the building until the first disconnect is reached. The exception, when met, allows these conductors to be routed through the building to the disconnecting means location that is still required to be readily accessible, but no longer is required to be at the point of penetration.

(D) Marking. Each dc PV system disconnecting means shall be permanently marked and identified.

(E) Suitable for Use. Each dc PV system disconnecting means shall be suitable for the prevailing conditions. Equipment in hazardous (classified) locations shall comply with Articles 500 through 517.

(F) Maximum Number of Disconnects. Each PV system, as a parallel power production service permitted by 230.2, shall have dc PV system disconnecting means consisting of not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a panel board as permitted by 230.71.

(G) Grouping. The dc disconnecting means shall be grouped with the disconnecting means for other services connected to the building or structure. A dc PV disconnecting means shall not be required at the PV module or array location. A dc PV disconnecting means shall be permitted at the array location if that location complies with 690.14 (C).

Exception: The disconnecting means for multiple PV systems on a single building or structure shall not be required to be grouped together where the requirements of 705.10 are met.

(H) Utility-Interactive Inverters Mounted in Not Readily-Accessible Locations,

Utility-interactive inverters shall be permitted to be mounted on roofs or other exterior areas that are not readily accessible. These installations shall comply with 690.14(H) (1) through (5):

(1) A dc PV disconnecting means shall be mounted within sight of or in each inverter.

(2) An ac disconnecting means shall be mounted within sight of or in each inverter.

(3) An additional disconnecting means complying with 690.14 (A), (C), and (E) shall be installed on the ac output circuit of the inverter(s).

(4) A plaque shall be installed in accordance with 705.10.

(I) AC PV Disconnect. The main service disconnect on a building or structure shall be permitted to serve as the ac PV disconnect for utility-interactive inverters or ac PV modules connected to the load side of the service disconnect.

Disconnecting means in the ac output circuit shall be required where the individual inverter is not within sight of the main service disconnect.

Where connections, as permitted by 705.12(A), are made on the supply side of the service disconnect, they shall be considered parallel power production systems as permitted by 230.2 and shall be permitted an additional six ac PV disconnects per PV system as allowed by 230.71.

Disconnecting means in the inverter ac output circuit shall be permitted for each individual inverter.

The disconnecting means shall comply with 690.17.

Substantiation: Revision of Section 690.14 has been proposed because it contained duplicate requirements to 690.13 and was not clear that it applied mainly the dc PV system disconnecting means. See the new definition proposed for Photovoltaic System Disconnect in 690.2.

690.14 Introductory Text –First Paragraph

The previous 690.14(C) was removed since it duplicated 690.13 and all other sections were upgraded one level. Several related revisions and clarifications have been made as shown below:

The unneeded reference to 690.14 was removed to comply with the *NEC Style Manual*.

While the main emphases is on the dc PV disconnect some clarification to the ac disconnect is needed in this system and is referenced.

690.14(A) No change

690.14 (B) "PV" added for clarity. Added direct-current (dc) to clarify that these device requirements do not apply to ac circuits.

690.14(C) Removed old 690.14(C) since the requirement is addressed in 690.13. The introduction used to be 690.14(C)1. No change

Exception: The exception was modified so that it pertains only to the dc outputs for modules and arrays. See related proposal for 690.31(E).

FPN #1 has been added because of the continuing inability of PV installers to realize that these disconnecting means requirements (added to the *2002 NEC* at the request of the Technical Correlating Committee) affect the routing of the conductors from the PV array to the inverter. This FPN gives information to improve understanding of the requirement and the exception.

690.14(D). Previously 690.14(C)(2). No change

690.14(E). Previously 690.14(C)(3). No change

690.14(F). Previously 690.14(C)(4). Revised to indicate that each PV system may be considered a separate service per 230.2 and that each service/system may have no more than six dc disconnecting means per 230.71

690.14(G). Previously 690.14(C)(5). Revised to be consistent with 690.14(F) and to indicate that PV disconnecting means may be required in areas normally considered not readily accessible in some situations (e.g. flat roofed buildings with ready access).

The Exception is needed for installations where there are multiple widely spaced PV systems on a large commercial building and it is not feasible to group either the dc or ac disconnects from all systems in a single location. Examples include warehouses, malls, and apartment complexes.

690.14(H) Previously (D) with revisions:

Clarified to be consistent with definitions.

690.14(I)

Utility-interactive inverters and ac PV modules shut down when the utility voltage is not present at their output terminals. Opening the main service disconnect will disable or turn off all utility-interactive inverters and ac PV modules connected to the load side of that disconnect.

In order for the main service disconnect to serve as the required maintenance disconnect, the inverter must be within sight of the main service disconnect. If the inverter and main service are not in sight, then a maintenance disconnect must be installed at each inverter to allow safe servicing. Optional, permitted disconnects may be installed at each inverter for system segregation or other purposes.

Panel Meeting Action: Reject

Panel Statement: The panel sees insufficient justification for the proposed language. The proposed language does not add any clarity.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

WILLS, R.: This was a no-doubt well-meant but very confusing proposal. Suggest the submitter shorten the submission by first, not providing original text (we all have copies of the 2008 code), and second, submitting in either in full underline/strikeout format, or if that becomes cumbersome, simply provide the new text in total so that we can compare line by line. This comment applies to 4-211 through 4-216, excluding 4-213 (Leaf)

Comment on Affirmative:

BOWER, W.: With just slight reorganization and adequate substantiation this rewrite of 690.14 will result in a better organized and less ambiguous article. The reference to AC PV modules in H needs to be corrected. The author should provide better substantiation per the panel statement. Perhaps the public comment period can clear up confusion and provide an accurate proposed change.

4-211 Log #2500 NEC-P04 **Final Action: Reject**
(690.14)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: It is proposed that Section 690.14 be restructured and revised to improve clarity and intent. This proposal covers the introduction section of 690.14. An overview proposal has been submitted. Additional proposals are provided on a subsection-by-subsection basis to allow comparisons with proposals submitted by others.
690.14 Additional Provisions. <u>The direct current (dc)</u> photovoltaic disconnecting means shall comply with ~~690.14~~(A) through (~~D~~ <u>H</u>)**.** <u>AC PV disconnecting means for PV systems or AC PV modules shall comply with (H) and (I)</u>.
Substantiation: Section 690.14 has been revised because it contained duplicate requirements to 690.13 and was not clear that it applied primarily the dc PV system disconnecting means. See the new definition proposed for Photovoltaic System Disconnect in 690.2.
The unneeded reference to 690.14 was removed to comply with the *NEC Style Manual*.
Added subsections have been proposed and need to be called out.
While the main emphases is on the dc PV disconnect some clarification to the ac disconnect is needed in this system and is referenced.
Panel Meeting Action: Reject
Panel Statement: See the action and statement on Proposal 4-210.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-212 Log #2495 NEC-P04 **Final Action: Reject**
(690.14(B))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: It is proposed that Section 690.14 be restructured and revised to improve clarity and intent. This proposal covers 690.14(B). An overview proposal has been submitted. Additional proposals are provided on a subsection-by-subsection basis to allow comparisons with proposals submitted by others.
(B) Equipment. Equipment such as photovoltaic source circuit isolating switches, overcurrent devices and blocking diodes shall be permitted on the <u>PV</u> side of the <u>dc</u> <u>PV</u> ~~photovoltaic~~ disconnecting means.
Substantiation: "PV" added for clarity. Added direct-current (dc) to clarify that these device requirements do not apply to ac circuits.
Panel Meeting Action: Reject
Panel Statement: See the action and statement on Proposal 4-210.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-213 Log #1452 NEC-P04 **Final Action: Reject**
(690.14(C) (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows: See 690.13 for grounded conductors.
Substantiation: This provision applies to all conductors which may or may not be permitted to be disconnected per 690.13.
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3. (b) of the Regulations Governing Committee Projects. Submitter does not indicate where new text is to be added.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-214 Log #2496 NEC-P04 **Final Action: Reject**
(690.14(C) through (G))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: It is proposed that Section 690.14 be restructured and revised to improve clarity and intent. This proposal is for 690.14(C). 690.14(C) contains information duplicated in 690.13 and is modified as shown below. An overview proposal has been submitted. Additional proposals are provided on a subsection-by-subsection basis to allow comparisons with proposals submitted by others.
(C) ~~**Requirements for Disconnecting Means.** Means shall be provided to disconnect all conductors in a building or other structure from the photovoltaic system conductors.~~
~~**G (1)**~~ **Location.** The <u>dc</u> photovoltaic disconnecting means shall be installed at a readily accessible location either ~~on the~~ outside of a building or structure or inside nearest the point of entrance of the system conductors.
Exception: <u>The location of the PV system disconnecting means for the dc PV source and output circuits</u> ~~Installations~~ that comply with 690.31(E) shall be permitted <u>to be in a location that is</u> ~~have the disconnecting means located~~ remote from the point of entry of the system conductors.
The ~~photovoltaic~~ <u>PV</u> system disconnecting means shall not be installed in bathrooms.
<u>FPN #1: The readily accessible location requirement for the dc PV system disconnecting means and the requirement that it be at the point of entry of the conductors implies that the PV system conductors remain outside the building until the first disconnect is reached. The exception, when met, allows these conductors to be routed through the building to the disconnecting means location that is still required to be readily accessible, but no longer is required to be at the point of penetration.</u>
~~**(2)**~~ **<u>(D)</u> Marking.** Each <u>dc</u> photovoltaic system disconnecting means shall be permanently marked <u>and identified</u> ~~to identify it as a photovoltaic system disconnect~~.
~~**(3)**~~ **<u>(E)</u> Suitable for Use.** Each <u>dc</u> photovoltaic system disconnecting means shall be suitable for the prevailing conditions. Equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.
~~**(4)**~~ **<u>(F)</u> Maximum Number of Disconnects.** <u>Each PV system, as a parallel power production service permitted by 230.2, shall have dc PV system disconnecting means consisting</u> ~~The photovoltaic system disconnecting means shall consist~~ of not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a ~~switchboard~~ <u>panelboard as permitted by 230.71.</u>
~~**(5)**~~ **<u>(G)</u> Grouping.** The ~~photovoltaic~~ <u>dc</u> <u>PV</u> system disconnecting means shall be grouped with <u>the</u> ~~other~~ disconnecting means for other <u>services connected to the building or structure to comply with 690.14(C)(4)</u>. A ~~photovoltaic~~ <u>dc PV</u> disconnecting means shall not be required at the photovoltaic module or array location. <u>A dc PV disconnecting means shall be permitted at the array location if that location complies with 690.14 (C).</u>
<u>Exception: The disconnecting means for multiple PV systems on a single building or structure shall not be required to be grouped together where the requirements of 705.10 are met.</u>
Substantiation: The introductory information in 690.14(C) is deleted since it duplicates 690.13 and the information in subsection (1) is elevated to (C) with revisions.
Subsections (2) through (5) are renumbered as (D) through (G) with revisions.
<u>690.14(C)</u> Removed old 690.14(C) since the requirement is addressed in 690.13. The introduction used to be 690.14(C)1. No change in language; just location.
Exception: The exception was modified so that it pertains only to the dc outputs for modules and arrays. See related proposal for 690.31(E).
FPN #1 has been added because of the continuing inability of PV installers to realize that these disconnecting means requirements (added to the *2002 NEC* at the request of the Technical Correlating Committee) affect the routing of the conductors from the PV array to the inverter. This FPN gives information to improve understanding of the requirement and the exception.
<u>690.14(D).</u> Previously 690.14(C)(2). No change
<u>690.14(E).</u> Previously 690.14(C)(3). No change
<u>690.14(F)</u>. Previously 690.14(C)(4). Revised to indicate that each PV system may be considered a separate service per 230.2 and that each service/system may have no more than six dc disconnecting means per 230.71
<u>690.14(G).</u> Previously 690.14(C)(5). Revised to be consistent with 690.14(F) and to indicate that PV disconnecting means may be required in areas normally considered not readily accessible in some situations (e.g. flat roofed buildings with ready access).
The Exception is needed for installations where there are multiple widely spaced PV systems on a large commercial building and it is not feasible to group either the dc or ac disconnects from all systems in a single location. Examples include warehouses, malls, and apartment complexes.
Panel Meeting Action: Reject
Panel Statement: See the action and statement on Proposal 4-210.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-215 Log #2497 NEC-P04 **Final Action: Reject**
(690.14(D))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: It is proposed that Section 690.14 be restructured and revised to improve clarity and intent. This new proposal revises 690.14(D), which is renumbered to (H). An overview proposal has been submitted. Additional proposals are provided on a subsection-by-subsection basis to allow comparisons with proposals submitted by others.
~~(D~~ H) Utility-interactive Inverters Mounted in Not Readily-Accessible Locations,
Utility-interactive inverters shall be permitted to be mounted on roofs or other exterior areas that are not readily accessible. These installations shall comply with 690.14(H) (1) through (5):
(1) A dc PV disconnecting means shall be mounted within sight of or in each inverter.
(2) An ac disconnecting means shall be mounted within sight of or in each inverter.
(3) An additional disconnecting means complying with 690.14 (A), (C), and (E) shall be installed on the ac output circuit of the inverter(s).
(4) A plaque shall be installed in accordance with 705.10.
Substantiation: 690.14(H) Previously (D) with revisions: Clarified to be consistent with definitions and other requirements.
Panel Meeting Action: Reject
Panel Statement: See the action and statement on Proposal 4-210.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-216 Log #2498 NEC-P04 **Final Action: Reject**
(690.14(I))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: It is proposed that Section 690.14 be restructured and revised to improve clarity and intent. This proposal covers new proposal 690.14(I). An overview proposal has been submitted. Additional proposals are provided on a subsection-by-subsection basis to allow comparisons with proposals submitted by others.
(I) AC PV Disconnect. The main service disconnect(s) on a building or structure shall be permitted to serve as the ac PV disconnect for utility-interactive inverters or ac PV modules connected to the load side of the service disconnect.
Where connections, as permitted by 705.12(A), are made on the supply side of the service disconnect, they shall be considered parallel power production systems as permitted by 230.2 and shall be permitted an additional six ac PV disconnects per PV system as allowed by 230.71.
Disconnecting means in the ac output circuit shall be required where the individual inverter is not within sight of the main service disconnect.
Disconnecting means in the inverter ac output circuit shall be permitted for each individual inverter.
The disconnecting means shall comply with 690.17.
Substantiation: Utility-interactive inverters and ac PV modules shut down when the utility voltage is not present at their output terminals. Opening the main service disconnect will disable or turn off all utility-interactive inverters and ac PV modules connected to the load side of that disconnect.
Many PV systems, because of their size, are connected on the supply side of the service disconnect. The main service disconnect cannot serve as a disconnect for the supply-side systems and they must have individual disconnects. This is consistent with 230.2(A)(5) and each of these PV systems as parallel power production systems is allowed six disconnects per 230.71.
In order for the main service disconnect to serve as the required maintenance disconnect, the inverter must be within sight of the main service disconnect. If the inverter and main service are not in sight, then a maintenance disconnect must be installed at each inverter to allow safe servicing. Optional, permitted disconnects may be installed at each inverter for system segregation or other purposes.
Panel Meeting Action: Reject
Panel Statement: See the action and statement on Proposal 4-210.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-217 Log #1453 NEC-P04 **Final Action: Reject**
(690.16)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and identify the specific lack of conformance with 4.3.3(b) of the NFPA Regulations Governing Committee Projects.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Identified ~~disconnecting~~ means shall be provided to disconnect a fuse from all sources of supply if the fuse can be energized from both ~~directions~~ line and load terminals. ~~and is accessible to other than qualified persons.~~ Such a fuse in a photovoltaic circuit shall ~~be capable of~~ have approved means of being disconnected independently of fuses in photovoltaic source circuits.
Substantiation: The disconnecting means should be suitable for the use. The provision should apply where accessible to qualified persons since they should be provided the same protection. "Both directions" is not specific; does it mean North or South or East and West top or bottom or left and right? (facetious)
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3. (b) of the Regulations Governing Committee Projects. Additionally, the use of line and load terminals for fuses is technically incorrect.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-218 Log #2501 NEC-P04 **Final Action: Accept**
(690.16(A) and (B))

TCC Action: The Technical Correlating Committee understands that the title of (A) is "Disconnecting Means" and the title for the entire section is "Fuses".
Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Label the existing paragraph as (A) and add the following paragraph B
(B) Fuse Servicing. Disconnecting means shall be installed on PV output circuits where overcurrent devices (fuses) must be serviced that cannot be isolated from energized PV circuits. The disconnecting means shall be within sight and accessible to the location of the fuse or integral with fuse holder and shall comply with 690.17. Where the disconnecting means are located more than 1.8m (6 feet) from the overcurrent device, a directory showing the location of each disconnect shall be installed at the overcurrent device location. Non-load-break rated disconnecting means shall be marked "Do not open under load."
Substantiation: Fuses must be serviced in a safe manner, and this usually means that they be disconnected from all sources of voltage. Most PV combiners use "finger safe" fuse holders for this purpose. Inverters are being manufactured that have internal PV source and output circuit combining fuses on the input circuits connected directly to the inverter input terminals. Unless external disconnecting means are installed, these fuses cannot be safely serviced when the PV array is illuminated. Typical fuses in the inverters used in these larger systems may be 100 amps or larger.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-219 Log #1457 NEC-P04 **Final Action: Reject**
(690.17(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete and substitute: Having ratings not less than the nominal circuit voltage and fault current available at its terminals.
Substantiation: Edit. "Sufficient" is subjective and a term to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects. The substantiation is not adequate with regard to the recommendation.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-220 Log #28 NEC-P04 **Final Action: Accept in Principle**
(690.19 (New))

NOTE: This proposal appeared as Comment 13-44 on Proposal 13-31a in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-31a was:
Revise 690-13 to read as follows:
Means shall be provided to disconnect all ~~current-carrying~~ <u>ungrounded</u> conductors of a photovoltaic power source from all other conductors in a building or other structure.
Submitter: Robert H. Wills, Intergrid, LLC
Recommendation: As the submitter of panel actions 13-31a and 13-35a, I request that CMP-13 Reject both actions as they now stand, and also consider modifying 690.13 as follows:
690.13 All Conductors. Means shall be provided to disconnect all current-carrying conductors of a photovoltaic power source from all other conductors in a building or other structure. A switch or circuit breaker shall not be installed in a grounded conductor unless:
(1) ~~that~~ <u>the</u> switch or circuit breaker is part of a ground-fault detection system required by 690.5 and ~~that~~ <u>the</u> switch or circuit breaker is automatically opened and indicated as a normal function of the device in responding to ground faults<u>, or,</u>
<u>(2) an optional switch or circuit breaker is provided in a grounded conductor for maintenance and troubleshooting, and only operable by qualified personnel.</u>
FPN: The grounded conductor may have a bolted or terminal disconnecting means to allow maintenance or troubleshooting by qualified personnel.
Substantiation: I brought up the inconsistency in 690.13 and 690.14(C) that requires means for disconnecting <u>all</u> current-carrying conductors, then go on to say that grounded conductors should not be disconnected.
This resulted in panel actions 13-31a and 13-35a.
Further research has shown that the inconsistency stems from the addition of the second sentence of 690.13 in the 1990s when GFI language was added.
The Fine Print Note: “The grounded conductor may have a bolted or terminal disconnecting means to allow maintenance of troubleshooting by qualified personnel.” was added at the same time.
The original version of Article 690 was written for the 1984 code cycle. One of the authors, Tom Key of Sandia Labs (now at EPRIPEAC) wrote in a paper included in the 1985 IEEE PV Specialists Conference Proceedings (“Grounding Considerations for Non-Isolated Photovoltaic Systems”): *Another frequently overlooked requirement is 690.13 which states that “means shall be provided to disconnect all current carrying conductors”. This applies to the “grounded” conductor of the PV array whether it be the neutral or negative lead. The disconnecting means, if properly rated, can provide a very effective way to extinguish a line-to-ground fault in the array.*
The paper’s Figure 2 showed a 2 pole disconnect opening both current-carrying conductors to the array, with the ground bond being on the inverter side of the switch.
Photovoltaic arrays typically contain many photovoltaic modules and interconnection wiring that can be subject to ground faults.
The requirement has changed over the years form opening all current-carrying conductors to ground fault interruption (which typically opens the grounded conductor) plus a FPN provision for bolted or terminal disconnect.
It is reasonable to consider the GFI equipment as now fulfilling the requirement that grounded conductors be disconnected (if there is a ground fault).
The FPN provision is, however, not a safe or sufficient substitute for a switched disconnect in large-scale photovoltaic systems. If multiple ground faults were to occur on different strings, the grounded conductors of the faulted strings would have to be disconnected in order to find the fault locations.
In doing so, the service person would have to open a bolted connection under load - a potentially hazardous activity.
An optional switched disconnect or circuit breaker in grounded conductors for service use only, and only operable by qualified personnel, satisfies the original intent of this section of the code and allows for the removal of a service hazard in large-scale systems.
Panel Meeting Action: Accept in Principle
Panel Statement: The addition of a new Section 690-19 is unnecessary. This proposal is similar to Proposal 4-206. See panel action on Proposal 4-206.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-221 Log #1916 NEC-P04 **Final Action: Reject**
(690.31)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text of (A): All <u>identified</u> raceway and cable wiring methods included in this Code, <u>flexible cords and cables covered in 690.31(C)</u> and other wiring systems specifically intended and identified for use on photovoltaic systems shall be permitted...(remainder unchanged
Delete text of (C) and substitute: Flexible cords and cables shall be permitted to connect moving parts of PV modules and shall be an extra-hard usage type identified for the use, water resistant, and sunlight resistant. (remainder unchanged)
Substantiation: Edit. Wiring methods should be identified for the use. This section can be perceived as modifying uses permitted or not permitted in the raceway and cable articles. Reference to 690.31(C) will correlate with that section. Subsection (C) should specifically indicate cords and cables are permitted if identified for the use. Some extra-hard usage types (EV, EVE, EVJE, EVT, are not suitable. Article 400 does not require listing and no “outdoor” use is indicated.
Panel Meeting Action: Reject
Panel Statement: The addition of “identified” and the reference to Section 690.31(C) is redundant and unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-222 Log #3619 NEC-P04 **Final Action: Reject**
(690.31(A))

Submitter: William Peter Kenney, III, Berkeley, CA
Recommendation: Revise text to read as follows:
Where photovoltaic source and output circuits operating at maximum system voltages greater then 30 volts are installed in readily accessible locations, circuit conductors shall be installed in a <u>metallic</u> raceway<u>, or rendered not readily accessible by approved guards or covers.</u>
Substantiation: These source circuits are considered energized in sunlight at levels up to 600 volts DC. The current installation practice that I have seen in California is to use nonmetallic flexible conduit installed with a one or two hole straps as support. Two concerns.
1. Temperature ratings of the raceway system they are using are not appropriate for the installation.
2. We are encouraging education for these systems to include an up close look at these systems. Families looking at these readily accessible systems often have young children that are looking for anything to occupy their time while the parents are learning about the benefits of a PV system. It would be very easy for a child to see this hanging loop of LFMC or LFNC as a place to swing from if it is less than 8 ft off the ground.
Panel Meeting Action: Reject
Panel Statement: The submitter has not presented any technical data to support such a severe restriction on wiring methods for these systems. There are already other NEC requirements that address the physical damage concerns of various wiring methods and the temperature limitations for conductors in non-metallic wiring methods. The phrase “or rendered not readily accessible by approved guards or covers” is not the only method to render a system not readily accessible and could be interpreted as the only approved method.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
STAFFORD, T.: This panel member agrees with the submitters substantiation in that LFNC does not have an adequate temperature rating for the installation. Does any nonmetallic raceway have appropriate temperature rating? By adding the word metallic it restricts nonmetallic raceways from being used. It doesn’t restrict non-flexible raceways though. The easiest way is to take these unprotected supply conductors and make them not readily accessible to the general population.

4-223 Log #2502 NEC-P04 **Final Action: Reject**
(690.31(A), FPN 1 and 2)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Renumber the existing FPN on 690.31(A) as #2 and add this new FPN #1 as follows:
<u>FPN #1: Adding fences or barriers around a PV array or installing protective barriers to the mounting racks of the modules may make the circuits not readily accessible.</u>
Substantiation: There are very few PV modules that are made with conduit-ready junction boxes. The great majority of modules being produced today are constructed with factory-attached pigtail leads using exposed, single-conductor cables and quick-connect (soon to be locking) connectors. Only a few manufacturers have special order modules available that can be used with conduits. This Fine Print Note informs the installer and inspectors that there are “out of the box” solutions to this seemingly very difficult requirement.
Panel Meeting Action: Reject

Panel Statement: Section 690.31 covers wiring methods for solar photovoltaic systems. It is not practical nor necessary to render these wiring methods not readily accessible and may also violate the listing of the PV array.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
BOWER, W.: The proposed language was a FPN and does not provide for rendering the wiring methods not readily accessible. It simply provides a suggested means for addressing common inspection questions that have been encountered in PV installations. Installations must still be careful to not violate the listing requirements for components and wiring.

4-224 Log #2503 NEC-P04 **Final Action: Accept**
(690.31(B), FPN)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and comply with the NEC Style Manual 3.1.3 in that Fine Print Notes shall not contain mandatory text.
This action will be considered by the panel as a public comment.
Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Add the following FPN:
FPN: Photovoltaic (PV) Wire (also Photovoltaic (PV) Cable) has a non-standard outer diameter. Conduit fill should be calculated using Table 1, Chapter 9. Conduit fill tables in Annex C should not be used.
Substantiation: Underwriters Laboratories (UL) Subject 4703 establishes the specifications for Photovoltaic Wire/PV Wire/Photovoltaic Cable/PV Cable. It requires that the insulation thickness be at least 15 mils thicker than the insulation on types UF or RHW conductors. This non-standard thickness will not permit the correct use of the conduit fill tables in Annex C. The conduit fill will have to be calculated using the measured outer diameter of the cable (which may vary from manufacturer to manufacturer) and the fill percentages in Table #1, Chapter 9.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ZINNANTE, V.: While I agree that Conduit tables in Annex C should not be used to size the conduit, I'm not sure that a FPN note is the right place for this information. Shouldn't a standard be developed by UL or the manufacturers that would would ensure a "standard" cm area for each size of PV conductors much like the manufacturers of THHN or THW cable did when developing these products?

4-225 Log #3453 NEC-P04 **Final Action: Reject**
(690.31(B), FPN (New))

Submitter: Larry Cross, Local Union #98 IBEW
Recommendation: Provide Fine Print Note: Thermoplastic insulation may stiffen at temperatures lower than - 10 deg. C (+14 deg. F). Thermoplastic insulation may also be deformed at normal temperatures where subjected to pressure, such as at points of support. Thermoplastic insulation, where used on dc circuits in wet locations, may result in Electro-endosmosis between conductor and insulation.
Substantiation: The installer should be aware of damage to conductor thermoplastic insulation due to the elements and conditions in the Solar Photovoltaic Systems installations. Thermoplastic insulation is the most common conductor insulation used in the marketplace and most installers are not aware of this reaction to thermoplastic insulation on DC circuits, lower temperatures and supports which are common practices on Solar Photovoltaic installation.
Panel Meeting Action: Reject
Panel Statement: This is an exact copy of the FPN in Section 330.13 that already provides the necessary information.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-226 Log #2193 NEC-P04 **Final Action: Accept**
(690.31(D))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(D) Small-Conductor Cables. Single-conductor cables listed for outdoor use that are sunlight resistant and moisture resistant in sizes 16 AWG and 18 AWG shall be permitted for module interconnections where such cables meet the ampacity requirements of 690.8. 310.15 shall be used to determine the cable ampacity ~~and temperature~~ adjustment and correction ~~derating~~ factors.
Substantiation: The terms "adjustment factors" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:
BOWER, W.: The word temperature should be retained.

4-227 Log #3025 NEC-P04 **Final Action: Accept in Principle**
(690.31(D))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(D) Small-Conductor Cables. Single-conductor cables listed for outdoor use that are sunlight resistant and moisture resistant in sizes 16 AWG and 18 AWG shall be permitted for module interconnections where such cables meet the ampacity requirements of 690.8. Section 310.15 shall be used to determine the cable ampacity ~~and temperature~~ adjustment and correction ~~derating~~ factors.
Substantiation: The terms "adjustment factor" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 4-226.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-228 Log #2504 NEC-P04 **Final Action: Accept in Principle**
(690.31(E))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the Section as follows:
(E) Direct-Current Photovoltaic Source and Output-Circuits Inside a Building. Where dc photovoltaic source or output circuits ~~of a utility-interactive inverter~~ from a building-integrated or other photovoltaic system are run inside a building or structure, they shall be contained in metal raceways, Type MC metal clad cable, or metal enclosures, from the point of penetration of the surface of the building or structure to the first readily accessible disconnecting means. The disconnecting means shall comply with 690.14 (A), (B) and (D) through (I).
Wiring methods shall not be installed within 25 cm (10 in)inches of the roof decking or sheathing except where directly below the roof surface covered by PV modules and associated equipment. To the extent practical, circuits shall be run vertically from the roof penetration point to supports a minimum of 25 cm (10 in) below the roof decking.
FPN: The 25 cm (10 in) requirement is to prevent accidental damage from saws used by firefighters for roof ventilation during a structure fire.
Where flexible metal conduit (FMC) or metal clad cable (MC) smaller than metric designator 21 (trade size ¾) containing PV power circuit conductors is installed across ceilings or floor joists, the raceway or cable shall be protected by substantial guard strips that are at least as high as the cable. Where run exposed, other than within 1.8 m (6 feet) of their connection to equipment, these wiring methods shall closely follow the building surface or be protected from physical damage by an approved means.
(1) The wiring methods and enclosures listed in (A) through (C) that contain photovoltaic power source conductors shall be marked with the wording "Photovoltaic Power Source" by means of identified permanently affixed labels or other approved permanent marking
(A) Exposed raceways, cable trays, and other wiring methods.
(B) The covers or enclosures of pull boxes and junction boxes.
(C) Conduit bodies in which any of the available conduit openings are unused.
(2) The labels or markings shall be visible after installation. PV power circuit labels shall appear in every section of the wiring system that is separated by enclosures, walls, partitions, ceilings, or floors. Spacing between labels and/or markings shall not be more than 3 m (10 ft). Labels required by this section shall be suitable for the environment where they are installed.
Substantiation: The reference to utility-interactive inverter was an error and is removed.
Type MC metal clad cable, a metallic cable assembly, has been added because, with the internal equipment-grounding conductor, it may provide equal and possibly superior safety and mechanical protection when compared with the allowed flexible metal conduit (FMC) for these PV output circuit conductors. The proper use of Type MC, metal clad cable, while maintaining system safety, greatly aids in new construction and the retrofit of existing houses with PV power systems. Type AC armored cable is not included, because when it has an aluminum enclosure, it is not allowed to be used for direct-current circuits (ref UL White Book).
Deliberate hand pressure or sharp bending over edges such as ceiling joists in attics can break smaller sizes of flexible metal conduit and metal clad cable. This is a concern because PV output conductors are often run through attics, an area that homeowners frequently use for storage. This is why routing of raceways and cable assemblies is critical, along with the use of guard strips where necessary. In other areas of the home (cellars/basements) children may hang on to or pull upon these raceways. There is also a concern for the safety of firefighters who in fighting a structure fire may inadvertently cut through a raceway.
Marking raceways that contain photovoltaic circuit conductors will help firefighters, homeowners, and electricians identify the location of such circuits within a building. It would also help to ensure that persons seeking to add on to an existing electrical installation do not accidentally connect other building wiring to the PV source or output circuit wiring. Similar marking is already required elsewhere in the *NEC* for fire alarm and intrinsic safety systems.
Panel Meeting Action: Accept in Principle

Revise the recommended text to read as follows:

(E) Direct-Current Photovoltaic Source and Output Circuits Inside a Building. Where dc photovoltaic source or output circuits from a building-integrated or other photovoltaic system are run inside a building or structure, they shall be contained in metal raceways, Type MC metal clad cable that complies with 250.118(10), or metal enclosures, from the point of penetration of the surface of the building or structure to the first readily accessible disconnecting means. The disconnecting means shall comply with 690.14 (A), (B) and (D) through (I).

Wiring methods shall not be installed within 25 cm (10 in.) of the roof decking or sheathing except where directly below the roof surface covered by PV modules and associated equipment. Circuits shall be run vertically from the roof penetration point to supports a minimum of 25 cm (10 in.) below the roof decking.

FPN: The 25 cm (10 in.) requirement is to prevent accidental damage from saws used by firefighters for roof ventilation during a structure fire.

Where flexible metal conduit (FMC) or metal clad cable (MC) smaller than metric designator 21 (trade size ¾) containing PV power circuit conductors is installed across ceilings or floor joists, the raceway or cable shall be protected by substantial guard strips that are at least as high as the raceway or cable. Where run exposed, other than within 1.8 m (6 ft) of their connection to equipment, these wiring methods shall closely follow the building surface or be protected from physical damage by an approved means:

(1) The following wiring methods and enclosures that contain photovoltaic power source conductors shall be marked with the wording "Photovoltaic Power Source" by means of permanently affixed labels or other approved permanent marking:

(1) Exposed raceways, cable trays, and other wiring methods.

(2) The covers or enclosures of pull boxes and junction boxes.

(3) Conduit bodies in which any of the available conduit openings are unused.

(2) The labels or markings shall be visible after installation. PV power circuit labels shall appear on every section of the wiring system that is separated by enclosures, walls, partitions, ceilings, or floors. Spacing between labels and/or markings shall not be more than 3 m (10 ft). Labels required by this section shall be suitable for the environment where they are installed.

Panel Statement: The panel added wording to clarify the intent of the proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

ROGERS, J.: This proposal as written should have been rejected. The language in the first section relative to the installation of wiring methods run vertically to specified distance whereby they can then run horizontally below roof decking "to the extent practical" is contradictory and unenforceable. If there is a concern with firefighters encountering these energized conductors then this does not address that issue. Furthermore if that is really an issue then it si just as great an issue when the wiring methods run vertically through interior partitions as currently allowed and firefighters are cutting interior walls either during suppression or overhaul. The only real way to adequately protect firefighters is to revert to the original language mandating a disconnecting means at a readily accessible location nearest the point of entrance of the conductors and not to allow these conductors to run throughout the building in an allegedly substantially protective metallic outer shell of some sort depending on the wiring method. This is even more important with newer PV systems due to the increased voltage levels and power delivery levels.

ZINNANTE, V.: I believe that there should be a method to distinguish PV source and output circuits from other types of systems, but I don't believe this proposal is that answer. Is this proposal going to define what "clearly marked" is as suggested in proposal 4-187? I also think this proposal contradicts proposal 4-187.

This proposal is saying that wiring methods shall not be installed within 10 inches of the roof decking for DC PV while proposal 4-187 allows PV source and output conductors to be imbedded in the built up laminate or membrane roofing material. Why couldn't there be an industry standard to differentiate PV raceways, much like red marking for fire alarm conduits?

Comment on Affirmative:

STAFFORD, T.: My meeting notes indicate that what showed up on the ROP's Panel action is not what we talked about at the meeting. In the panel action it shows 690.31(E) subsections being misnumbered.

4-229 Log #2755 NEC-P04 **Final Action: Accept in Principle**
(690.31(E))

Submitter: Paul R. Picard, AFC Cable Systems, Inc.

Recommendation: Revise text to read as follows:

(E) Direct-Current Photovoltaic Source and Output Circuits Inside a Building. Where direct-current photovoltaic source or output circuits of a utility-interactive inverter from a building-integrated or other photovoltaic are run inside a building or structure, they shall be contained in metal raceways, <u>Metal-Clad Cable, Armored Cable</u>, or metal enclosures, from the point of penetration of the surface of the building or structure to the first readily accessible disconnecting means. The disconnecting means shall comply with 690.14(A) through (D).

Substantiation: The present wording only permits metal raceways; the use of Metal-Clad Cable or Armored Cable would provide equivalent mechanical protection.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on proposal 4-228. Armored cable is not permitted for dc systems in accordance with the UL white book.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-230 Log #2873 NEC-P04 **Final Action: Reject**
(690.31(F))

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

690.31 Methods Permitted.

(F) Flexible, Fine-Stranded Cables. Flexible, fine-stranded cables shall be terminated ~~only with terminals, lugs, devices, or connectors that are identified and listed for such use.~~ <u>as per 110.14(A)(1)</u>

Substantiation: Relocate this text to 110.14(A)(1) so this requirement can be applied to all installations where fine-stranded conductors and fine-stranded jacketed cables are installed, not just for solar or battery connections. This was a new item that was added in article 690.31 (F) in the 2008 NEC. The issue is that fine-stranded conductors and jacketed cables are being installed for other installation types where a wide range of flexibility is desired. With the expanded use of fine-stranded cables and conductors being used for welders, cranes, elevators, battery bank connections, computer data cables, UPS cables and many other installations, this requirements needs to be relocated to requirements for electrical installations. As this rule is applied currently within the NEC, only specific applications can require terminations to use devices and equipment rated for these conductor types. This relocated requirement will provide a procedure for identified lugs and terminations providing a safer installation without possible hot spots or cable overheating due to bad or loose lug connections when terminated with acceptable identified crimping tools.

Panel Meeting Action: Reject

Panel Statement: The submitter's section referenced does not exist.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

WILLS, R.: The suggestion to have common language for fine-stranded cables is a good one. It could be in Article 110 or Article 400. The panel justification was a little trite - sure the referenced sections does not exist, but the intent of the proposal is to create such a common section.

4-231 Log #4667 NEC-P04 **Final Action: Reject**
(690.31(F))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 1-149.

This action will be considered by the panel as a public comment.

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Delete this lettered paragraph.

Substantiation: This is a companion proposal to one from this submitter to relocate this material into 110.14. These requirements are hardly unique to photovoltaic installations, and should therefore apply to all installations, as the testing laboratories intend. This proposal should be provisionally accepted until CMP 1 acts on the other proposal.

Panel Meeting Action: Reject

Panel Statement: The required text does not currently exist in Section 110.14.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

WILLS, R.: See My Explanation of Negative on 4-230.

4-232 Log #2505 NEC-P04 **Final Action: Accept**
(690.43)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise 690.43 as follows:

690.43 Equipment Grounding. <u>Equipment grounding conductors and devices shall comply with (A) through (F).</u>

<u>(A) Equipment Grounding Required</u>. Exposed non–current carrying metal parts of <u>PV</u> module frames, <u>electrical</u> equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage.

<u>(B) Equipment Grounding Conductor Required</u>. An equipment-grounding conductor between a PV array and other equipment shall be required in accordance with 250.110.

<u>(C) Structure as Equipment Grounding Conductor.</u> Devices listed and identified for grounding the metallic frames of PV modules or other equipment shall be permitted to bond the exposed ~~metallic frames of PV modules~~ metal surfaces or other equipment to mounting structures. <u>Metallic mounting structures, other than building steel, used for grounding purposes shall be identified as equipment-grounding conductors or shall have identified bonding</u>

jumpers or devices connected between the separate metallic sections and shall be bonded to the grounding system.

(D) PV Mounting Systems and Devices. Devices and systems used for mounting PV modules that are also used to provide grounding of the module frames shall be identified for the purpose of grounding PV modules.

(E) Adjacent Modules. Devices identified and listed for bonding the metallic frames of PV modules shall be permitted to bond the exposed metallic frames of PV modules to the metallic frames of adjacent PV modules.

(F) All Conductors Together. Equipment grounding conductors for the PV array and structure (where installed) shall be contained within the same raceway or cable, or otherwise run with the PV array circuit conductors when those circuit conductors leave the vicinity of the PV array.

Substantiation: The section has been rearranged to allow the inclusion of two new requirements. Making a durable connection between an aluminum PV module frame and a grounding system is difficult because aluminum and copper are dissimilar metals and aluminum is frequently clear coated and/or oxidizes very rapidly when the surface is exposed to the atmosphere. UL has clarified UL Standard 1703 with respect to the grounding requirements of PV modules, and numerous devices are being developed to quickly and effectively ground the frames of PV modules. The Code must establish installation requirements that allow these grounding devices and methods to be used in a manner that effectively provides for a durable and safe grounded PV system.

(C) Devices are being developed that bond the module frame to an aluminum mounting rack. These racks are normally designed to mechanical standards and are not designed or certified as equipment grounding conductors. They may have mechanical joints that allow for thermal expansion but do not provide electrical continuity. Unlike building steel, which is generally acknowledged as a suitable grounded structure, these aluminum racks are as difficult to make electrical connections to as the PV modules themselves. Requiring them to be identified as equipment-grounding conductors will correct this problem. Additionally, these racks, after being identified as equipment-grounding conductors must make a connection to an accepted grounding system. A copper conductor connected to ground would be acceptable.

(D) Devices are being developed that will ground the module frame through the mechanical fasteners that hold the module to the supporting structure. The difficulty in making a good, durable electrical contact with aluminum and any other materials dictates that these devices must be identified for the use.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-233 Log #2506 NEC-P04 **Final Action: Reject**
(690.46)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise 690.46 as follows. Add the following second paragraph.

690.46 Array Equipment Grounding Conductors. Equipment grounding conductors for PV modules smaller than 6 AWG shall comply with 250.120(C). Solid (non-stranded) equipment-grounding conductors and grounding-electrode conductors of 6 AWG and smaller shall be permitted in raceways for PV array grounding.

Substantiation: Section 310.3 requires the use of stranded conductors of 8 AWG and larger in raceways, but the exception to 310.3 does allow the use of larger, solid conductors where permitted elsewhere in the Code. Given the problem of moisture, which is generally present at the location of the modules, and the installation requirements of 690.46/250.120(C), it would simplify PV installations if the use of solid conductors of 6 AWG in raceways were allowed. This would address not only issues of water migration into stranded grounding conductors and subsequent degradation of the conductor and/or connection, but would also allow electricians to more effectively deal with the concerns of inspectors who expect to see grounding conductors smaller than 6 AWG protected in a raceway. The allowance of 6 AWG solid conductors in raceways would allow an electrician to run an unspliced #6 (or smaller) solid conductor from the DC disconnect or combiner box to the array. This conductor could then be used to bond all of the mounting components and even connect to any auxiliary grounding electrodes installed at the location of the array without a splice.

Panel Meeting Action: Reject

Panel Statement: The submitter has not presented sufficient technical data to support this change. The requirement for stranded conductors in raceways has been in place for a long period of time based on installation limitations when larger sizes of solid conductors are used.

Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

WILLS, R.: I'd like to see more justification for solid conductors in this application. Why can't stranded conductors be used? Is it a cost issue? Water migration is mentioned, but this surely affects all conductors.

4-234 Log #2507 NEC-P04 **Final Action: Accept**
(690.47(B))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by providing more description related to the words "identified for the purpose."

This action will be considered by the panel as a public comment.

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Add the following second paragraph to 690.47(B).

A common dc grounding-electrode conductor shall be permitted to serve multiple inverters. The size of the common grounding electrode and the tap conductors shall be in accordance with 250.166. The tap conductors shall be connected to the common grounding-electrode conductor by exothermic welding or with connectors identified for the purpose.

Substantiation: PV installations using multiple small inverters are becoming more common as costs continue to decline for these products. Since each inverter and the connected modules represent individual dc systems, a common dc grounding electrode can be used to provide the necessary connection to earth for all inverters. The size of this common grounding-electrode conductor is determined by the type of grounding electrode in accordance with 250.166. Because the dc circuits for each inverter are separate and distinct, there is no requirement to make the common conductor any larger than the size of the grounding-electrode conductor required for a single inverter.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

WILLS, R.: Members of CMP-5 brought up the issue that there are some circumstances where a GEC is simply not available (for example on an upper floor of a high-rise building with no metal structure). We may need an exception to cover these situations. E.g., "Exception: Where no grounding electrode conductor is accessible, dc systems are permitted to be grounded to the building equipment grounding system."

4-235 Log #2508 NEC-P04 **Final Action: Accept in Principle**
(690.47(C))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Delete the entire existing 690.47(C) and replace it with the proposed:

~~(C) Systems with Alternating-Current and Direct-Current Grounding Requirements. Systems with alternating-current and direct-current grounding requirements shall comply with items (C)(1) through (C)(8):~~

~~(1) Where photovoltaic power systems have both alternating-current (ac) and direct-current (dc) grounding requirements, the dc grounding system shall be bonded to the ac grounding system.~~

~~(2) A bonding conductor between these systems shall be sized as the larger of the dc requirement in accordance with 690.45, the ac requirements based on the inverter alternating current overcurrent device rating and 250.122, and the system bonding requirements of 250.28.~~

~~(3) A conductor that serves as both an equipment grounding conductor and as part of the bond between ac and dc systems for an inverter incorporating dc ground-fault protection shall meet the requirements for equipment bonding jumpers in accordance with 250.102 but shall not be subject to the requirements for bonding jumpers in accordance with 250.28. A single conductor shall be permitted to be used to perform the multiple functions of dc grounding, ac grounding, and bonding between ac and dc systems.~~

~~(4) A bonding conductor or equipment grounding conductor that serves multiple inverters shall be sized based on the sum of applicable maximum currents used in item (2).~~

~~(5) A common ground bus shall be permitted to be used for both systems.~~

~~(6) A common grounding electrode shall be permitted to be used for both systems, in which case the grounding electrode conductor shall be connected to the ac ground system bonding point.~~

~~(7) Grounding electrode conductor(s) shall be sized to meet the requirements of both 250.66 (ac system) and 250.166 (dc system).~~

~~(8) For systems with utility-interactive inverters, the premises grounding system serves as the ac grounding system.~~

690.47(C) Systems with Alternating and Direct-Current Grounding Requirements. PV systems having direct current (dc) circuits and alternating current (ac) circuits with no direct connection between the dc grounded conductor and ac grounded conductor shall have a dc grounding system. The dc grounding system shall be bonded to the ac grounding system by one of the methods listed in (1), (2), or (3).

This section shall not apply to ac PV modules.

When using the methods of (2) or (3), a visual inspection shall be made to ensure that the existing ac grounding-electrode system meets the applicable requirements of Article 250, Part III.

FPN No. 1: ANSI/Underwriters Laboratory Standard 1741 for PV inverters and charge controllers requires that any inverter or charge controller that has a bonding jumper between the grounded dc conductor and the grounding system connection point have that point marked as a grounding-electrode conductor (GEC) connection point. In PV inverters, the terminals for the dc equipment-grounding conductors and the terminals for ac equipment-grounding conductors are generally connected to or electrically in common with a grounding busbar that has a marked dc GEC terminal.

FPN No.2: For utility-interactive systems, the existing premises grounding system serves as the ac grounding system.

(1) Separate DC Grounding Electrode System Bonded to the AC Grounding Electrode System. A separate dc grounding electrode or system shall be installed, and it shall be bonded directly to the ac grounding-electrode system. The size of any bonding jumper(s) between ac and dc systems shall be based on the larger size of the existing ac grounding-electrode conductor or the size of the dc grounding-electrode conductor specified by 250.166. The dc grounding-electrode system conductor(s) or the bonding jumpers to the ac grounding-electrode system shall not be used as a substitute for any required ac equipment-grounding conductors.

(2) Common DC and AC Grounding Electrode. A dc grounding-electrode conductor of the size specified by 250.166, shall be run from the marked direct-current grounding electrode connection point to the ac grounding-electrode. Where an ac grounding electrode is not accessible, the dc grounding-electrode conductor shall be connected to the ac grounding-electrode conductor in accordance with 250.64(C)(1). This dc grounding-electrode conductor shall not be used as a substitute for any required ac equipment-grounding conductors.

(3) Combined DC Grounding-Electrode Conductor and AC Equipment-Grounding Conductor. An unspliced, or irreversibly spliced, combined grounding conductor shall be run from the marked dc grounding-electrode conductor connection point along with the ac circuit conductors to the grounding bus bar in the associated ac equipment. This combined grounding conductor shall be the larger of the size specified by 250.122 or 250.166 and shall be installed in accordance with 250.64(E).

Substantiation: Section 690.47(C) was edited extensively in the Code Making Panel during the final meeting of the *2008 NEC* cycle and was not subject to public review.

This proposal takes a combination of the *2005 NEC* 690.47(C) and the *2008 NEC 690.47(C)*, clarifies that Code language and includes the requirements meeting the intent of the *2008 NEC* in a clear and understandable manner

This proposal establishes when ac and dc grounding are required, it presents the requirement for bonding the two grounding systems together, and it gives three ways of achieving that bonding. The proposal presents this information as concisely as possible without unnecessary duplication of material found elsewhere in the Code. It also provides informative material to assist installers and inspectors.

Section 690.47(C) in the *2008 NEC* did not establish the need for bonding the dc grounding system to the ac grounding system. The revised proposal does so.

This proposal clarifies the requirement and the methods of meeting the requirement.

Section 690.47(C) in the *2008 NEC* presented only one method of achieving the ac and dc bonding. This is a method that may not be applicable to all PV systems, large and small. This proposal presents three distinct methods, including the one in 690.47(C) in the *2008 NEC*. It can also be used when the listed inverter instructions require that each inverter have a dc grounding electrode installed near each inverter.

It should be noted that the combined conductor bonding method (3) requires that all entry and exit points for metal enclosures and raceways be bonded. This is important because each ferrous metal enclosure or raceway that the combined conductor passes through represents a significant increase in ground path inductance if not properly bonded. Such inductances reduce the ability of the conductor to carry surges to ground.

When using the method described in (2) or (3), it should not be presumed that the existing grounding at a building or structure is present and properly installed. Many older buildings are deficient in their grounding electrode systems. A cursory check should therefore be performed to ensure that the premises grounding electrode system exists and appears to be installed properly.

Fine Print Note (FPN) No. 1 provides information that many inspectors need to know so that they can make informed inspections of this equipment and these installations without having to search elsewhere for the information.

The Exceptions are necessary because of the increasing use of concrete encased electrodes.

Panel Meeting Action: Accept in Principle

Change FPN No. 1: to reference Underwriters Laboratories UL-1741 Standard for Inverters, Converters, and Controllers for Use in Independent Power Systems.

Revise thetitle to read: **690.47(C) Systems with Alternating-Current and Direct-Current Grounding Requirements.**

Panel Statement: Revise the wording in the proposal to correct the reference to Underwriters laboratories. Add the word current back into the title.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

DEATON, R.: The term "utility" refers to a utility supplying electrical power.

ROGERS, J.: I agree with the panel action on this proposal and with the clarified requirement as presented by the submitter. In the comment period it is my opinion that the last sentence in parts 1 and 2 should be removed as it is redundant and other code sections already mandate the installation of the AC side grounding conductor separate of the DC grounding electrode conductor.

4-236 Log #4668 NEC-P04 **Final Action: Accept in Principle**
(690.47(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Add the following wording at the end of the parent language and before item (1): "These systems shall be permitted to use both a common ground bus and a common grounding electrode for both systems. The grounding electrode conductor connected to a common grounding electrode, if used, shall be connected to the ac system ground point.

Delete 690.47(C)(5 and 6) and renumber the remaining items accordingly.

Substantiation: This section is set up based on items (1) through (8) being the subject of a mandate for compliance, and yet (5) and (6) are written as permissive rules. This proposal relocates these items to the parent text so the mandatory requirements properly fall into line.

Panel Meeting Action: Accept in Principle

Panel Statement: See the action and statement on Proposal 4-235.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-237 Log #4669 NEC-P04 **Final Action: Accept in Principle**
(690.47(C)(2) Exception (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Insert the following exception:

Exception: The bonding conductor shall not be required to be larger than the conductor required in 680.47(C)(3).

Substantiation: Consider a utility-interactive inverter with a 30A connection to a 200A service panel. The bonding conductor size per (2) is the largest of three sizes: a) the dc 690.45 requirement, or b) the ac requirement based on the inverter overcurrent device size and Table 250.122 (normally 10 AWG in this case), or c) the system bonding requirements of 250.28 (if connected at a 200 A service with the usual conductors this would be 4 AWG), so the minimum size would be 4 AWG; but, now look at (3).

In item (3), a conductor that is both an equipment grounding conductor and part of the bonding path between an ac system and a dc system that incorporates GFP, and therefore has the dc grounding connection at that location, is sized in accordance with 250.102. There are two equipment bonding conductors in 250.102, one on the load side of the service sized by 250.122, and one on the line side, sized per 250.66. Since this is on the load side, 250.122 governs the sizing and we are back to a 10 AWG conductor. This is reinforced by the statement that 250.28 does not apply, which is what drove the 4 AWG result in item 2. That said, there is no language in the parent text that provides for resolving an internal conflict, other than compliance with all 8 rules, and that could be argued as mandating the 4 AWG conductor. There is no technical merit to the larger size wire. This is purely to hold two systems at the same potential, and the worst case fault on either system is one that will be resolved through a conductor sized in accordance with 250.122.

This proposal provides the mechanism to resolve these conflicts.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and panel statement for Proposal 4-235 for 690.47(C) that covers the size of the common grounding bus and common grounding electrode case addressed in this proposal.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-238 Log #2509 NEC-P04 **Final Action: Reject**
(690.47(D))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Delete 690.47(D)

~~(D) Additional Electrodes for Array Grounding. Grounding electrodes shall be installed in accordance with 250.52 at the location of all ground- and pole-mounted photovoltaic arrays and as close as practicable to the location of roof-mounted photovoltaic arrays. The electrodes shall be connected directly to the array frame(s) or structure. The dc grounding electrode conductor shall be sized according to 250.166. Additional electrodes are not permitted to be used as a substitute for equipment bonding or equipment grounding conductor requirements.~~

~~The structure of a ground- or pole-mounted photovoltaic array shall be permitted to be considered a grounding electrode if it meets the requirements of 250.52. Roof-mounted photovoltaic arrays shall be permitted to use the metal frame of a building or structure if the requirements of 250.52(A)(2) are met.~~

~~Exception No. 1: Array grounding electrode(s) shall not be required where the load served by the array is integral with the array.~~

~~Exception No. 2: Additional array grounding electrode(s) shall not be required if located within 6 ft of the premises wiring electrode.~~

Substantiation: This requirement, new to the *2008 NEC*, was added to mandate lightning protection for PV arrays. It does not replace or substitute for any other Code-required grounding systems that are designed to ensure the safety of the public.

Lightning protection is beyond the scope of the *NEC* and is covered in other NFPA documents.

Normal, equipment-grounding systems provide the necessary safety for PV systems.

A similar, optional requirement is already in the Codes as 250.54.

These lightning-protection requirements should be deleted from the Code.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided sufficient technical data to support the removal of this requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-239 Log #4670 NEC-P04 **Final Action: Reject**

(690.47(D))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Either:

1) Insert the following sentence after the second sentence: The electrodes shall be bonded to the grounding electrode system for the building.

Or:

2) Change the beginning of the first sentence to read “Auxiliary grounding electrodes shall be installed in accordance with 250.54 at the location...”.

Substantiation: If a separate electrode is used, whether or not it must be bonded to the power system electrodes depends on whether they are classified as “auxiliary” electrodes as covered in 250.54. The proposal for this 2008 change clearly intended that they be so classified; but the panel removed the reference and failed to substantiate its actions. This proposal seeks to force a clear stand on whether or not to bond these electrodes. The fact that they are a down payment on lightning protection suggests they are not supplemental, because NFPA 780 requires bonding to power system grounding electrode systems while retaining separate electrodes for their protective system.

Panel Meeting Action: Reject

Panel Statement: Conductors between the array and inverter is an equipment grounding conductor. Section 250.54 allows auxiliary grounding electrodes to be installed without bonding to the grounding system. Additionally, the proposal does not meet the requirements of 4.3.3(b) the Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-240 Log #4671 NEC-P04 **Final Action: Reject**

(690.48)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Insert the following sentence at the end: “A conductor meeting the terms of this requirement together with fittings suitable for creating a bonding connection shall be secured to the building surface at an easily seen location at the system connection to the grounding electrode conductor, together with instructions regarding when to install the temporary bonding jumper.”

Substantiation: The present NEC text is a maintenance procedure requirement suitable for NFPA 70E and not an installation requirement, and therefore it has no business being in the NEC as written. The rule says, in effect, that if you remove the equipment for servicing, you must install a temporary bonding conductor so as to maintain the continuity between the two equipment grounding systems that normally are bonded through the missing equipment. Now this is a very good idea, just like it is a very good idea to test electrical components for voltage before working on them. But what steps can be taken prior to the final electrical inspection by way of modifications to the electrical system to achieve the result? The rule cannot be complied with by an installing electrician.

This proposal adds actual field installation criteria that could be enforced as part of normal electrical inspections. The submitter understands that this proposal may not be suitable either. If the panel cannot develop an appropriate installation requirement, then this section should be marked for deletion.

Panel Meeting Action: Reject

Panel Statement: The proposal as submitted does not add clarity to Section 690.48. It is unclear how the submitter intends for instructions to be placarded and followed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-241 Log #4672 NEC-P04 **Final Action: Reject**

(690.49)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Insert the following sentence at the end: “A conductor meeting the terms of this requirement together with fittings suitable for creating a bonding connection shall be secured to the building surface at an easily seen location at the system connection to the grounding electrode conductor, together with instructions regarding when to install the temporary bonding jumper.”

Substantiation: The present NEC text is a maintenance procedure requirement suitable for NFPA 70E and not an installation requirement, and therefore it has no business being in the NEC as written. The rule says, in effect, that if you remove an inverter for servicing, you must install a temporary bonding conductor so as to maintain the continuity between the two equipment grounding systems that normally are bonded through the missing equipment. Now this is a very good idea, just like it is a very good idea to test electrical components for voltage before working on them. But what steps can be taken prior to the final electrical inspection by way of modifications to the electrical system to achieve the result? The rule cannot be complied with by an installing electrician.

This proposal adds actual field installation criteria that could be enforced as part of normal electrical inspections. The submitter understands that this proposal may not be suitable either. If the panel cannot develop an appropriate installation requirement, then this section should be marked for deletion.

Panel Meeting Action: Reject

Panel Statement: The proposal as submitted does not add clarity to Section 690.49. It is unclear how the submitter intends for instructions to be placarded and followed.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-242 Log #2510 NEC-P04 **Final Action: Accept**

(690.62)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with the NEC Style Manual to provide titles for each subsection.

This action will be considered by the panel as a public comment.

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Delete the existing first paragraph and replace with the following:

~~If a single-phase, 2-wire inverter output is connected to the neutral conductor and one the ungrounded conductor (only) of a 3-wire or of a 3-phase 4-wire, wye-connected system, the maximum load connected between the neutral conductor and any one ungrounded conductor plus the inverter output rating shall not exceed the ampacity if the neutral conductor.~~

690.62 Ampacity of Neutral Conductor.

The ampacity of the neutral conductors shall comply with either A or B.

A. Where the outputs of single or multiple single-phase inverter(s) are connected between the neutral conductor and one or more of the ungrounded conductors of a 3-phase 4-wire, wye-connected system or a 120/240V single-phase system, the ampacity of the neutral conductor shall be no less than the greater of (1) or (2)

(1) 125% of the continuous load plus 100% of the non continuous load on that neutral conductor or

(2) 125% of the sum of the rated output current of all inverters considering worst-case imbalance.

Renumber second paragraph as B.

Substantiation: These two currents ((1) and (2)) are not additive in this requirement because they may exist separately at different times. The existing requirement, as written, is incorrect in requiring the sum of these two currents to be used. Since the currents (power) will generally flow in opposite directions, the sum may be near zero at times.

If the inverters are not operating, the neutral must be able to carry any connected load currents. The operation of the inverters in the presence of load currents will tend to decrease currents in the neutral. If there are no loads, then the circuit must carry the full rated output of the inverter(s). Where multiple inverters are installed and connected phase-to-neutral, consideration must be given to situations where one or more inverters could fail, be turned off, or the connected array shaded thus eliminating any balance between the phases and increasing the neutral currents. The 125% of rated output is needed to ensure that the neutral conductor ampacity is consistent with the ampacity calculated elsewhere in the Code.

Example:

480/277V, 3-phase, 4-wire, wye system: Existing maximum, connected, unbalanced load current in the neutral is 40 amps. Two 7 kW inverters are connected between each phase and neutral. A total of six inverters are connected. Rated output current of each inverter is 27.3 amps. When all six inverters are producing rated current, the neutral currents from the inverters are near zero. In a worst-case situation, only two inverters connected on one phase are working at rated output and the others are shut off or have failed. The currents in the neutral from these two inverters would total 2 x 27.3 amps or 54.6 amps, and this should be used to calculate the required ampacity for the neutral, since it is larger than the 40 amps of load current.

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-243 Log #4736 NEC-P04 **Final Action: Accept**
(690.63)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal since the text does not comply with the NEC Style Manual requiring mandatory text and including the subject of the rules being referenced.

The title of 705.100 is also inconsistent with the reference.

This action will be considered by the panel as a public comment.

Submitter: Todd W. Stafford, National Joint Apprentice & Training Committee
Recommendation: Revise text to read as follows:

690.63 Unbalanced Interconnections.

~~(A) Single Phase. Single phase inverters for photovoltaic systems are ac modules in interactive solar photovoltaic systems shall not be connected to 3-phase power systems unless the interconnected system is designed so that significant unbalanced voltages cannot result.~~

~~(B) Three Phase. Three phase inverters and 3-phase ac modules in interactive systems shall have all phases automatically de-energized upon loss of, or unbalanced, voltage in one or more phases unless the interconnected system is designed so that significant unbalanced voltages will not result.~~

See 705.100 Unbalanced Connections

Substantiation: This proposal was generated by the Task Group for CMP4. This Task group was asked to develop appropriate proposals to address the redundant point of interconnection requirements for PV in 690, Fuel Cells in 692 and Electric Power Sources in 705.

Task Group members are:
Todd W. Stafford, Chair
Ward I. Bower
Kenneth Krastins
Vincent C. Zinnante
Timothy P. Zgonena

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-244 Log #2511 NEC-P04 **Final Action: Accept in Principle**
(690.64)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Delete all of Section 690.64.

~~The output of a utility-interactive inverter shall be connected as specified in 690.64(A) or (B).~~

~~(A) Supply Side. The output of a utility-interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6).~~

~~(B) Load Side. The output of a utility-interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility-interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeders, or both, the interconnecting provisions for the utility-interactive inverter(s) shall comply with (B)(1) through (B)(7).~~

~~(1) Dedicated Overcurrent and Disconnect. Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.~~

~~(2) Bus or Conductor Rating. The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility-interactive inverter(s) shall be used in the calculations for all busbars and conductors.~~

~~(3) Ground-Fault Protection. The interconnection point shall be on the line side of all ground-fault protection equipment.~~

~~Exception: Connection shall be permitted to be made to the load side of ground-fault protection, provided that there is ground-fault protection for equipment from all ground-fault current sources. Ground-fault protection devices used with supplies connected to the load-side terminals shall be identified and listed as suitable for backfeeding.~~

~~(4) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.~~

~~(5) Suitable for Backfeed. Circuit breakers, if backfed, shall be suitable for such operation.~~

~~FPN: Circuit breakers that are marked "Line" and "Load" have been evaluated only in the direction marked. Circuit breakers without "Line" and "Load" have been evaluated in both directions.~~

~~(6) Fastening. Listed plug-in-type circuit breakers backfed from utility-interactive inverters complying with 690.60 shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.~~

~~(7) Inverter Output Connection. Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices supplying it, a connection in a panelboard shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:~~

~~**WARNING**~~
~~**INVERTER OUTPUT CONNECTION**~~
~~**DO NOT RELOCATE THIS OVERCURRENT DEVICE**~~

Substantiation: The requirements of 690.64 were moved to 705.12 during the *2008 NEC* Code making cycle and are no longer needed in Article 690.

Proposals submitted for 690.64 should be addressed as proposals for 705.12.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 4-246.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-245 Log #3442 NEC-P04 **Final Action: Accept in Principle**
(690.64)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

690.64 Point of Connection. The output of a utility-interactive inverter shall be connected as specified in ~~690.64(A) or (B)~~ 705.12(A) or (D).

~~**(A) Supply Side.** The output of a utility-interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6).~~

~~**(B) Load Side**. The output of a utility-interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeder, or both, the interconnecting provisions for the utility-interactive inverter(s) shall comply with (B)(1) through (B)(7).~~

~~**(1) Dedicated Overcurrent and Disconnect.** Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.~~

~~**(2) Bus or Conductor Rating.** The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility-interactive inverter(s) shall be used in the calculations for all busbars and conductors.~~

~~(3) **Ground-Fault Protection**. The interconnection point shall be on the line side of all ground-fault protection equipment.~~

~~*Exception:* Connection shall be permitted to be made to the load side of ground-fault protection, provided that there is ground-fault protection for equipment from all ground fault current sources. Ground fault protection devices used with supplies connected to the load side terminals shall be identified and listed as suitable for backfeeding.~~

~~**(4) Marking**. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.~~

~~**(5) Suitable for Backfeed.** Circuit breakers, if backfed, shall be suitable for such operation.~~

~~FPN: Circuit breakers that are marked "Line" and "Load" have been evaluated only in the direction marked. Circuit breakers without "Line" and "Load" have been evaluated in both directions..~~

~~**(6) Fastening.** Listed plug-in-type circuit breakers backfed from utility-interactive-inverters complying with 690.60 shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.~~

~~**(7) Inverter Output Connection.** Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices ;supplying it, a connection in a panel-board shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:~~

~~WARNING~~
~~INVERTER OUTPUT CONNECTION~~
~~DO NOT RELOCATE~~
~~THIS OVERCURRENT DEVICE~~

Substantiation: Photovoltaic systems operating in parallel with another electric supply to a premise electrical system are considered Interconnected Electric Power Production Systems and fall within the scope of Article 705. The point of connection requirements in 690.64 duplicate the text Section 705.12. Repeating the requirements, to interconnect a photovoltaic utility-interactive inverter in Article 690 is redundant. The requirements in Section 690.64 are not specific to photovoltaic installations. Many types of interconnected electric production systems use utility-interactive inverters, such as wind, photovoltaic, fuel cells, and micro-turbines, to mention a few. Section 705.12(A) and (D) provides uniform interconnection requirements for this inverter technology, regardless of the primary energy source.

The requirements in Section 690.64 duplicate the text in 705.12 as listed below:

- 690.64(A) is duplicated text from 705.12(A)
- 690.64(B), B(1) through B(7) is duplicated by 705.12(D), (D)(1) through (D)(7)

This proposal removes the duplicated text in Article 690 and references Article 705 sections that state the utility-interactive inverter point of connection requirements.

Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 4-246.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-246 Log #4734 NEC-P04 **Final Action: Accept**
(690.64)

TCC Action: The Technical Correlating Committee directs that the panel comply with the NEC Style Manual by providing the specific text necessary for the point of connection requirements in 705.12 that should be used in 690.64.

This action will be considered by the panel as a public comment.
Submitter: Todd W. Stafford, National Joint Apprentice & Training Committee
Recommendation: Revise text to read as follows:

690.64 Point of Connection. ~~The output of a utility interactive inverter shall be connected as specified in 690.64(A) or (B).~~

~~(A) Supply Side. The output of a utility interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6).~~

~~(B) Load Side. The output of a utility interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the promises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeders, or both, the interconnecting provisions for the utility interactive inverter(s) shall comply with (B)(1) through (B)(7).~~

~~(1) Dedicated Overcurrent and Disconnect. Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.~~

~~(2) Bus or Conductor Rating. The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility interactive inverter(s) shall be used in the calculations for all busbars and conductors.~~

~~(3) Ground Fault Protection. The interconnection point shall be on the line side of all ground fault protection equipment.~~

~~*Exception: Connection shall be permitted to be made to the load side of ground fault protection, provided that there is ground fault protection for equipment from all ground fault current sources. Ground fault protection devices used with supplies connected to the load side terminals shall be identified and listed as suitable for backfeeding.*~~

~~(4) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.~~

~~(5) Suitable for Backfeed. Circuit breakers, if backfed, shall be suitable for such operation.~~

~~FPN: Circuit breakers that are marked “Line” and “Load” have been evaluated only in the direction marked. Circuit breakers without “line” and “Load” have been evaluated in both directions.~~

~~(6) Fastening. Listed plug in type circuit breakers backfed from utility interactive inverters complying with 690.60 shall be permitted to omit the additional fastener normally required by 408.36 (D) for such application.~~

~~(7) Inverter Output Connection. Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices supplying it, a connection in a panelboard shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:~~

~~Warning~~
~~Inverter Output Connection~~
~~Do Not Relocate~~
~~The Overcurrent Device~~
<u>See 705.12 Point of Connection</u>

Substantiation: This proposal was generated by the Task Group for CMP4. This Task group was asked to develop appropriate proposals to address the redundant point of interconnection requirements for PV in 690, Fuel Cells in 692 and Electric Power Sources in 705.

Task Group members are:
Todd W. Stafford, Chair
Ward I. Bower
Kenneth Krastins
Vincent C. Zinnante
Timothy P. Zgonena

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-247 Log #4144 NEC-P04 **Final Action: Reject**
(690.71)

Submitter: Robert H. Wills, Intergrid, LLC / Rep. American Wind Energy Association
Recommendation: Revise text to read as follows:

VIII. Storage Batteries

690.71 Installation.

(A) General. Storage batteries in a solar photovoltaic system shall be installed in accordance with the provisions of Article 480. The interconnected battery cells shall be considered grounded where the photovoltaic power source is installed in accordance with 690.41.

Batteries in PV power systems are usually grounded when the PV power system is grounded in accordance with Article 690, Part VI.

~~(B) Dwellings.~~

~~(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).~~

~~Exception: Where live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 690.7 shall be permitted.~~

~~(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.~~

~~FPN: Batteries in solar photovoltaic systems are subject to extensive charge–discharge cycles and typically require frequent maintenance, such as checking electrolyte and cleaning connections.~~

~~At any voltage, a primary safety concern in battery systems is that a fault (e.g., a metal tool dropped onto a terminal) might cause a fire or an explosion. Guarded, as defined in Article 100, describes the best method to reduce this hazard.~~

~~(C) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries where the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 690.16.~~

~~Large banks of storage batteries can deliver significant amounts of short-circuit current. Current-limiting overcurrent devices should be used if necessary.~~

~~(D) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted where no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.~~

~~This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that may require steel cases for proper operation.~~

~~Grounded metal trays and cases or containers (as normally required by 250.110) in flooded, lead-acid battery systems operating over 48 volts, nominal, have been shown to be a contributing factor in ground faults. Nonconductive racks, trays, and cases minimize this problem.~~

~~(E) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, where more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.~~

~~(F) Battery Maintenance Disconnecting Means. Battery installations, where there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductor(s) in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductor(s) for the remainder of the photovoltaic electrical system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.~~

(G) Battery Systems of More Than 48 Volts. On photovoltaic systems where the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided that the photovoltaic array source and output circuits comply with 690.41.

~~(2) The dc and ac load circuits shall be solidly grounded.~~

~~(3) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.~~

~~(4) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.~~

Insert into Article 480, Storage Batteries

480.xx Installation.

(A) Dwellings.

(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).

Exception: Where live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 690.7 shall be permitted.

(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.

FPN: Batteries in systems subject to extensive charge–discharge cycles typically require frequent maintenance, such as checking electrolyte and cleaning connections.

At any voltage, a primary safety concern in battery systems is that a fault (e.g., a metal tool dropped onto a terminal) might cause a fire or an explosion. Guarded, as defined in Article 100, describes the best method to reduce this hazard.

(B) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries where the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 690.16.

Large banks of storage batteries can deliver significant amounts of short-circuit current. Current-limiting overcurrent devices should be used if necessary.

(C) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted where no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.

This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that may require steel cases for proper operation.

Grounded metal trays and cases or containers (as normally required by 250.110) in flooded, lead-acid battery systems operating over 48 volts, nominal, have been shown to be a contributing factor in ground faults. Nonconductive racks, trays, and cases minimize this problem.

(D) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, where more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.

(E) Battery Maintenance Disconnecting Means. Battery installations, where there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductor(s) in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductor(s) for the remainder of the electrical system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.

(F) Battery Systems of More Than 48 Volts. On systems where the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided the following conditions are met:

(1) The dc and ac load circuits shall be solidly grounded.

(2) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.

(3) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.

Substantiation: The section on the installation of storage batteries in residences in Article 690 makes a lot of sense for systems other than photovoltaics. In writing the new proposed article for Small Wind Electric Systems, we copied this language, changing PV to Small Wind Electric. These requirements should apply to any substantial battery storage system, and thus should be moved to a general section of the code.

The problem – language duplicated in several articles, and not being applied for other situations where it is relevant – e.g. small wind, hydro, etc.

The solution – move it to Article 480, perhaps

Panel Meeting Action: Reject

Panel Statement: The proposal is incomplete as written. The panel suggests that the submitter comments on the proposal with technical data to substantiate the comment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

WILLS, R.: The committee rejected this proposal more due to lack of time than lack of substantiation. The issue of moving common language to a suitable common article should be addressed at the ROC meeting, and by the TCC. I am the author of this proposal. Communication with others on CMP4 at Hilton Head brought me to a different conclusion to that proposed here. The common sections covering storage batteries in 690, 692 and 694(new) are also relevant to other forms of energy storage including ultra-capacitors, flywheels etc.

We believe that a better solution is to create a new Article in Chapter 6 (Special Equipment) entitled “Energy Storage Systems”, and that that this be location for this common text. There are two reasons for this:

1/ Energy storage systems are now encompassing more than just storage batteries

2/ The relevant aspects of energy storage systems to PV, fuel cells and wind should stay in the same CMP as 690-694. It seemed that things were more coordinated when 690, 692 & 705 were in CMP 13 with 445 (generators) and 480 (storage batteries). I will prepare a comment that is a complete draft of a new Article, 69x, Energy Storage Systems.

(One other issue to address is that plug-in hybrid and pure electric vehicles are now interacting with the electric grid - both charging and discharging. These “mobile” energy storage systems need to be addressed).

4-248 Log #4300 NEC-P04 **Final Action: Reject**
(690.71)

Submitter: Robert H. Wills, Intergrid, LLC

Recommendation: Revise as follows:

VIII. Storage Batteries

690.71 Installation.

(A) General. Storage batteries in a solar photovoltaic system shall be installed in accordance with the provisions of Article 480. The interconnected battery cells shall be considered grounded where the photovoltaic power source is installed in accordance with 690.41.

Batteries in PV power systems are usually grounded when the PV power system is grounded in accordance with Article 690, Part VI.

~~(B) Dwellings.~~

~~(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).~~

~~Exception: Where live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 690.7 shall be permitted.~~

~~(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.~~

~~FPN: Batteries in solar photovoltaic systems are subject to extensive charge–discharge cycles and typically require frequent maintenance, such as checking electrolyte and cleaning connections.~~

~~At any voltage, a primary safety concern in battery systems is that a fault (e.g., a metal tool dropped onto a terminal) might cause a fire or an explosion. Guarded, as defined in Article 100, describes the best method to reduce this hazard.~~

~~(C) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries where the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 690.16.~~

~~Large banks of storage batteries can deliver significant amounts of short-circuit current. Current-limiting overcurrent devices should be used if necessary.~~

~~(D) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted where no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.~~

~~This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that may require steel cases for proper operation.~~

~~Grounded metal trays and cases or containers (as normally required by 250.110) in flooded, lead-acid battery systems operating over 48 volts, nominal, have been shown to be a contributing factor in ground faults. Nonconductive racks, trays, and cases minimize this problem.~~

~~(E) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, where more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.~~

~~(F) Battery Maintenance Disconnecting Means. Battery installations, where there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductor(s) in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductor(s) for the remainder of the photovoltaic electrical system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.~~

(G) Battery Systems of More Than 48 Volts. On photovoltaic systems where the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided that the photovoltaic array source and output circuits comply with 690.41.

~~(2) The dc and ac load circuits shall be solidly grounded.~~

~~(3) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.~~

~~(4) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.~~

Insert into Article 480, Storage Batteries

480.xx Installation.

(A) Dwellings.

(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).

Exception: Where live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 690.7 shall be permitted.

(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.

FPN: Batteries in systems subject to extensive charge–discharge cycles typically require frequent maintenance, such as checking electrolyte and cleaning connections.

At any voltage, a primary safety concern in battery systems is that a fault (e.g., a metal tool dropped onto a terminal) might cause a fire or an explosion. Guarded, as defined in Article 100, describes the best method to reduce this hazard.

(B) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries where the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 690.16.

Large banks of storage batteries can deliver significant amounts of short-circuit current. Current-limiting overcurrent devices should be used if necessary.

(C) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted where no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.

This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that may require steel cases for proper operation.

Grounded metal trays and cases or containers (as normally required by 250.110) in flooded, lead-acid battery systems operating over 48 volts, nominal, have been shown to be a contributing factor in ground faults. Nonconductive racks, trays, and cases minimize this problem.

(D) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, where more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.

(E) Battery Maintenance Disconnecting Means. Battery installations, where there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductor(s) in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductor(s) for the remainder of the electrical system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.

(F) Battery Systems of More Than 48 Volts. On systems where the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided the following conditions are met:

(1) The dc and ac load circuits shall be solidly grounded.

(2) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.

(3) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.

Substantiation: The section on the installation of storage batteries in residences in Article 690 makes a lot of sense for systems other than photovoltaics. In writing the new proposed article for Small Wind Electric Systems, we copied this language, changing PV to Small Wind Electric. These requirements should apply to any substantial battery storage system, and thus should be moved to a general section of the code.

The problem – language duplicated in several articles, and not being applied for other situations where it is relevant – e.g. small wind, hydro, etc.

The solution – move it to Article 480, perhaps

Panel Meeting Action: Reject

Panel Statement: The proposal is incomplete as written. The panel suggests that the submitter comments on the proposal with technical data to substantiate the comment.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-249 Log #2512 NEC-P04 **Final Action: Reject**
(690.71(H))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Add the following section H to 690.71

(H) Disconnects and Overcurrent Protection. Where battery bank input and output terminals are more than 1.5 meters (5 feet) from connected equipment, or where the circuits from these terminals pass through a wall or partition, a switched disconnecting means and overcurrent protection shall be provided at the battery end of the circuit. Fused disconnecting means or circuit breakers are acceptable. Where fused disconnecting means are used, the "Line" terminals of the disconnecting means shall be connected toward the battery terminals. Overcurrent devices or disconnecting means shall not be installed in battery enclosures where explosive atmospheres can exist.

Substantiation: Batteries represent significant sources of short-circuit current, and circuits connected to these sources must be protected with overcurrent devices. A switched disconnecting means is required to allow rapid disconnection of the batteries from the circuit under connected equipment failure and during maintenance. It is difficult to install this equipment when the cable lengths are shorter than about five feet, and this is the distance that Underwriters Laboratories (UL) generally allows for unprotected cable lengths when testing PV power centers. Any penetration of a wall or partition necessitates the installation of a disconnecting means and overcurrent protection at the battery end of the circuit to protect the circuit as it passes through the wall and to allow the battery to be disconnected at the source.

Panel Meeting Action: Reject

Panel Statement: The submitter's proposed new section and requirements are addressed in other sections of the code. See 240.21(H) and Section 480.5. The 5 ft rule is not substantiated as a UL requirement.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-250 Log #2513 NEC-P04 **Final Action: Accept in Principle**
(690.72(C))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal and comply with the NEC Style Manual 3.1 regarding the use of the wording "must be met" and use mandatory language.

This action will be considered by the panel as a public comment.

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Add the new section as follows:

690.72(C) Buck/Boost DC Converters. Buck/boost charge controllers and other dc power converters that increase or decrease the output current or output voltage with respect to the input current or input voltage shall be installed in compliance with (1) and (2).

(1) The ampacity of the conductors in output circuits shall be based on the maximum rated continuous, output current of the charge controller or converter for the selected output voltage range.

(2) The voltage rating of the output circuits shall be based on the maximum voltage output of the charge controller or converter for the selected output voltage range.

Substantiation: Many new charge controllers and other power converters (aka linear current boosters) are of the buck/boost type that can accept high input voltages at low current and deliver lower output voltages at considerably higher currents to a load. For example: A PV array producing 150 volts at 12 amps would be processed through the charge controller to 24 volts at 60 amps for battery charging. These controllers usually have several different nominal output operating voltage ranges that are selected by the installer to match the nominal battery voltage. Nominal voltages such as 12, 24, and 48 are common, and the maximum output current may vary with each voltage range. The proposal requires that these variations in output voltage and current be addressed when determining the rating of over current protective devices and the ampacity of conductors in the output circuits.

Panel Meeting Action: Accept in Principle

Revise the wording as follows:

690.72(C) Buck/Boost DC Converters. When buck/boost charge controllers and other dc power converters that increase or decrease the output current or output voltage with respect to the input current or input voltage are installed, the following requirements must be met:

(1) The ampacity of the conductors in output circuits shall be based on the maximum rated continuous, output current of the charge controller or converter for the selected output voltage range.

(2) The voltage rating of the output circuits shall be based on the maximum voltage output of the charge controller or converter for the selected output voltage range.

Panel Statement: The panel revised the language to clarify that installation of buck-boost converters is not mandatory, however, when installed the requirements must be met.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

Comment on Affirmative:

ROGERS, J.: I vote in favor of this proposal, however, it is my opinion that the language that the submitter proposed is more suitable for this requirement than the language presented by the Panel. It is my recommendation that the submitter submit a comment on this during the comment period.

4-251 Log #2872 NEC-P04 **Final Action: Reject**
(690.74)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reconsidered and correlated with the action taken on Proposal 1-149.

This action will be considered by the panel as a public comment.

Submitter: James M. Imlah, City of Hillsboro

Recommendation: Revise text to read as follows:

690.74 Battery Interconnections.

Flexible cables, as identified in Article 400, in sizes 2/0 AWG and larger shall be permitted within the battery enclosure from battery terminals to a nearby junction box where they shall be connected to an approved wiring method. Flexible battery cables shall also be permitted between batteries and cells within the battery enclosure. Such cables shall be listed for hard-service use and identified as moisture resistant.

Flexible, fine-stranded cables shall ~~only~~ be ~~used with terminals, lugs, devices, and connectors that are listed and marked for such use.~~ terminated as per 110.14(A)(1).

Substantiation: Relocate this text to 110.14 (A) (1) so this requirement can be applied to all installations where fine-stranded This was a new item that was added in article 690.31 (F) in the 2008 NEC. The issue is that fine-stranded conductors and jacketed cables are being installed for other installation types where a wide range of flexibility is desired. With the expanded use of fine-stranded cables and conductors being used for welders, cranes, elevators, battery bank connections, computer data cables, UPS cables and many other installations, this requirements needs to be relocated to requirements for electrical installations. As this rule is applied currently within the NEC, only specific applications can require terminations to use devices and equipment rated for these conductor types. This relocated requirement will provide a procedure for identified lugs and terminations providing a safer installation without possible hot spots or cable overheating due to bad or loose lug connections when terminated with acceptable identified crimping tools. Conductors and fine-stranded jacketed cables are installed, not just for solar or battery connections.

Panel Meeting Action: Reject

Panel Statement: The required text does not currently exist in Section 110.14.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 692 — FUEL CELL SYSTEMS

4-252 Log #3663 NEC-P04 **Final Action: Reject**
(692.4(C))

Submitter: Keith W. Brand, Baton Rouge Area Electrical JATC

Recommendation: Add the following new text:

692.4(C) System Installation. Fuel Cell Systems shall be installed by qualified persons with documented training and experience in the installation of and NEC requirements applicable to such equipment. The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation. Records of qualified persons must be furnished upon request to the local authority having jurisdiction.

Substantiation: Electrical power sources that operate in parallel to utility power sources, or operate alone, provide the same voltage thresholds that were previously determined to be within a cautious working environment. It follows that training and qualifications should be required before work is allowed on such systems. To prevent the unsafe conditions that have been exposed in the Photovoltaics industry and to be consistent within the area of parallel energy sources, the above proposed added text does provide a method to ensure increased adherence to the National Electrical Code. The Code Making Panel has the opportunity to help prevent unsafe conditions by being proactive within this emerging industry.

Additionally, The inclusion of the wording "qualified persons" does have precedence in the NEC.

See: 685.1 Scope.

This article covers integrated electrical systems, other than unit equipment, in which orderly shutdown is necessary to ensure safe operation. An integrated electrical system as used in this article is a unitized segment of an industrial wiring system where all of the following conditions are met:

(1) An orderly shutdown is required to minimize personnel hazard and electrical damage.

(2) The conditions of maintenance and supervision ensure that qualified persons service the system. **The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.**

A person designated as a qualified person shall possess the skills and knowledge related to the construction and operation of the electrical equipment and installation and shall have received documented safety training on the hazards involved. **Documentation of their qualifications shall be on file with the office of the establishment in charge of the completed installation.**

(3) Effective safeguards acceptable to the authority having jurisdiction are established and maintained.

Also:

215.2(B)(3) Supervised Installations. For supervised installations, feeder conductor sizing shall be permitted to be determined by qualified persons under engineering supervision. Supervised installations are defined as those portions of a facility where all of the following conditions are met:

(1) Conditions of design and installation are provided under engineering supervision.

(2) **Qualified persons with documented training and experience** in over 600-volt systems provide maintenance, monitoring, and servicing of the system. 215.2

Panel Meeting Action: Reject

Panel Statement: The panel supports installation of these systems by qualified persons. However, the NEC cannot contain requirements relative to the qualifications of installers for any electrical system, these requirements need to be handled by local or state qualification committees or licensing boards. See Annex H of the NEC for recommendations on establishing such bodies.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 10 Negative: 2

Explanation of Negative:

STAFFORD, T.: This Panel Member has determined that extensive training is required for emerging technologies. A large percentage of installers have no electrical background and/or training and there is no license requirement in place to mandate this requirement. The panel statement "The NEC cannot contain requirements relative to the qualifications of the installers for any electrical system, these requirements need to be handled by local state qualification committees or licensing boards" is ineffective for the following reasons.

First, the NEC does contain requirements for qualifications of installers and maintaining documentation thereof, see Article 685 and Article 215.2B)(3) and substantiation provided in the original proposal by submitter. Article 685 describes industrial wiring system and details the importance of necessary training for the personnel involved. The same concerns are present for parallel energy sources. Specifically, an orderly shutdown of the system is required upon certain conditions, service of equipment requires someone knowledgeable in the functions and electrical characteristic thereof, and effective safeguards should be in place acceptable to the AHJ. The original proposal attempts to provide the safeguards that are critically needed by a growing industry. The panel may decide that article 685 is not relevant when determining if like requirements should be in place for article 690, but the panel cannot claim the affects are as critical to personnel and equipment.

Second, local license boards are not addressing the issue at a pace to insure safety for the consumer/users of parallel energy sources and for the personnel involved.

TOOMER, R.: See Proposal 4-186.

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, however, the submitter is correct in his concern relative to requiring "qualified persons" to install these systems. This is extremely important for these systems to assure the safety or persons and property where these systems are utilized. Unfortunately the NEC is an installation document and not a qualification document. Any areas of the country that utilize any type of electrical licensing laws should be sure that their laws extend to these installations. Any areas of the country that do not have electrical licensing laws should refer to Annex H of the NEC and consider adopting it as a guide for qualified personnel performing electrical installations.

4-253 Log #3664 NEC-P04 **Final Action: Reject**
(692.4(C) (New))

Submitter: Keith W. Brand, Baton Rouge Area Electrical JATC
Recommendation: Add the following new text:
69X.4(C) Equipment Installation. Equipment shall be installed by qualified persons with documented training and experience in the installation of and NEC requirements applicable to such equipment. The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation. Records of qualified persons must be furnished upon request to the local authority having jurisdiction.
Substantiation: Electrical power sources that operate in parallel to utility power sources, or operate alone, provide the same voltage thresholds that were previously determined to be within a cautious working environment. It follows that training and qualifications should be required before work is allowed on such systems. To prevent the unsafe conditions that have been exposed in the Photovoltaics industry and to be consistent within the area of parallel energy sources, the above proposed added text does provide a method to ensure increased adherence to the National Electrical Code. The Code Making Panel has the opportunity to help prevent unsafe conditions by being proactive within this emerging industry.
Additionally, The inclusion of the wording “qualified persons” does have precedence in the NEC.
See: 685.1 Scope.
This article covers integrated electrical systems, other than unit equipment, in which orderly shutdown is necessary to ensure safe operation. An integrated electrical system as used in this article is a unitized segment of an industrial wiring system where all of the following conditions are met:
(1) An orderly shutdown is required to minimize personnel hazard and equipment damage.
(2) The conditions of maintenance and supervision ensure that qualified persons service the system. **The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.**
A person designated as a qualified person shall possess the skills and knowledge related to the construction and operation of the electrical equipment and installation and shall have received documented safety training on the hazards involved. **Documentation of their qualifications shall be on file with the office of the establishment in charge of the completed installation.**
(3) Effective safeguards acceptable to the authority having jurisdiction are established and maintained.
Also:
215.2(B)(3) Supervised Installations. For supervised installations, feeder conductor sizing shall be permitted to be determined by qualified persons under engineering supervision. Supervised installations are defined as those portions of a facility where all of the following conditions are met:
(1) Conditions of design and installation are provided under engineering supervision.
(2) **Qualified persons with documented training and experience** in over 600-volt systems provide maintenance, monitoring, and servicing of the system. 215.2
Panel Meeting Action: Reject
Panel Statement: The panel supports installation of these systems by qualified persons. However, the NEC cannot contain requirements relative to the qualifications of installers for any electrical system. These requirements need to be handled by local or state qualification committees or licensing boards. See Annex H of the NEC for recommendations on establishing such bodies.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
STAFFORD, T.: This Panel Member has determined that extensive training is required for emerging technologies. As another emerging technology provides renewable resources, wind power will be another exponentially growing resource for electric power generation. As there are no provisions outlined in the electrical safety standards, this is an opportunity to ensure safe, reliable growth of an emerging technology and prevent the failures of the past related to other parallel energy sources. A large percentage of installers have no electrical background and/or training and there is no license requirement in place to mandate this requirement. The panel statement “The NEC cannot contain requirements relative to the qualifications of the installers for any electrical system, these requirements need to be handled by local state qualification committees or licensing boards” is ineffective for the following reasons.
First, the NEC does contain requirements for qualifications of installers and maintaining documentation thereof, see Article 685 and Article 215.2B)(3) and substantiation provided in the original proposal by submitter. Article 685 describes industrial wiring system and details the importance of necessary training for the personnel involved. The same concerns are present for parallel energy sources. Specifically, an orderly shutdown of the system is required upon certain conditions, service of equipment requires someone knowledgeable in the functions and electrical characteristic thereof, and effective safeguards should be in place acceptable to the AHJ. The original proposal attempts to provide the safeguards that are critically needed by a growing industry. The panel may decide that article 685 is not relevant when determining if like requirements should be in place for article 690, but the panel cannot claim the affects are as critical to personnel and equipment.
Second, local license boards are not addressing the issue at a pace to insure safety for the consumer/users of parallel energy sources and for the personnel involved.
TOOMER, R.: See Proposal 4-186.
Comment on Affirmative:
ROGERS, J.: I agree with the panel action on this proposal, however, the submitter is correct in his concern relative to requiring “qualified persons” to install these systems. This is extremely important for these systems to assure the safety or persons and property where these systems are utilized. Unfortunately the NEC is an installation document and not a qualification document. Any areas of the country that utilize any type of electrical licensing laws should be sure that their laws extend to these installations. Any areas of the country that do not have electrical licensing laws should refer to Annex H of the NEC and consider adopting it as a guide for qualified personnel performing electrical installations.

4-254 Log #4673 NEC-P04 **Final Action: Accept**
(692.14)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this section.
Substantiation: This is a very strange requirement because none of these rules have anything to do with fuel cells in particular. If a fuel cell system is in a building fed with a feeder, it will be an additional power source at that location, the rules in Chap. 2 will apply to it because nothing in Art. 692 amends those rules. After reviewing the substantiation when this article went into the NEC, it appears that the panel was trying to make sure not that the remote building was protected from the fuel cell source, but rather that the fuel cell source could be disconnected from the building. However, the present wording in 692.13 does the whole job, and much more simply.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-255 Log #4674 NEC-P04 **Final Action: Reject**
(692.59)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Rewrite the final sentence to read as follows: “Transfer switches with one side connected to a service conductors shall be listed as being suitable for use as service equipment.”
Substantiation: If the fuel cell is used in a noninteractive system that also has a service connection as a backup supply, the fuel cell system is to be connected to the premises system through one side of a transfer switch that keeps the two supply sources separated. This simply requires what 702.6 already requires anyway. However, the last sentence is apparently incorrect because it requires that “when” (condition of time) the transfer switch is connected on the utility side, the switch must comply with a part of Art. 230 that is about the manufactured characteristics of service equipment, specifically, its energized parts must be enclosed or guarded, and the equipment is to have been marked by the manufacturer to identify it as suitable for use as service equipment. These are not conditions of time. The only practical way to address this for now is to make certain that the transfer switch has been listed as “suitable for use as service equipment.”
Panel Meeting Action: Reject
Panel Statement: The requirements are covered in Article 230 and 702.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-256 Log #4675 NEC-P04 **Final Action: Accept**
(692.60)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change “listed and identified” to “listed and marked.”
Substantiation: The definition of “identified” in Article 100 does not mean marked, and this section pretty clearly expects this equipment to be marked so interested parties know what they are dealing with. Identified means recognizable as suitable, and since the requirement is for a listing, that will necessitate the use of equipment that meets the lesser standard of being identified.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-257 Log #4733 NEC-P04 **Final Action: Accept**
(692.61)

TCC Action: The Technical Correlating Committee directs that the panel comply with the NEC Style Manual by providing the specific text necessary for the output characteristic requirements in 705.14 to be used in 692.61.

This action will be considered by the panel as a public comment.
Submitter: Todd W. Stafford, National Joint Apprentice & Training Committee
Recommendation: Revise text to read as follows:

692.61 Output Characteristics. ~~The output of a fuel cell system operating in a parallel with an electric supply system shall be compatible with the voltage, wave shape, and frequency of the system to which it is connected.~~

<u>See 705.14 Output Characteristics.</u>

Substantiation: This proposal was generated by the Task Group for CMP4. This Task group was asked to develop appropriate proposals to address the redundant point of interconnection requirements for PV in 690, Fuel Cells in 692 and Electric Power Sources in 705.

Task Group members are:
Todd W. Stafford, Chair
Ward I. Bower
Kenneth Krastins
Vincent C. Zinnante
Timothy P. Zgonena

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-258 Log #4737 NEC-P04 **Final Action: Accept**
(692.64)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal since the text does not comply with the NEC Style Manual requiring mandatory text and including the subject of the rules being referenced.

The title of 705.100 is also inconsistent with the reference.

This action will be considered by the panel as a public comment.
Submitter: Todd W. Stafford, National Joint Apprentice & Training Committee
Recommendation: Revise text to read as follows:

692.64 Unbalanced Interconnections.

~~(A) Single Phase. Single phase interactive fuel cell systems shall not be connected to a 3-phase power system unless the interactive system is so designed that significant unbalanced voltages cannot result.~~

~~(B) Three Phase. Three phase interactive fuel cell systems shall have all phases automatically de-energized upon loss of voltage, or upon unbalance of voltage in one or more phases, unless the interactive system is designed so that significant unbalanced voltages will not result.~~

<u>See 705.100 Unbalanced Connections</u>

Substantiation: This proposal was generated by the Task Group for CMP4. This Task group was asked to develop appropriate proposals to address the redundant point of interconnection requirements for PV in 690, Fuel Cells in 692 and Electric Power Sources in 705.

Task Group members are:
Todd W. Stafford, Chair
Ward I. Bower
Kenneth Krastins
Vincent C. Zinnante
Timothy P. Zgonena

Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-259 Log #3441 NEC-P04 **Final Action: Accept in Principle**
(692.65)

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:

692.65 Utility-Interactive Point of Connection. The output of a utility-interactive inverter shall be connected as specified in ~~692.65 (A) or (B)~~ <u>705.12(A) or (D).</u>

~~**(A) Supply Side.** The output of a utility-interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6).~~

~~**(B) Load Side**. The output of a utility interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeder, or both, the interconnecting provisions for the utility-interactive inverter(s) shall comply with (B)(1) through (B)(7).~~

~~**(1) Dedicated Overcurrent and Disconnect.** Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.~~

~~**(2) Bus or Conductor Rating**. The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility-interactive inverter(s) shall be used in the calculations for all busbars and conductors.~~

~~(3) **Ground-Fault Protection**. The interconnection point shall be on the line side of all ground-fault protection equipment.~~

~~*Exception:* Connection shall be permitted to be made to the load side of ground-fault protection, provided that there is ground-fault protection for equipment from all ground fault current sources. Ground fault protection devices used with supplies connected to the load side terminals shall be identified and listed as suitable for backfeeding.~~

~~**(4) Marking**. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.~~

~~**(5) Suitable for Backfeed.** Circuit breakers, if backfed, shall be suitable for such operation.~~

~~FPN: Circuit breakers that are marked "Line" and "Load" have been evaluated only in the direction marked. Circuit breakers without "Line" and "Load" have been evaluated in both directions.~~

~~**(6) Fastening.** Listed plug-in-type circuit breakers backfed from utility-interactive-inverters complying with 690.60 shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.~~

~~**(7) Inverter Output Connection.** Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices ;supplying it, a connection in a panel-board shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:~~

~~WARNING~~
~~INVERTER OUTPUT CONNECTION~~
~~DO NOT RELOCATE~~
~~THIS OVERCURRENT DEVICE~~

Substantiation: Fuel Cell systems operating in parallel with another electric supply to a premise electrical system are considered Interconnected Electric Power Production Systems and fall within the scope of Article 705. The point of connection requirements in 692.65 duplicate the text Section 705.12. Repeating the requirements, to interconnect a fuel cell utility-interactive inverter in Article 692 is redundant. The requirements in Section 692.65 are not specific to fuel cell installations. Many types of interconnected electric production systems use utility-interactive inverters, such as wind, solar, fuel cells, and micro-turbines, to mention a few. Section 705.12(A) and (D) provides uniform interconnection requirements for this inverter technology, regardless of the primary energy source. The requirements in Section 692.65 duplicate the text in 705.12 as listed below:

- 692.65 (A) is duplicated text from 705.12(A)
- 692.65(B), B(1) through B(7) is duplicated by 705.12(D), (D)(1) through (D)(7)

This proposal removes the duplicated text in Article 692 and references Article 705 sections that state the utility-interactive inverter point of connection requirements.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 4-260.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-260 Log #4735 NEC-P04 **Final Action: Accept**
(692.65)

TCC Action: The Technical Correlating Committee directs that the panel comply with the NEC Style Manual by providing the specific text necessary for the point of connection requirements in 705.12 to be used in 692.65.

This action will be considered by the panel as a public comment.
Submitter: Todd W. Stafford, National Joint Apprentice & Training Committee
Recommendation: Revise text to read as follows:

692.65 Utility-Interactive Point of Connection. ~~The output of a utility interactive inverter shall be connected as specified in 692.65(A) or (B).~~

~~(A) Supply Side. The output of a utility interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6).~~

~~(B) Load Side. The output of a utility interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the promises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeders, or both, the interconnecting provisions for the utility interactive inverter(s) shall comply with (B)(1) through (B)(7).~~

~~(1) Dedicated Overcurrent and Disconnect. Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.~~

~~(2) Bus or Conductor Rating. The sum of the ampere rating of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor.~~

~~(3) Ground Fault Protection. The interconnection point shall be on the line side of all ground fault protection equipment.~~

~~*Exception: Connection shall be permitted to be made to the load side of ground fault protection, provided that there is ground fault protection for equipment from all ground fault current sources. Ground fault protection devices used with supplies connected to the load side terminals shall be identified and listed as suitable for backfeeding.*~~

~~(4) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.~~

~~(5) Suitable for Backfeed. Circuit breakers, if backfed, shall be suitable for such operation.~~

~~FPN: Circuit breakers that are marked "Line" and "Load" have been evaluated only in the direction marked. Circuit breakers without "Line" and "Load" have been evaluated in both directions.~~

~~(6) Fastening. Listed plug in type circuit breakers backfed from utility interactive inverters complying with 692.60 shall be permitted to omit the additional fastener normally required by 408.36 (D) for such application.~~

~~(7) Inverter Output Connection. Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices supplying it, a connection in a panelboard shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:~~

~~Warning~~

~~Inverter Output Connection~~

~~Do Not Relocate~~

~~The Overcurrent Device~~

<u>See 705.12 Point of Connection</u>

Substantiation: This proposal was generated by the Task Group for CMP4. This Task group was asked to develop appropriate proposals to address the redundant point of interconnection requirements for PV in 690, Fuel Cells in 692 and Electric Power Sources in 705.

Task Group members are:

Todd W. Stafford, Chair

Ward I. Bower

Kenneth Krastins

Vincent C. Zinnante

Timothy P. Zgonena

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-261 Log #1412 NEC-P04 **Final Action: Reject**
(692.65(B)(5) and Exception)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

Circuit breakers, if backfed, shall be ~~suitable~~ <u>identified</u> for such operation

FPN: Circuit breakers that are marked "Line" and "Load" have been evaluated only for such connections <u>and shall only be so connected</u>. Circuit breakers without such markings have been evaluated <u>for backfeed connections</u> ~~in both directions~~ <u>and shall be permitted to be so connected.</u>

Substantiation: Edit. "Suitable" is a term to be avoided per the Style Manual. Proposal is more specific than "in both directions".

Panel Meeting Action: Reject

Panel Statement: The circuit breakers are not "identified". The FPN is written in the form of a requirement. An FPN is not a requirement. The submitter has not presented sufficient technical data to support the change stated in the proposal. The proposal attempts to place mandatory requirements into a fine print note. The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

ARTICLE 694 — SMALL WIND ELECTRIC SYSTEMS

4-262 Log #3818 NEC-P04 **Final Action: Accept in Principle**
(694 (New))

Submitter: Thomas J. Baker, Puget Sound Electrical Training

Recommendation: Add new text to read as follows:

Create new article <u>694 WIND TURBINES</u>

<u>Wind driven generator equipment. This equipment includes alternators or generators that produce electrical current through the conversion of wind energy into electrical energy. Wind driven generation equipment must demonstrate conformance to applicable safety standards.</u>

<u>Installation</u>

<u>(1) A wind driven generator system design review must be submitted at the time of the inspection request. permit holders must submit a copy of the wind driven generator equipment manufacturer's installation information and a legible one-line diagram of the wind driven generator design and calculations used to determine voltage and current within the generation system to the electrical inspector. This diagram must show the wind driven generator equipment, devices, overcurrent protection, conductor sizing, grounding, ground fault protection if required, and any system interconnection points.</u>

<u>(2) For utility interactive systems, any person making interconnections between the generator system and the utility distribution network must consult the serving utility and is required to meet all additional utility standards.</u>

<u>(3) All wind driven generator equipment and disconnecting means must be permanently identified as to their purpose, maximum voltages and type of current within the system with an identification plate.</u>

Substantiation: There are no rules in the NEC for Wind turbines. This proposal would create a new article to address scope, circuit requirements, disconnecting means, wiring methods, grounding, marking and other requirements for users to safely install this equipment.

The proposed rules are taken from the Washington State Electrical Rules that are to be adopted late in 2008.

While most wind turbines are installed by electric utilities and are not under the scope of the NEC, there are some installations done under the scope of the NEC. In Washington State, there have been several of the small wind turbines installed, creating difficulties for electrical approval, as there are no product standards or NEC rules.

Several companies market wind turbines that are targeted toward the residential market. The American Wind Turbine Association (AWEA) designation is small wind, defined as 100 Kw and below.

The payback for a small wind turbine can be better that a photovoltaic system, as it can operate more hours per day. According to the AWEA, A 3 kW, 15 ft rotor, on a 23 ft tower can produce about 5,000 kWh/yr, if wind conditions allow.

There is a significant market for wind turbines. The Mayor of San Francisco announced in July 2008 that the city would "expedite permitting and minimize costs for the installation of residential, commercial and municipal wind generation in the city".

The U.S. Department of Energy, in its 2007 edition of the annual report on U.S. wind power installation, noted that wind power capacity increased 46%.

It is expected that the new article would be created with input from stakeholders, manufacturers and trade associations.

Panel Meeting Action: Accept in Principle

See Panel Action on Proposal 4-263.

Panel Statement: This proposal is addressed in general by panel action on Proposal 4-263 which, as the proposer suggests, should "create a new article to address scope, circuit requirements, disconnecting means, wiring methods, grounding, marking, and other requirements for users to safely install this equipment."

The proposed text "Wind driven generation equipment must demonstrate conformance to applicable safety standards" is addressed in part by the panel action on Proposal 4-263, in 690.4(B) "Inverters used in small wind electric systems shall be identified and either listed or recognized for the application". A general requirement for all equipment to be listed or recognized would create a problem for this new industry as applicable safety standards are currently under development, and not yet published. The panel will revisit this issue in the future.

Section (1) and (2) of the proposal (referenced from Washington State Electrical Rules) regarding details of a design review by the AHJ and additional utility requirements are not directly related to the installation of electrical conductors, equipment, and raceways, and so fall outside the scope of the NEC. See also NEC Annex H, Administration and Enforcement.

Section (3) of the proposal has been addressed by the panel action on Proposal 4-263 in Article 694, Part VI, Marking.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

4-263 Log #4499 NEC-P04 **Final Action: Accept in Principle**
(694 (New))

TCC Action: The Technical Correlating Committee directs that the panel reconsider the proposal relative to technical inconsistencies and NEC Style Manual issues.

The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee directs that the new Article Scope be modified to read as follows:

"694.1 Scope. The provisions of this article apply to small wind (turbine) electric systems that consisting of one or more wind electric generators with individual systems up to and including 100 kW. These systems can include generators, alternators, inverters, and controllers.

FPN: See FPN Figure 694.1 No. 1 and FPN Figure 694.1 No. 2

FPN: These systems can be interactive with other electrical power production sources or may be stand-alone systems. These systems can have ac or dc output, with or without electrical energy storage, such as batteries.

FPN Figure 694.1 No. 1 Identification of Small Wind Electric System Components – Interactive System.

FPN Figure 694.1 No. 2 Identification of Small Wind Electric System Components – Stand-Alone System."

This action shall be considered by the panel as a public comment.

Submitter: Robert H. Wills, Intergrid, LLC

Recommendation: Add new text as follows:

Note: this is a proposed new article. All text is new. For clarity, the text is not underscored.

Notes in square brackets [...] are informational and not intended to be part of the final article.

ARTICLE 69x Small Wind Electric Systems

I. General

69X.1 Scope

The provisions of this article apply to small wind electric systems (also known as small wind turbine systems), including generators, alternators, inverter(s), and controller(s) for such systems. [See Figures 69X.1(A) and 69X.1(B).]

This article applies to small wind electric systems consisting of one or more wind electric generators with individual systems up to and including 100KW rated power output.

Systems covered by this article may be interactive with other electrical power production sources or stand-alone, with or without electrical energy storage such as batteries. These systems may have ac or dc output for utilization.

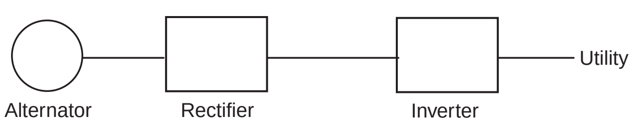

Figure 69x.1(A) Identification of Small Wind Electric System Components – Interactive System.

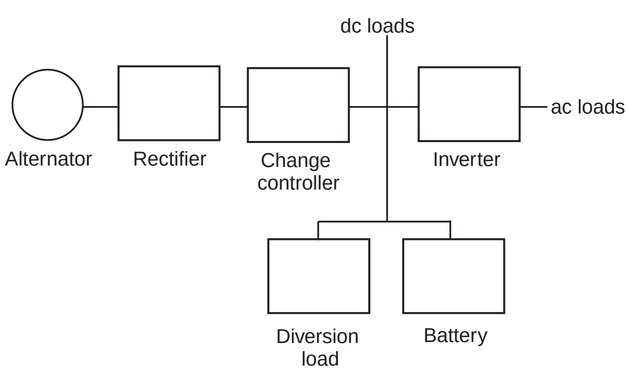

Figure 69x.1(B) Identification of Small Wind Electric System Components – Stand-Alone System.

69x.2 Definitions

Wind Turbine. A mechanical device that converts wind energy to electrical energy.

Wind Turbine System. A small wind electric generating system.

Tower. A pole or other structure that supports a wind turbine.

Guy. A cable that mechanically supports a wind turbine tower.

Nacelle. An enclosure housing the alternator and other parts of a wind turbine.

Rated Power: The wind turbine's power output at 11.0 m/s (24.6 mph) when measured in accordance with IEC 61400-12-1, *Power Performance Measurements of Electricity Producing Wind Turbines.*

Maximum Output Power . The maximum one-minute average power output a wind turbine will produce in normal steady-state operation (peak instantaneous power output can be higher).

Maximum Voltage . The maximum voltage the wind turbine will produce in operation including open circuit conditions.

Wind Turbine Output Circuit. Circuit conductors between the internal components of a small wind turbine (which may include an alternator, integrated rectifier, controller and/or inverter), and other equipment.

Inverter Output Circuit. Conductors between the inverter and an ac panelboard for stand-alone systems or the conductors between the and inverter and service equipment or another electric power production source, such as a utility, for an electrical production and distribution network.

Charge Controller. Equipment that controls dc voltage or dc current, or both, used to charge a battery.

Diversion Charge Controller. Equipment that regulates the charging process of a battery by diverting power from energy storage to direct-current or alternating-current loads or to an interconnected utility service.

Diversion Load Controller. Equipment that regulates the output of a wind generator by diverting power from the generator to direct-current or alternating-current loads or to an interconnected utility service.

Diversion Load. A load connected to a diversion charge controller or diversion load controller. Also known as a Dump Load.

FPN: See also definitions for Interconnected Systems in Article 705 [or Article 100 if they are moved there].

[Note: Other definitions from Article 69x may need to be included, but hopefully common language will be moved to Article 705 or Article 100].

69x.3 Other Articles

Wherever the requirements of other articles of this Code and Article 69x differ, the requirements of Article 69x shall apply and, if the system is operated in parallel with a primary source(s) of electricity, the requirements in 705 shall apply.

Exception: Small wind electric systems, equipment, or wiring installed in a hazardous (classified) location shall also comply with the applicable portions of Articles 500 through 516.

69x.4 Installation

(A) Small Wind Electric System. A small wind electric system shall be permitted to supply a building or other structure in addition to any service(s) of another electricity supply system(s).

(B) Equipment. Inverters or motor generators intended for use in small wind electric systems shall be identified and either listed or recognized for the application.

[Note: Justification for other than the PV listing requirements – the industry group developing this article plans to include requirements that all electrical components in small wind electric systems be listed or recognized in a future edition of the NEC, but currently there are no UL standards for listing wind turbines, although a standard is planned. This language ensures safety for parallel operation with the grid, while giving the industry time to develop standards and to test equipment to these standards].

(C) Diversion Load Controllers. A small wind electric system employing a diversion load controller as the sole means of regulating the speed of a wind turbine rotor shall be equipped with two reliable independent means to prevent over-speed operation. An interconnected utility service shall not be considered to be a reliable diversion load.

(D) Surge Protective Devices. A surge protective device shall be installed between a small wind electric system and any loads served by the premises electrical system. The surge protective device is permitted to be a Type 3 device located on a dedicated branch circuit serving a small wind electric system, or a Type 2 device anywhere on the load side of the service disconnect. Surge protective devices shall be installed in accordance with Article 285.

(E) Receptacles. A receptacle is permitted to be attached to a small wind electric system branch or feeder circuit for maintenance or data acquisition use. Receptacles shall be protected with an overcurrent device that is rated at no greater than the current rating of the receptacle.

II. Circuit Requirements

69x.7 Maximum Voltage.

(A) Turbine Output Circuits. For wind turbines connected to one- and two-family dwellings, turbine output circuits shall be permitted to have a maximum voltage up to 600 volts. Other installations with a maximum voltage over 600 volts shall comply with Article 69x, Part IX.

(B) Direct-Current Utilization Circuits. The voltage of dc utilization circuits shall conform to 210.6.

(C) Circuits over 150 Volts to Ground. In one- and two-family dwellings, live parts in circuits over 150 volts to ground shall not be accessible to other than qualified persons while energized.

FPN: See 110.27 for guarding of live parts, and 210.6 for voltage to ground and between conductors.

69x.8 Circuit Sizing and Current.

(A) Calculation of Maximum Circuit Current. The maximum current for the specific circuit shall be calculated in accordance with 69x.8(A)(1) through (A)(3).

(1) Turbine Output Circuit Currents. The maximum current shall be the circuit current when the wind turbine is operating at Maximum Output Power.

(2) Inverter Output Circuit Current. The maximum current shall be the inverter continuous output current rating.

(3) Stand-Alone Inverter Input Circuit Current. The maximum current shall be the stand-alone continuous inverter input current rating when the inverter is producing rated power at the lowest input voltage.

(B) Ampacity and Overcurrent Device Ratings. Small wind electric system currents shall be considered to be continuous.

(1) Sizing of Conductors and Overcurrent Devices. The circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents as calculated in 69x.8(A). The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B) and (C).

Exception: Circuits containing an assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be utilized at 100 percent of its rating.

69x.9 Overcurrent Protection.

(A) Circuits and Equipment. Turbine output circuits, inverter output circuits, and storage battery circuit conductors and equipment shall be protected in accordance with the requirements of Article 240. Circuits connected to more than one electrical source shall have overcurrent devices located so as to provide overcurrent protection from all sources.

Exception: An overcurrent device shall not be required for circuit conductors sized in accordance with 69x.8(B) and located where one of the following apply:

(a) There are no external sources such as batteries or backfeed from inverters.

(b) The maximum currents from all sources do not exceed the ampacity of the conductors.

FPN: Possible backfeed of current from any source of supply, including a supply through an inverter into the alternator output circuit, is a consideration in determining whether adequate overcurrent protection from all sources is provided for conductors and modules. Some small wind electric systems rely on the turbine output circuit to regulate turbine speed. In systems of this type, manufacturers instructions should be followed.

(B) Power Transformers. Overcurrent protection for a transformer with a source(s) on each side shall be provided in accordance with 450.3 by considering first one side of the transformer, then the other side of the transformer, as the primary.

Exception: A power transformer with a current rating on the side connected toward the small wind electric power source, not less than the short-circuit output current rating of the inverter, shall be permitted without overcurrent protection from that source.

(C) Direct-Current Rating. Overcurrent devices, either fuses or circuit breakers, used in any dc portion of a small wind electric system shall be listed for use in dc circuits and shall have the appropriate voltage, current, and interrupting ratings.

[Note: The following common language to 69x, 692 and 69x should move to a common Article – perhaps a new one near 705, but focused on stand-alone rather than interconnected systems.

A separate proposal has been submitted to this effect. If this proposal is accepted, 69x.10 could be deleted]

69x.10 Stand-Alone Systems.

The premises wiring system shall be adequate to meet the requirements of this Code for a similar installation connected to a service. The wiring on the supply side of the building or structure disconnecting means shall comply with this Code except as modified by 69x.10(A) through (D).

(A) Inverter Output. The ac output from a stand-alone inverter(s) shall be permitted to supply ac power to the building or structure disconnecting means at current levels less than the calculated load connected to that disconnect. The inverter output rating or the rating of an alternate energy source shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.

(B) Sizing and Protection. The circuit conductors between the inverter output and the building or structure disconnecting means shall be sized based on the output rating of the inverter. These conductors shall be protected from overcurrents in accordance with Article 240. The overcurrent protection shall be located at the output of the inverter.

(C) Single 120-Volt Supply. The inverter output of a stand-alone small wind electric system shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the rating of the overcurrent device connected to the output of the inverter shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:

WARNING

SINGLE 120-VOLT SUPPLY. DO NOT CONNECT
MULTIWIRE BRANCH CIRCUITS!

(D) Energy Storage or Backup Power System Requirements. Energy storage or backup power supplies are not required.

==

III. Disconnecting Means

69X.13 All Conductors.

Means shall be provided to disconnect all current-carrying conductors of a small wind electric power source from all other conductors in a building or other structure. A switch, circuit breaker, or other device, either ac or dc, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the marked, grounded conductor in an ungrounded and energized state.

Exception: A wind turbine that uses the turbine output circuit for regulating turbine speed does not require a turbine output circuit disconnecting means.

69X.14 Additional Provisions.

Disconnecting means shall comply with 69X.14(A) through (D).

(A) Disconnecting Means. The disconnecting means shall not be required to be suitable as service equipment and shall comply with the following:

The disconnecting means for ungrounded conductors shall consist of a manually operable switch(es) or circuit breaker(s) complying with all of the following requirements:

(1) Located where readily accessible

(2) Externally operable without exposing the operator to contact with live parts

(3) Plainly indicating whether in the open or closed position

(4) Having an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment

Where all terminals of the disconnecting means may be energized in the open position, a warning sign shall be mounted on or adjacent to the disconnecting means. The sign shall be clearly legible and have the following words or equivalent:

WARNING

ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE
ENERGIZED
IN THE OPEN POSITION.

(B) Equipment. Equipment such as rectifiers, controllers, output circuit isolating and shorting switches and overcurrent devices shall be permitted on the wind turbine side of the disconnecting means.

(C) Requirements for Disconnecting Means

(1) Location. The small wind electric system disconnecting means shall be installed at a readily accessible location either on or adjacent to the turbine tower, on the outside of a building or structure or inside nearest the point of entrance of the system conductors.

Exception: Installations that comply with 69X.31(E) shall be permitted to have the disconnecting means located remotely from the point of entry of the system conductors.

The disconnecting means shall not be installed in bathrooms.

(2) Marking. Each turbine disconnecting means shall be permanently marked to identify it as a small wind electric system disconnect. A plaque shall be installed in accordance with 705.10.

(3) Suitable for Use. Each turbine system disconnecting means shall be suitable for the prevailing conditions. Equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.

(4) Maximum Number of Disconnects. The turbine disconnecting means shall consist of not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard.

(5) Grouping. The turbine disconnecting means shall be grouped with other disconnecting means for the system to comply with 69X.14(C)(4). A turbine disconnecting means shall not be required at the nacelle or tower location.

(D) Equipment Mounted in Not-Readily-Accessible Locations. Rectifiers, controllers, and inverters shall be permitted to be mounted in nacelles or other exterior areas that are not readily accessible.

69X.15 Disconnection of Small Wind Electric System Equipment.

Means shall be provided to disconnect equipment, such as inverters, batteries, charge controllers, and the like, from all ungrounded conductors of all sources. If the equipment is energized from more than one source, the disconnecting means shall be grouped and identified. A single disconnecting means in accordance with 69X.17 shall be permitted for the combined ac output of one or more inverters in an interactive system.

Exception: Equipment housed in a turbine nacelle is not required to have a disconnecting means.

69X.16 Fuses.

Means shall be provided to disconnect a fuse from all sources of supply if the fuse is energized from both directions and is accessible to other than qualified persons. Switches, pullouts, or similar devices that have suitable ratings may serve as means to disconnect fuses from all sources of supply. A shorting plug shall be permitted to be used as an alternative to a disconnect in systems that regulate turbine speed using the turbine output circuit.

69X.18 Installation and Service of a Wind Turbine.

Open circuiting, short circuiting, or mechanical brakes shall be used to disable a turbine for installation and service.

FPN: Some wind turbines rely on the connection from the alternator to a remote controller for speed regulation. Opening turbine output circuit conductors may cause mechanical damage to a turbine and create excessive voltages that could damage equipment or expose persons to electric shock.

69X.20 Disconnection of Wind Turbine Alternators.

IV. Wiring Methods

69x.31 Methods Permitted

(A) Wiring Systems. All raceway and cable wiring methods included in this *Code* and other wiring systems and fittings specifically intended for use on wind turbines shall be permitted. Where turbine output circuits operating at maximum voltages greater than 30 volts are installed in readily accessible locations, circuit conductors shall be installed in raceway.

(B) Flexible Cords and Cables. Flexible cords and cables, where used to connect the moving parts of turbines, shall comply with Article 400 and shall be of a type identified as a hard service cord or portable power cable; they shall be suitable for extra-hard usage, listed for outdoor use, and water resistant. Cables exposed to sunlight shall be sunlight resistant.

V. Grounding

69X.43 Equipment Grounding.

(A) General. Exposed non–current-carrying metal parts of towers, turbine nacelles, other equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage. Attached metal parts such as turbine blades and tails that have no source of electrical energization are not required to be grounded.

(B) Guy Wires. Guy wires used to support turbine towers shall not be required to be grounded.

[FPN] Guy wires supporting towers that are adequately grounded are not likely to become energized and so are not subject to the requirements of 250.110. Grounding of metallic guy wires may be required by lighting codes.

(C) Tower Grounding.

(1) Auxiliary Electrode(s). A wind turbine tower shall be grounded with auxiliary electrode(s) to limit voltages imposed by lightning. Auxiliary electrodes are permitted to be installed in accordance with 250.54. Electrodes that are part of the tower foundation and that meet the requirements for concrete encased electrodes (250.52(A)(3)) are acceptable. A grounded metal tower support is acceptable if it meets the requirements of 250.136(A).

(2) Equipment Grounding Conductor. An equipment grounding conductor shall be required between a turbine and the system grounded conductor in accordance with 250.110.

(3) Tower Grounding Connections. The equipment grounding conductor, and grounding electrode conductors (if used), shall be shall be connected to a metallic tower by exothermic welding, listed lugs, listed pressure connectors, listed clamps, or other listed means. Devices such as connectors and lugs shall be suitable for the material of the conductor and the structure to which they connect. Where practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action and corrosion. All mechanical elements used to terminate these conductors shall be accessible.

(4) Lightning Protection Systems. Auxiliary electrodes and grounding electrode conductors shall be permitted to act as lightning protection system components if they meet the requirements of NFPA 780. If separate, the tower lightning protection system grounding electrodes shall be bonded to the tower auxiliary grounding electrode system. Guy lightning protection system ground electrodes shall not be required to be bonded to the tower auxiliary grounding electrode system.

FPN: See NFPA 780-2008, *Standard for the Installation of Lightning Protection Systems, Annex N, Wind Turbine Generator Systems*, for information on lightning protection of wind turbines.

VI. Marking

69x.54 Interactive System Point of Interconnection.

All interactive system(s) points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating ac voltage.

69x.55 Power Systems Employing Energy Storage.

Small wind electric systems employing energy storage shall be marked with the maximum operating voltage, including any equalization voltage and the polarity of the grounded circuit conductor.

69x.56 Identification of Power Sources.

(A) Facilities with Stand-Alone Systems. Any structure or building with a power system that is not connected to a utility service source and is a stand-alone system shall have a permanent plaque or directory installed on the exterior of the building or structure at a readily visible location. The plaque or directory shall indicate the location of system disconnecting means and that the structure contains a stand-alone electrical power system.

(B) Facilities with Utility Services and Small Wind Electric Systems. Buildings or structures with both utility service and a small wind electric system shall have a permanent plaque or directory providing the location of the service disconnecting means and the small wind electric system disconnecting means if not located at the same location.

VII. Connection to Other Sources

[This section should be coordinated with similar language in 69x and 692 that indicates that the requirements of Article 705 apply.]

69x.60 Identified Interactive Equipment. Only inverters listed or recognized, and identified as interactive shall be permitted in interactive systems.

69x.62 Installation. Small wind electric systems, when connected to other electric sources, shall comply with the requirements of article 705.

69x.62 Ampacity of Neutral Conductor.

If a single-phase, 2-wire inverter output is connected to the neutral conductor and one ungrounded conductor (only) of a 3-wire system or of a 3-phase, 4-wire, wye-connected system, the maximum load connected between the neutral conductor and any one ungrounded conductor plus the inverter output rating shall not exceed the ampacity of the neutral conductor.

A conductor used solely for instrumentation, voltage detection, or phase detection, and connected to a single-phase or 3-phase utility-interactive inverter, shall be permitted to be sized at less than the ampacity of the other current-carrying conductors and shall be sized equal to or larger than the equipment grounding conductor.

69x.63 Operating Voltage Range. Systems operating on dedicated branch or feeder circuits may exceed normal voltage operating ranges provided that the voltage at any general distribution equipment remains within these ranges.

[Justification - This provision is added in recognition that wind turbines may use the electric grid to dump energy from short-term wind gusts. This may result in the voltage at the turbine exceeding the limits set out in ANSI C84.1-2006, Voltage Ratings for Electric Power Systems and Equipment (60 Hz), however the voltage at the distribution equipment must stay within the C84.1 range.].

69x.64 Point of Connection.

[Note – this section may be deleted if Article 705 has equivalent language]

The output of a utility-interactive inverter shall be connected as specified in 69x.64(A) or (B).

(A) Supply Side. The output of a utility-interactive inverter shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6).

(B) Load Side. The output of a utility-interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment, including switchboards and panelboards, is fed simultaneously by a primary source(s) of electricity and one or more utility-interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeders, or both, the interconnecting provisions for the utility-interactive inverter(s) shall comply with (B)(1) through (B)(7).

(1) Dedicated Overcurrent and Disconnect. Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.

(2) Bus or Conductor Rating. The sum of the ampere ratings of overcurrent devices in circuits supplying power to a busbar or conductor shall not exceed 120 percent of the rating of the busbar or conductor. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility-interactive inverter(s) shall be used in the calculations for all busbars and conductors.

(3) Ground-Fault Protection. The interconnection point shall be on the line side of all ground-fault protection equipment.

Exception: Connection shall be permitted to be made to the load side of ground-fault protection, provided that there is ground-fault protection for equipment from all ground-fault current sources. Ground-fault protection devices used with supplies connected to the load-side terminals shall be identified and listed as suitable for backfeeding.

(4) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.

(5) Suitable for Backfeed. Circuit breakers, if backfed, shall be suitable for such operation.

FPN: Circuit breakers that are marked “Line” and “Load” have been evaluated only in the direction marked. Circuit breakers without “Line” and “Load” have been evaluated in both directions.

(6) Fastening. Listed plug-in-type circuit breakers backfed from utility-interactive inverters complying with 69x.60 shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.

(7) Inverter Output Connection. Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices supplying it, a connection in a panelboard shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment with the following or equivalent marking:

WARNING

INVERTER OUTPUT CONNECTION

DO NOT RELOCATE THIS OVERCURRENT DEVICE

VIII. Storage Batteries

[This common language should move to 480 or another common article]

69X.71 Installation.

(A) General. Storage batteries in small wind electric systems shall be installed in accordance with the provisions of Article 480.

(B) Dwellings.

(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).

Exception: Where live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 69X.7 shall be permitted.

(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.

FPN: Batteries in small wind electric systems are subject to extensive charge–discharge cycles and typically require frequent maintenance, such as checking electrolyte and cleaning connections.

(C) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries where the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 69X.16.

(D) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted where no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.

This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that may require steel cases for proper operation.

(E) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, where more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.

(F) Battery Maintenance Disconnecting Means. Battery installations, where there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductor(s) in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductor(s) for the remainder of the small wind electric system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.

(G) Battery Systems of More Than 48 Volts. On small wind electric systems where the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided the following conditions are met:

(1) The turbine output circuits shall comply with 69X.41.

(2) The dc and ac load circuits shall be solidly grounded.

(3) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.

(4) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.

69X.72 Charge Control.

(A) General. Equipment shall be provided to control the charging process of the battery. Charge control shall not be required where the design of the small wind electric source is matched to the voltage rating and charge current requirements of the interconnected battery cells and the maximum charging current multiplied by 1 hour is less than 3 percent of the rated battery capacity expressed in ampere-hours or as recommended by the battery manufacturer. All adjusting means for control of the charging process shall be accessible only to qualified persons.

FPN: Certain battery types such as valve-regulated lead acid or nickel cadmium can experience thermal failure when overcharged.

(B) Diversion Charge Controller.

(1) Sole Means of Regulating Charging. A small wind electric system employing a diversion charge controller as the sole means of regulating the charging of a battery shall be equipped with two reliable independent means to prevent overcharging of the battery. An interconnected utility service shall not be considered to be a reliable diversion load.

(2) Circuits with Direct-Current Diversion Charge Controller and Diversion Load. Circuits containing a dc diversion charge controller and a dc diversion load shall comply with the following:

(1) The current rating of the diversion load shall be less than or equal to the current rating of the diversion load charge controller. The voltage rating of the diversion load shall be greater than the maximum battery voltage. The power rating of the diversion load shall be at least 150 percent of the maximum power rating of the turbine.

(2) The conductor ampacity and the rating of the overcurrent device for this circuit shall be at least 150 percent of the maximum current rating of the diversion charge controller.

IX. Systems over 600 Volts

69x.80 General

Small wind electric systems with a maximum system voltage over 600 volts dc shall comply with Article 490 and other requirements applicable to installations rated over 600 volts.

69x.85 Definitions

For the purposes of Part IX of this article, the voltages used to determine cable and equipment ratings are as follows.

Battery Circuits. In battery circuits, the highest voltage experienced under charging or equalizing conditions.

Other Circuits. In other circuits, the maximum voltage experienced in normal operation.

Substantiation: This proposal was generating by a working group from the small wind electric industry comprising over 50 members, and is supported by the American Wind Energy Association.

The problem: Hundreds of small wind turbines are being installed in the USA every month and there is no specific article to address the particular characteristics of their electrical systems. While many installations are stand-alone applications, most nowadays are utility interactive, and so requirements similar to Article 690, Photovoltaic Systems, apply.

Substantiation: Small wind electric systems are being installed at rural, and now increasingly, in urban locations. The electrical safety of these installations can be improved by clear requirements for grounding and other aspects the electrical installation. As wind turbine towers are typically tall structures, they are subject to lightning strikes and as such deserve special attention when connected to a premises electrical system.

The proposed text follows the structure, and in many cases the language of Articles 690 and 692. It will be a welcome addition to the 2011 NEC for all installers of small wind electric systems.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

ARTICLE 694 Small Wind Electric Systems

I. General

694.1 Scope. The provisions of this article apply to small wind electric systems (also known as small wind turbine systems), including generators, alternators, inverters, and controllers for such systems. [See Figures 694.1(A) and 694.1(B).]

This article applies to small wind electric systems consisting of one or more wind electric generators with individual systems up to and including 100 kW rated power output.

Systems covered by this article may be interactive with other electrical power production sources or stand-alone, with or without electrical energy storage such as batteries. These systems may have ac or dc output for utilization.

Figure 694.1(A) Identification of Small Wind Electric System Components – Interactive System.

Figure 694.1(B) Identification of Small Wind Electric System Components – Stand-Alone System.

694.2 Definitions

Charge Controller. Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device.

Diversion Charge Controller. Equipment that regulates the charging process of a battery or other energy storage device by diverting power from energy storage to direct-current or alternating-current loads or to an interconnected utility service.

Diversion Load Controller. Equipment that regulates the output of a wind generator by diverting power from the generator to direct-current or alternating-current loads or to an interconnected utility service.

Diversion Load. A load connected to a diversion charge controller or diversion load controller. Also known as a Dump Load.

Guy. A cable that mechanically supports a wind turbine tower.

Inverter Output Circuit. Conductors between an inverter and an ac panelboard for stand-alone systems or the conductors between an inverter and service equipment or another electric power production source, such as a utility, for an electrical production and distribution network.

Maximum Output Power. The maximum one-minute average power output a wind turbine will produce in normal steady-state operation (instantaneous power output can be higher).

Maximum Voltage. The maximum voltage the wind turbine will produce in operation including open circuit conditions.

Nacelle. An enclosure housing the alternator and other parts of a wind turbine.

Rated Power. The wind turbine's power output at a wind speed of 11.0 m/s (24.6 mph). If a turbine produces more power at lower wind speeds, the rated power shall be measured at a wind speed less than 11 m/s that produces the greatest output power.

FPN: The method for measuring wind turbine power output is specified IEC 61400-12-1, Power Performance Measurements of Electricity Producing Wind Turbines.

Tower. A pole or other structure that supports a wind turbine.

Wind Turbine. A mechanical device that converts wind energy to electrical energy.

Wind Turbine Output Circuit. Circuit conductors between the internal components of a small wind turbine (which may include an alternator, integrated rectifier, controller, and/or inverter), and other equipment.

Wind Turbine System. A small wind electric generating system.

FPN: See also definitions for interconnected systems in Article 705.

694.3 Other Articles. Whenever the requirements of other articles of the *Code* and Article 694 differ, the requirements of Article 694 shall apply. If the system is operated in parallel with primary sources of electricity, the requirements in Article 705 shall apply.

Exception: Small wind electric systems, equipment, or wiring installed in a hazardous (classified) location shall also comply with the applicable portions of Articles 500 through 516.

694.4 Installation.

(A) Small Wind Electric System. Small wind electric system(s) shall be permitted to supply a building or other structure in addition to any services of another electricity supply system.

(B) Equipment. Inverters used in small wind electric systems shall be identified and either listed or recognized for the application.

(C) Diversion Load Controllers. A small wind electric system employing a diversion load controller as the primary means of regulating the speed of a wind turbine rotor shall be equipped with an additional, independent, reliable means to prevent over-speed operation. An interconnected utility service shall not be considered to be a reliable diversion load.

(D) Surge Protective Devices. A surge protective device shall be installed between a small wind electric system and any loads served by the premises electrical system. The surge protective device is permitted to be a Type 3 device located on a dedicated branch circuit serving a small wind electric system, or a Type 2 device anywhere on the load side of the service disconnect.

Surge protective devices shall be installed in accordance with Article 285. Part II.

(E) Receptacles. A receptacle is permitted to be attached to a small wind electric system branch or feeder circuit for maintenance or data acquisition use. Receptacles shall be protected with an overcurrent device that is rated at no greater than the current rating of the receptacle.

II. Circuit Requirements

694.7 Maximum Voltage.

(A) Turbine Output Circuits. For wind turbines connected to one- and two-family dwellings, turbine output circuits shall be permitted to have a maximum voltage up to 600 volts. Other installations with a maximum voltage over 600 volts shall comply with Article 694, Part IX.

(B) Direct-Current Utilization Circuits. The voltage of dc utilization circuits shall conform to 210.6.

(C) Circuits over 150 Volts to Ground. In one- and two-family dwellings, live parts in circuits over 150 volts to ground shall not be accessible to other than qualified persons while energized.

FPN: See 110.27 for guarding of live parts and 210.6 for branch circuit voltage limitations.

694.8 Circuit Sizing and Current.

(A) Calculation of Maximum Circuit Current. The maximum current for a circuit shall be calculated in accordance with 694.8(A)(1) through (A)(3).

(1) Turbine Output Circuit Currents. The maximum current shall be the circuit current when the wind turbine is operating at Maximum Output Power.

(2) Inverter Output Circuit Current. The maximum current shall be the inverter continuous output current rating.

(3) Stand-Alone Inverter Input Circuit Current. The maximum current shall be the stand-alone continuous inverter input current rating when the inverter is producing rated power at the lowest input voltage.

(B) Ampacity and Overcurrent Device Ratings. Small wind electric system currents shall be considered to be continuous.

(1) Sizing of Conductors and Overcurrent Devices. Circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents as calculated in 694.8(A). The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B) and (C).

Exception: Circuits containing an assembly, together with its overcurrent devices, that is listed for continuous operation at 100 percent of its rating shall be permitted to be used at 100 percent of its rating.

694.9 Overcurrent Protection.

(A) Circuits and Equipment. Turbine output circuits, inverter output circuits, and storage battery circuit conductors and equipment shall be protected in accordance with the requirements of Article 240. Circuits connected to more than one electrical source shall have overcurrent devices located so as to provide overcurrent protection from all sources.

Exception: An overcurrent device shall not be required for circuit conductors sized in accordance with 694.8(B) and when the maximum currents from all sources do not exceed the ampacity of the conductors.

FPN: Possible backfeed of current from any source of supply, including a supply through an inverter to the wind turbine output circuit, is a consideration in determining whether adequate overcurrent protection from all sources is provided. Some small wind electric systems rely on the turbine output circuit to regulate turbine speed. Inverters may also operate in reverse to for turbine startup or speed control. In systems of these types, manufacturers instructions should be followed.

(B) Power Transformers. Overcurrent protection for a transformer with sources on each side shall be provided in accordance with 450.3 by considering first one side of the transformer, then the other side of the transformer, as the primary.

Exception: A power transformer with a current rating on the side connected to the inverter output, which is not less than the rated continuous output current rating of the inverter, shall be permitted without overcurrent protection from the inverter.

(C) Direct-Current Rating. Overcurrent devices, either fuses or circuit breakers, used in any dc portion of a small wind electric system shall be listed for use in dc circuits and shall have appropriate voltage, current, and interrupting ratings.

694.10 Stand-Alone Systems.

The premises wiring system shall be adequate to meet the requirements of this Code for a similar installation connected to a service. The wiring on the supply side of the building or structure disconnecting means shall comply with this Code except as modified by 694.10(A) through (D).

(A) Inverter Output. The ac output from stand-alone inverters shall be permitted to supply ac power to the building or structure disconnecting means at current levels less than the calculated load connected to that disconnect. The inverter output rating or the rating of a wind energy source shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.

(B) Sizing and Protection. The circuit conductors between the inverter output and the building or structure disconnecting means shall be sized based on the output rating of the inverter. These conductors shall be protected from overcurrents in accordance with Article 240. The overcurrent protection shall be located at the output of the inverter.

(C) Single 120-Volt Supply. The inverter output of a stand-alone small wind electric system shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the rating of the overcurrent device connected to the output of the inverter shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:

WARNING
SINGLE 120-VOLT SUPPLY. DO NOT CONNECT
MULTIWIRE BRANCH CIRCUITS!

(D) Energy Storage or Backup Power System Requirements. Energy storage or backup power supplies are not required.

III. Disconnecting Means

694.13 All Conductors. Means shall be provided to disconnect all current-carrying conductors of a small wind electric power source from all other conductors in a building or other structure. A switch, circuit breaker, or other device, either ac or dc, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the marked, grounded conductor in an ungrounded and energized state.

Exception: A wind turbine that uses the turbine output circuit for regulating turbine speed shall not require a turbine output circuit disconnecting means.

694.14 Additional Provisions. Disconnecting means shall comply with 694.14(A) through (D).

(A) Disconnecting Means. The disconnecting means shall not be required to be suitable as service equipment and shall comply with the following:

The disconnecting means for ungrounded conductors shall consist of manually operable switches or circuit breakers complying with all of the following requirements:

(1) Located where readily accessible
(2) Externally operable without exposing the operator to contact with live parts
(3) Plainly indicating whether in the open or closed position
(4) Having an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment

When all terminals of the disconnecting means may be energized in the open position, a warning sign shall be mounted on or adjacent to the disconnecting means. The sign shall be clearly legible and have the following words or equivalent:

WARNING
ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE
ENERGIZEDIN THE OPEN POSITION.

(B) Equipment. Equipment such as rectifiers, controllers, output circuit isolating and shorting switches and overcurrent devices shall be permitted on the wind turbine side of the disconnecting means.

(C) Requirements for Disconnecting Means.

(1) Location. The small wind electric system disconnecting means shall be installed at a readily accessible location either on or adjacent to the turbine tower, on the outside of a building or structure or inside nearest the point of entrance of the system conductors.

Exception: Installations that comply with 694.31(C) shall be permitted to have the disconnecting means located remotely from the point of entry of the system conductors.

A turbine disconnecting means shall not be required to be located at the nacelle or tower.

The disconnecting means shall not be installed in bathrooms.

(2) Marking. Each turbine system disconnecting means shall be permanently marked to identify it as a small wind electric system disconnect. A plaque shall be installed in accordance with 705.10.

(3) Suitable for Use. Turbine system disconnecting means shall be suitable for the prevailing conditions. Equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.

(4) Maximum Number of Disconnects. The turbine disconnecting means shall consist of not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard.

(5) Grouping. The turbine disconnecting means shall be grouped with other disconnecting means for the system to comply with 694.14(C)(4).

(D) Equipment Mounted in Not-Readily-Accessible Locations. Rectifiers, controllers, and inverters shall be permitted to be mounted in nacelles or other exterior areas that are not readily accessible.

694.15 Disconnection of Small Wind Electric System Equipment. Means shall be provided to disconnect equipment, such as inverters, batteries, charge controllers, and the like, from all ungrounded conductors of all sources. If the equipment is energized from more than one source, the disconnecting means shall be grouped and identified. A single disconnecting means in accordance with 694.14 shall be permitted for the combined ac output of one or more inverters in an interactive system.

A shorting switch or plug shall be permitted to be used as an alternative to a disconnect in systems that regulate turbine speed using the turbine output circuit.

Exception: Equipment housed in a turbine nacelle is not required to have a disconnecting means.

694.16 Fuses. Means shall be provided to disconnect a fuse from all sources of supply if the fuse is energized from both directions and is accessible to other than qualified persons. Switches, pullouts, or similar devices that have suitable ratings shall be permitted to serve as means to disconnect fuses from all sources of supply.

694.18 Installation and Service of a Wind Turbine. Open circuiting, short circuiting, or mechanical brakes shall be used to disable a turbine for installation and service.

FPN: Some wind turbines rely on the connection from the alternator to a remote controller for speed regulation. Opening turbine output circuit conductors may cause mechanical damage to a turbine and create excessive voltages that could damage equipment or expose persons to electric shock.

IV. Wiring Methods

694.31 Methods Permitted.

(A) Wiring Systems. All raceway and cable wiring methods included in this Code and other wiring systems and fittings specifically intended for use on wind turbines shall be permitted. When turbine output circuits operating at maximum voltages greater than 30 volts are installed in readily accessible locations, circuit conductors shall be installed in raceways.

(B) Flexible Cords and Cables. Flexible cords and cables, when used to connect the moving parts of turbines or used to permit ready removal for maintenance and repair, shall comply with Article 400 and shall be of a type identified as a hard service cord or portable power cable; they shall be suitable for extra-hard usage, listed for outdoor use, and water resistant. Cables exposed to sunlight shall be sunlight resistant.

(C) Direct-Current Turbine Output Circuits Inside a Building. When direct-current turbine output circuits are run inside a building or structure, they shall be contained in metal raceways or metal enclosures from the point of penetration of the surface of the building or structure to the first readily accessible disconnecting means.

V. Grounding

694.43 Equipment Grounding.

(A) General. Exposed non–current-carrying metal parts of towers, turbine nacelles, other equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage. Attached metal parts such as turbine blades and tails that have no source of electrical energization are not required to be grounded.

(B) Guy Wires. Guy wires used to support turbine towers shall not be required to be grounded.

[FPN] Guy wires supporting towers that are adequately grounded are not likely to become energized and so are not subject to the requirements of 250.110. Grounding of metallic guy wires may be required by lightning codes.

(C) Tower Grounding.

(1) Auxiliary Electrodes. A wind turbine tower shall be grounded with one or more auxiliary electrodes to limit voltages imposed by lightning. Auxiliary electrodes are permitted to be installed in accordance with 250.54. Electrodes that are part of the tower foundation and that meet the requirements for concrete encased electrodes (250.52(A)(3)) are acceptable. A grounded metal tower support is acceptable if it meets the requirements of 250.136(A).

(2) Equipment Grounding Conductor. An equipment grounding conductor shall be required between a turbine and the system grounded conductor in accordance with 250.110.

(3) Tower Grounding Connections. The equipment grounding conductor and grounding electrode conductors, if used, shall be connected to a metallic tower by exothermic welding, listed lugs, listed pressure connectors, listed clamps, or other listed means. Devices such as connectors and lugs shall be suitable for the material of the conductor and the structure to which they connect. When practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action and corrosion. All mechanical elements used to terminate these conductors shall be accessible.

(4) Lightning Protection Systems. Auxiliary electrodes and grounding electrode conductors shall be permitted to act as lightning protection system components if they meet applicable requirements. If separate, the tower lightning protection system grounding electrodes shall be bonded to the tower auxiliary grounding electrode system. Guy lightning protection system ground electrodes shall not be required to be bonded to the tower auxiliary grounding electrode system.

FPN: See NFPA 780-2008, *Standard for the Installation of Lightning Protection Systems*, Annex N, Wind Turbine Generator Systems, for information on lightning protection of wind turbines.

VI. Marking

694.54 Interactive System Point of Interconnection.

All interactive system points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating ac voltage.

694.55 Power Systems Employing Energy Storage.

Small wind electric systems employing energy storage shall be marked with the maximum operating voltage, including any equalization voltage and the polarity of the grounded circuit conductor.

694.56 Identification of Power Sources.

(A) Facilities with Stand-Alone Systems. Any structure or building with a power system that is not connected to a utility service source and is a stand-alone system shall have a permanent plaque or directory installed on the exterior of the building or structure at a readily visible location. The plaque or directory shall indicate the location of system disconnecting means and that the structure contains a stand-alone electrical power system.

(B) Facilities with Utility Services and Small Wind Electric Systems. Buildings or structures with both utility service and small wind electric systems shall have a permanent plaque or directory providing the location of the service disconnecting means and the small wind electric system disconnecting means.

694.57 Instructions for Disabling Turbine. A plaque shall be installed at or adjacent to a turbine location providing basic instructions for disabling the turbine.

VII. Connection to Other Sources

694.60 Identified Interactive Equipment. Only inverters listed or recognized, and identified as interactive shall be permitted in interactive systems.

694.61 Installation. Small wind electric systems, when connected to other electric sources, shall comply with the requirements of article 705.

694.62 Ampacity of Neutral Conductor.

If a single-phase, 2-wire inverter output is connected to the neutral conductor and one ungrounded conductor (only) of a 3-wire system or of a 3-phase, 4-wire, wye-connected system, the maximum load connected between the neutral conductor and any one ungrounded conductor plus the inverter output rating shall not exceed the ampacity of the neutral conductor.

A conductor used solely for instrumentation, voltage detection, or phase detection and connected to a single-phase or 3-phase utility-interactive inverter, shall be permitted to be sized at less than the ampacity of the other current-carrying conductors and shall be sized equal to or larger than the equipment grounding conductor.

694.63 Operating Voltage Range. Small wind electric systems operating on dedicated branch or feeder circuits shall be permitted to exceed normal voltage operating ranges at the end of these circuits provided that the voltage at any distribution equipment supplying other loads remains within normal ranges.

FPN: Wind turbines may use the electric grid to dump energy from short-term wind gusts. Normal operating voltages are defined in ANSI C84.1-2006, Voltage Ratings for Electric Power Systems and Equipment (60 Hz).

694.64 Point of Connection.

See 705.12 Point of Connection.

VIII. Storage Batteries

[This common language should move to 480 or another common article]

694.71 Installation.

(A) General. Storage batteries in small wind electric systems shall be installed in accordance with the provisions of Article 480.

(B) Dwellings.

(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).

Exception: When live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 694.7 shall be permitted.

(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.

FPN: Batteries in small wind electric systems are subject to extensive charge–discharge cycles and typically require frequent maintenance, such as checking electrolyte and cleaning connections.

(C) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries when the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 694.16.

(D) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted when no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.

This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that require steel or other conductive material cases for proper operation.

(E) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, when more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.

(F) Battery Maintenance Disconnecting Means. Battery installations, when there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductors in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductors for the remainder of the small wind electric system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.

(G) Battery Systems of More Than 48 Volts. On small wind electric systems when the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided the following conditions are met:

(1) The dc and ac load circuits shall be solidly grounded.

(2) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.

(3) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.

694.72 Charge Control.

(A) General. Equipment shall be provided to control the charging process of the battery. Charge control shall not be required when the design of the small wind electric source is matched to the voltage rating and charge current requirements of the interconnected battery cells and the maximum charging current multiplied by 1 hour is less than 3 percent of the rated battery capacity expressed in ampere-hours or as recommended by the battery manufacturer.
All adjusting means for control of the charging process shall be accessible only to qualified persons.
FPN: Certain battery types such as valve-regulated lead acid or nickel cadmium can experience thermal failure when overcharged.
(B) Diversion Charge Controller.
(1) Sole Means of Regulating Charging. A small wind electric system employing a diversion charge controller as the sole means of regulating the charging of a battery shall be equipped with two reliable independent means to prevent overcharging of the battery. An interconnected utility service shall not be considered to be a reliable diversion load.
(2) Circuits with Direct-Current Diversion Charge Controller and Diversion Load. Circuits containing a dc diversion charge controller and a dc diversion load shall comply with the following:
(1) The current rating of the diversion load shall be less than or equal to the current rating of the diversion load charge controller. The voltage rating of the diversion load shall be greater than the maximum battery voltage. The power rating of the diversion load shall be at least 150 percent of the maximum power output rating of the small wind electric system.
(2) The conductor ampacity and the rating of the overcurrent device for this circuit shall be at least 150 percent of the maximum current rating of the diversion charge controller.
IX. Systems over 600 Volts
694.80 General.
Small wind electric systems with a maximum system voltage over 600 volts dc shall comply with Article 490 and other requirements applicable to installations rated over 600 volts.
694.85 Definitions.
For the purposes of Part IX of this article, the voltages used to determine cable and equipment ratings are as follows.
Battery Circuits. In battery circuits, the highest voltage experienced under charging or equalizing conditions.
Other Circuits. In other circuits, the maximum voltage experienced in normal operation.
Panel Statement:
Revise text to read as follows:
ARTICLE 694 Small Wind Electric Systems
I. General
694.1 Scope. The provisions of this article apply to small wind electric systems (also known as small wind turbine systems), including generators, alternators, inverters, and controllers for such systems. [See Figures 694.1(A) and 694.1(B).]
This article applies to small wind electric systems consisting of one or more wind electric generators with individual systems up to and including 100 kW rated power output.
Systems covered by this article may be interactive with other electrical power production sources or stand-alone, with or without electrical energy storage such as batteries. These systems may have ac or dc output for utilization.
Figure 694.1(A) Identification of Small Wind Electric System Components – Interactive System.
Figure 694.1(B) Identification of Small Wind Electric System Components – Stand-Alone System.
694.2 Definitions
Charge Controller. Equipment that controls dc voltage or dc current, or both, and that is used to charge a battery or other energy storage device.
Diversion Charge Controller. Equipment that regulates the charging process of a battery or other energy storage device by diverting power from energy storage to direct-current or alternating-current loads or to an interconnected utility service.
Diversion Load Controller. Equipment that regulates the output of a wind generator by diverting power from the generator to direct-current or alternating-current loads or to an interconnected utility service.
Diversion Load. A load connected to a diversion charge controller or diversion load controller. Also known as a Dump Load.
Guy. A cable that mechanically supports a wind turbine tower.
Inverter Output Circuit. Conductors between an inverter and an ac panelboard for stand-alone systems or the conductors between an inverter and service equipment or another electric power production source, such as a utility, for an electrical production and distribution network.
Maximum Output Power. The maximum one-minute average power output a wind turbine will produce in normal steady-state operation (instantaneous power output can be higher).
Maximum Voltage. The maximum voltage the wind turbine will produce in operation including open circuit conditions.
Nacelle. An enclosure housing the alternator and other parts of a wind turbine.
Rated Power. The wind turbine's power output at a wind speed of 11.0 m/s (24.6 mph). If a turbine produces more power at lower wind speeds, the rated power shall be measured at a wind speed less than 11 m/s that produces the greatest output power.
FPN: The method for measuring wind turbine power output is specified IEC 61400-12-1, Power Performance Measurements of Electricity Producing Wind Turbines.
Tower. A pole or other structure that supports a wind turbine.
Wind Turbine. A mechanical device that converts wind energy to electrical energy.
Wind Turbine Output Circuit. Circuit conductors between the internal components of a small wind turbine (which may include an alternator, integrated rectifier, controller, and/or inverter), and other equipment.
Wind Turbine System. A small wind electric generating system.
FPN: See also definitions for interconnected systems in Article 705.
694.3 Other Articles. Whenever the requirements of other articles of the *Code* and Article 694 differ, the requirements of Article 694 shall apply. If the system is operated in parallel with primary sources of electricity, the requirements in Article 705 shall apply.
Exception: Small wind electric systems, equipment, or wiring installed in a hazardous (classified) location shall also comply with the applicable portions of Articles 500 through 516.
694.4 Installation.
(A) Small Wind Electric System. Small wind electric system(s) shall be permitted to supply a building or other structure in addition to any services of another electricity supply system.
(B) Equipment. Inverters used in small wind electric systems shall be identified and either listed or recognized for the application.
(C) Diversion Load Controllers. A small wind electric system employing a diversion load controller as the primary means of regulating the speed of a wind turbine rotor shall be equipped with an additional, independent, reliable means to prevent over-speed operation. An interconnected utility service shall not be considered to be a reliable diversion load.
(D) Surge Protective Devices. A surge protective device shall be installed between a small wind electric system and any loads served by the premises electrical system. The surge protective device is permitted to be a Type 3 device located on a dedicated branch circuit serving a small wind electric system, or a Type 2 device anywhere on the load side of the service disconnect. Surge protective devices shall be installed in accordance with Article 285. Part II.
(E) Receptacles. A receptacle is permitted to be attached to a small wind electric system branch or feeder circuit for maintenance or data acquisition use. Receptacles shall be protected with an overcurrent device that is rated at no greater than the current rating of the receptacle.
II. Circuit Requirements
694.7 Maximum Voltage.
(A) Turbine Output Circuits. For wind turbines connected to one- and two-family dwellings, turbine output circuits shall be permitted to have a maximum voltage up to 600 volts. Other installations with a maximum voltage over 600 volts shall comply with Article 694, Part IX.
(B) Direct-Current Utilization Circuits. The voltage of dc utilization circuits shall conform to 210.6.
(C) Circuits over 150 Volts to Ground. In one- and two-family dwellings, live parts in circuits over 150 volts to ground shall not be accessible to other than qualified persons while energized.
FPN: See 110.27 for guarding of live parts and 210.6 for branch circuit voltage limitations.
694.8 Circuit Sizing and Current.
(A) Calculation of Maximum Circuit Current. The maximum current for a circuit shall be calculated in accordance with 694.8(A)(1) through (A)(3).
(1) Turbine Output Circuit Currents. The maximum current shall be the circuit current when the wind turbine is operating at Maximum Output Power.
(2) Inverter Output Circuit Current. The maximum current shall be the inverter continuous output current rating.
(3) Stand-Alone Inverter Input Circuit Current. The maximum current shall be the stand-alone continuous inverter input current rating when the inverter is producing rated power at the lowest input voltage.
(B) Ampacity and Overcurrent Device Ratings. Small wind electric system currents shall be considered to be continuous.
(1) Sizing of Conductors and Overcurrent Devices. Circuit conductors and overcurrent devices shall be sized to carry not less than 125 percent of the maximum currents as calculated in 694.8(A). The rating or setting of overcurrent devices shall be permitted in accordance with 240.4(B) and (C).
Exception: Circuits containing an assembly, together with its overcurrent devices, that is listed for continuous operation at 100 percent of its rating shall be permitted to be used at 100 percent of its rating.
694.9 Overcurrent Protection.
(A) Circuits and Equipment. Turbine output circuits, inverter output circuits, and storage battery circuit conductors and equipment shall be protected in accordance with the requirements of Article 240. Circuits connected to more than one electrical source shall have overcurrent devices located so as to provide overcurrent protection from all sources.
Exception: An overcurrent device shall not be required for circuit conductors sized in accordance with 694.8(B) and when the maximum currents from all sources do not exceed the ampacity of the conductors.

FPN: Possible backfeed of current from any source of supply, including a supply through an inverter to the wind turbine output circuit, is a consideration in determining whether adequate overcurrent protection from all sources is provided. Some small wind electric systems rely on the turbine output circuit to regulate turbine speed. Inverters may also operate in reverse to for turbine startup or speed control. In systems of these types, manufacturers instructions should be followed.

(B) Power Transformers. Overcurrent protection for a transformer with sources on each side shall be provided in accordance with 450.3 by considering first one side of the transformer, then the other side of the transformer, as the primary.

Exception: A power transformer with a current rating on the side connected to the inverter output, which is not less than the rated continuous output current rating of the inverter, shall be permitted without overcurrent protection from the inverter.

(C) Direct-Current Rating. Overcurrent devices, either fuses or circuit breakers, used in any dc portion of a small wind electric system shall be listed for use in dc circuits and shall have appropriate voltage, current, and interrupting ratings.

694.10 Stand-Alone Systems.

The premises wiring system shall be adequate to meet the requirements of this Code for a similar installation connected to a service. The wiring on the supply side of the building or structure disconnecting means shall comply with this Code except as modified by 694.10(A) through (D).

(A) Inverter Output. The ac output from stand-alone inverters shall be permitted to supply ac power to the building or structure disconnecting means at current levels less than the calculated load connected to that disconnect. The inverter output rating or the rating of a wind energy source shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.

(B) Sizing and Protection. The circuit conductors between the inverter output and the building or structure disconnecting means shall be sized based on the output rating of the inverter. These conductors shall be protected from overcurrents in accordance with Article 240. The overcurrent protection shall be located at the output of the inverter.

(C) Single 120-Volt Supply. The inverter output of a stand-alone small wind electric system shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the rating of the overcurrent device connected to the output of the inverter shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:

WARNING

SINGLE 120-VOLT SUPPLY. DO NOT CONNECT
MULTIWIRE BRANCH CIRCUITS!

(D) Energy Storage or Backup Power System Requirements. Energy storage or backup power supplies are not required.

III. Disconnecting Means

694.13 All Conductors. Means shall be provided to disconnect all current-carrying conductors of a small wind electric power source from all other conductors in a building or other structure. A switch, circuit breaker, or other device, either ac or dc, shall not be installed in a grounded conductor if operation of that switch, circuit breaker, or other device leaves the marked, grounded conductor in an ungrounded and energized state.

Exception: A wind turbine that uses the turbine output circuit for regulating turbine speed shall not require a turbine output circuit disconnecting means.

694.14 Additional Provisions. Disconnecting means shall comply with 694.14(A) through (D).

(A) Disconnecting Means. The disconnecting means shall not be required to be suitable as service equipment and shall comply with the following:

The disconnecting means for ungrounded conductors shall consist of manually operable switches or circuit breakers complying with all of the following requirements:

(1) Located where readily accessible
(2) Externally operable without exposing the operator to contact with live parts
(3) Plainly indicating whether in the open or closed position
(4) Having an interrupting rating sufficient for the nominal circuit voltage and the current that is available at the line terminals of the equipment

When all terminals of the disconnecting means may be energized in the open position, a warning sign shall be mounted on or adjacent to the disconnecting means. The sign shall be clearly legible and have the following words or equivalent:

WARNING

ELECTRIC SHOCK HAZARD. DO NOT TOUCH TERMINALS.
TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE
ENERGIZEDIN THE OPEN POSITION.

(B) Equipment. Equipment such as rectifiers, controllers, output circuit isolating and shorting switches and overcurrent devices shall be permitted on the wind turbine side of the disconnecting means.

(C) Requirements for Disconnecting Means.

(1) Location. The small wind electric system disconnecting means shall be installed at a readily accessible location either on or adjacent to the turbine tower, on the outside of a building or structure or inside nearest the point of entrance of the system conductors.

Exception: Installations that comply with 694.31(C) shall be permitted to have the disconnecting means located remotely from the point of entry of the system conductors.

A turbine disconnecting means shall not be required to be located at the nacelle or tower.

The disconnecting means shall not be installed in bathrooms.

(2) Marking. Each turbine system disconnecting means shall be permanently marked to identify it as a small wind electric system disconnect. A plaque shall be installed in accordance with 705.10.

(3) Suitable for Use. Turbine system disconnecting means shall be suitable for the prevailing conditions. Equipment installed in hazardous (classified) locations shall comply with the requirements of Articles 500 through 517.

(4) Maximum Number of Disconnects. The turbine disconnecting means shall consist of not more than six switches or six circuit breakers mounted in a single enclosure, in a group of separate enclosures, or in or on a switchboard.

(5) Grouping. The turbine disconnecting means shall be grouped with other disconnecting means for the system to comply with 694.14(C)(4).

(D) Equipment Mounted in Not-Readily-Accessible Locations. Rectifiers, controllers, and inverters shall be permitted to be mounted in nacelles or other exterior areas that are not readily accessible.

694.15 Disconnection of Small Wind Electric System Equipment. Means shall be provided to disconnect equipment, such as inverters, batteries, charge controllers, and the like, from all ungrounded conductors of all sources. If the equipment is energized from more than one source, the disconnecting means shall be grouped and identified. A single disconnecting means in accordance with 694.14 shall be permitted for the combined ac output of one or more inverters in an interactive system.

A shorting switch or plug shall be permitted to be used as an alternative to a disconnect in systems that regulate turbine speed using the turbine output circuit.

Exception: Equipment housed in a turbine nacelle is not required to have a disconnecting means.

694.16 Fuses. Means shall be provided to disconnect a fuse from all sources of supply if the fuse is energized from both directions and is accessible to other than qualified persons. Switches, pullouts, or similar devices that have suitable ratings shall be permitted to serve as means to disconnect fuses from all sources of supply.

694.18 Installation and Service of a Wind Turbine. Open circuiting, short circuiting, or mechanical brakes shall be used to disable a turbine for installation and service.

FPN: Some wind turbines rely on the connection from the alternator to a remote controller for speed regulation. Opening turbine output circuit conductors may cause mechanical damage to a turbine and create excessive voltages that could damage equipment or expose persons to electric shock.

IV. Wiring Methods

694.31 Methods Permitted.

(A) Wiring Systems. All raceway and cable wiring methods included in this Code and other wiring systems and fittings specifically intended for use on wind turbines shall be permitted. When turbine output circuits operating at maximum voltages greater than 30 volts are installed in readily accessible locations, circuit conductors shall be installed in raceways.

(B) Flexible Cords and Cables. Flexible cords and cables, when used to connect the moving parts of turbines or used to permit ready removal for maintenance and repair, shall comply with Article 400 and shall be of a type identified as a hard service cord or portable power cable; they shall be suitable for extra-hard usage, listed for outdoor use, and water resistant. Cables exposed to sunlight shall be sunlight resistant.

(C) Direct-Current Turbine Output Circuits Inside a Building. When direct-current turbine output circuits are run inside a building or structure, they shall be contained in metal raceways or metal enclosures from the point of penetration of the surface of the building or structure to the first readily accessible disconnecting means.

V. Grounding

694.43 Equipment Grounding.

(A) General. Exposed non–current-carrying metal parts of towers, turbine nacelles, other equipment, and conductor enclosures shall be grounded in accordance with 250.134 or 250.136(A) regardless of voltage. Attached metal parts such as turbine blades and tails that have no source of electrical energization are not required to be grounded.

(B) Guy Wires. Guy wires used to support turbine towers shall not be required to be grounded.

[FPN] Guy wires supporting towers that are adequately grounded are not likely to become energized and so are not subject to the requirements of 250.110. Grounding of metallic guy wires may be required by lightning codes.

(C) Tower Grounding.

(1) Auxiliary Electrodes. A wind turbine tower shall be grounded with one or more auxiliary electrodes to limit voltages imposed by lightning. Auxiliary electrodes are permitted to be installed in accordance with 250.54. Electrodes that are part of the tower foundation and that meet the requirements for concrete encased electrodes (250.52(A)(3)) are acceptable. A grounded metal tower support is acceptable if it meets the requirements of 250.136(A).

(2) Equipment Grounding Conductor. An equipment grounding conductor shall be required between a turbine and the system grounded conductor in accordance with 250.110.

(3) Tower Grounding Connections. The equipment grounding conductor and grounding electrode conductors, if used, shall be connected to a metallic tower by exothermic welding, listed lugs, listed pressure connectors, listed clamps, or other listed means. Devices such as connectors and lugs shall be suitable for the material of the conductor and the structure to which they connect. When practicable, dissimilar metals in contact anywhere in the system shall be avoided to eliminate the possibility of galvanic action and corrosion. All mechanical elements used to terminate these conductors shall be accessible.

(4) Lightning Protection Systems. Auxiliary electrodes and grounding electrode conductors shall be permitted to act as lightning protection system components if they meet applicable requirements. If separate, the tower lightning protection system grounding electrodes shall be bonded to the tower auxiliary grounding electrode system. Guy lightning protection system ground electrodes shall not be required to be bonded to the tower auxiliary grounding electrode system.

FPN: See NFPA 780-2008, *Standard for the Installation of Lightning Protection Systems*, Annex N, Wind Turbine Generator Systems, for information on lightning protection of wind turbines.

VI. Marking

694.54 Interactive System Point of Interconnection.

All interactive system points of interconnection with other sources shall be marked at an accessible location at the disconnecting means as a power source and with the rated ac output current and the nominal operating ac voltage.

694.55 Power Systems Employing Energy Storage.

Small wind electric systems employing energy storage shall be marked with the maximum operating voltage, including any equalization voltage and the polarity of the grounded circuit conductor.

694.56 Identification of Power Sources.

(A) Facilities with Stand-Alone Systems. Any structure or building with a power system that is not connected to a utility service source and is a stand-alone system shall have a permanent plaque or directory installed on the exterior of the building or structure at a readily visible location. The plaque or directory shall indicate the location of system disconnecting means and that the structure contains a stand-alone electrical power system.

(B) Facilities with Utility Services and Small Wind Electric Systems. Buildings or structures with both utility service and small wind electric systems shall have a permanent plaque or directory providing the location of the service disconnecting means and the small wind electric system disconnecting means.

694.57 Instructions for Disabling Turbine. A plaque shall be installed at or adjacent to a turbine location providing basic instructions for disabling the turbine.

VII. Connection to Other Sources

694.60 Identified Interactive Equipment. Only inverters listed or recognized, and identified as interactive shall be permitted in interactive systems.

694.61 Installation. Small wind electric systems, when connected to other electric sources, shall comply with the requirements of article 705.

694.62 Ampacity of Neutral Conductor.

If a single-phase, 2-wire inverter output is connected to the neutral conductor and one ungrounded conductor (only) of a 3-wire system or of a 3-phase, 4-wire, wye-connected system, the maximum load connected between the neutral conductor and any one ungrounded conductor plus the inverter output rating shall not exceed the ampacity of the neutral conductor.

A conductor used solely for instrumentation, voltage detection, or phase detection and connected to a single-phase or 3-phase utility-interactive inverter, shall be permitted to be sized at less than the ampacity of the other current-carrying conductors and shall be sized equal to or larger than the equipment grounding conductor.

694.63 Operating Voltage Range. Small wind electric systems operating on dedicated branch or feeder circuits shall be permitted to exceed normal voltage operating ranges at the end of these circuits provided that the voltage at any distribution equipment supplying other loads remains within normal ranges.

FPN: Wind turbines may use the electric grid to dump energy from short-term wind gusts. Normal operating voltages are defined in ANSI C84.1-2006, Voltage Ratings for Electric Power Systems and Equipment (60 Hz).

694.64 Point of Connection.

See 705.12 Point of Connection.

VIII. Storage Batteries

[This common language should move to 480 or another common article]

694.71 Installation.

(A) General. Storage batteries in small wind electric systems shall be installed in accordance with the provisions of Article 480.

(B) Dwellings.

(1) Operating Voltage. Storage batteries for dwellings shall have the cells connected so as to operate at less than 50 volts nominal. Lead-acid storage batteries for dwellings shall have no more than twenty-four 2-volt cells connected in series (48-volts nominal).

Exception: When live parts are not accessible during routine battery maintenance, a battery system voltage in accordance with 694.7 shall be permitted.

(2) Guarding of Live Parts. Live parts of battery systems for dwellings shall be guarded to prevent accidental contact by persons or objects, regardless of voltage or battery type.

FPN: Batteries in small wind electric systems are subject to extensive charge–discharge cycles and typically require frequent maintenance, such as checking electrolyte and cleaning connections.

(C) Current Limiting. A listed, current-limiting, overcurrent device shall be installed in each circuit adjacent to the batteries when the available short-circuit current from a battery or battery bank exceeds the interrupting or withstand ratings of other equipment in that circuit. The installation of current-limiting fuses shall comply with 694.16.

(D) Battery Nonconductive Cases and Conductive Racks. Flooded, vented, lead-acid batteries with more than twenty-four 2-volt cells connected in series (48 volts, nominal) shall not use conductive cases or shall not be installed in conductive cases. Conductive racks used to support the nonconductive cases shall be permitted when no rack material is located within 150 mm (6 in.) of the tops of the nonconductive cases.

This requirement shall not apply to any type of valve-regulated lead-acid (VRLA) battery or any other types of sealed batteries that require steel or other conductive material cases for proper operation.

(E) Disconnection of Series Battery Circuits. Battery circuits subject to field servicing, when more than twenty-four 2-volt cells are connected in series (48 volts, nominal), shall have provisions to disconnect the series-connected strings into segments of 24 cells or less for maintenance by qualified persons. Non–load-break bolted or plug-in disconnects shall be permitted.

(F) Battery Maintenance Disconnecting Means. Battery installations, when there are more than twenty-four 2-volt cells connected in series (48 volts, nominal), shall have a disconnecting means, accessible only to qualified persons, that disconnects the grounded circuit conductors in the battery electrical system for maintenance. This disconnecting means shall not disconnect the grounded circuit conductors for the remainder of the small wind electric system. A non–load-break-rated switch shall be permitted to be used as the disconnecting means.

(G) Battery Systems of More Than 48 Volts. On small wind electric systems when the battery system consists of more than twenty-four 2-volt cells connected in series (more than 48 volts, nominal), the battery system shall be permitted to operate with ungrounded conductors, provided the following conditions are met:

(1) The dc and ac load circuits shall be solidly grounded.

(2) All main ungrounded battery input/output circuit conductors shall be provided with switched disconnects and overcurrent protection.

(3) A ground-fault detector and indicator shall be installed to monitor for ground faults in the battery bank.

694.72 Charge Control.

(A) General. Equipment shall be provided to control the charging process of the battery. Charge control shall not be required when the design of the small wind electric source is matched to the voltage rating and charge current requirements of the interconnected battery cells and the maximum charging current multiplied by 1 hour is less than 3 percent of the rated battery capacity expressed in ampere-hours or as recommended by the battery manufacturer.

All adjusting means for control of the charging process shall be accessible only to qualified persons.

FPN: Certain battery types such as valve-regulated lead acid or nickel cadmium can experience thermal failure when overcharged.

(B) Diversion Charge Controller.

(1) Sole Means of Regulating Charging. A small wind electric system employing a diversion charge controller as the sole means of regulating the charging of a battery shall be equipped with two reliable independent means to prevent overcharging of the battery. An interconnected utility service shall not be considered to be a reliable diversion load.

(2) Circuits with Direct-Current Diversion Charge Controller and Diversion Load. Circuits containing a dc diversion charge controller and a dc diversion load shall comply with the following:

(1) The current rating of the diversion load shall be less than or equal to the current rating of the diversion load charge controller. The voltage rating of the diversion load shall be greater than the maximum battery voltage. The power rating of the diversion load shall be at least 150 percent of the maximum power output rating of the small wind electric system.

(2) The conductor ampacity and the rating of the overcurrent device for this circuit shall be at least 150 percent of the maximum current rating of the diversion charge controller.

IX. Systems over 600 Volts

694.80 General.

Small wind electric systems with a maximum system voltage over 600 volts dc shall comply with Article 490 and other requirements applicable to installations rated over 600 volts.

694.85 Definitions.

For the purposes of Part IX of this article, the voltages used to determine cable and equipment ratings are as follows.

Battery Circuits. In battery circuits, the highest voltage experienced under charging or equalizing conditions.

Other Circuits. In other circuits, the maximum voltage experienced in normal operation.

Number Eligible to Vote: 10

Ballot Results: Affirmative: 10

ARTICLE 695 — FIRE PUMPS

13-47 Log #70 NEC-P13 **Final Action: Reject**
(695)

Note: This Proposal appeared as Comment 13-103 on Proposal 13-77 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-77 was:
Revise extracted text from NFPA 20 to reflect 2006 edition revisions. Following is the NFPA 20 - Chapter 9 text as it has been voted on by the NFPA 20 Committee to date.
NFPA 20 - DRAFT
Chapter 9 Electric Drive for Pumps
9.1 General.
9.1.1 This chapter covers the minimum performance and testing requirements of the sources and transmission of electrical power to motors driving fire pumps.
9.1.2 Also covered are the minimum performance requirements of all intermediate equipment between the source(s) and the pump, including the motor(s) but excepting the electric fire pump controller, transfer switch, and accessories (see Chapter 10).
9.1.3 All electrical equipment and installation methods shall comply with NFPA 70, National Electrical Code, Article 695, and other applicable articles.
9.1.4* All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.
9.1.5 All power supplies shall have the capacity to run the fire pump on a continuous basis.
9.1.6 All power supplies shall comply with the voltage drop requirements of Section 9.7.
9.2 Normal Power.
9.2.1 An electric motor driven fire pump shall be provided with a normal source of power as a continually available source.
9.2.2 The normal source of power required in 9.2.1 and its routing shall be arranged in accordance with one of the following:
(1) Service connection dedicated to the fire pump installation.
(2) On-site power production facility connection dedicated to the fire pump installation.
(3) A dedicated feeder connection derived directly from the dedicated service to the fire pump installation.
(4) As a feeder connection where all of the following conditions are met:
a. The protected facility is part of a multi-building campus style arrangement.
b. A back-up source of power is provided from a source independent of the normal source of power.
c. It is impractical to supply the normal source of power through arrangement 9.2.2(1), 9.2.2(2), 9.2.2(3) or 9.2.2(5).
d. The arrangement is acceptable to the authority having jurisdiction.
e. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).
(5) A dedicated transformer connection directly from the service meeting the requirements of Article 695 of NFPA 70.
9.2.3 For fire pump installations using the arrangement of 9.2.2(1), 9.2.2(2),9.2.2(3), 9.2.2(5) for the normal source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller.
9.2.3.1 Where the disconnecting means permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following:
(1) Identified as being suitable for use as service equipment.
(2) Lockable in the closed position.
(3) * Located remote from other building disconnecting means.
(4) * Located remote from other fire pump source disconnecting means.
(5) Marked "Fire Pump Disconnecting Means" in letters that are no less than one inch (25 mm) in height and that can be seen without opening enclosure doors or covers.
9.2.3.2 Where the disconnecting means permitted by 9.2.3 is installed, a placard shall be placed adjacent to the fire pump controller stating the location of this disconnection means and the location of any key needed to unlock the disconnect.
9.2.3.3 Where the disconnecting means permitted by 9.2.3 is installed, the disconnect shall be supervised in the closed position by one of the following methods:
(1) Central station, proprietary or remote station signal device
(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended location
(3) Locking the disconnecting means in the closed position
(4) Sealing of disconnecting means and approved weekly recorded inspections where the disconnecting means are located within fenced enclosures or in buildings under the control of the owner
9.2.3.4 Where the overcurrent protection permitted by 9.2.3 is installed, the overcurrent protection device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment.
9.3 Alternate power.
9.3.1 Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided when the height of the structure is beyond the pumping capacity of the fire department apparatus.
9.3.2* Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided where the normal source is not reliable.
9.3.3 An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard.
9.3.4 When provided, the alternate source of power shall be supplied from one of the following sources:
(1) A generator installed in accordance with Section 9.8.
(2) One of the sources identified in 9.2.2(1); 9.2.2(2); 9.2.2(3); or 9.2.2(5) when the power is provided independent of the normal source of power.
9.3.5 When provided, the alternate supply shall be arranged so that the power to the fire pump is not disrupted when overhead lines are de-energized for fire department operations.
9.4 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.
9.4.1 The junction box shall be securely mounted.
9.4.2* Mounting and installing of a junction box shall not violate the enclosure Type (NEMA) rating of the fire pump controller(s).
9.4.3* Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the Short Circuit Rating of the controller(s).
9.4.4 As a minimum, a National Electrical Manufacturers Association (NEMA) Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed f or the subject to match the fire pump controller enclosure Type rating.
9.4.5 Terminals, junction blocks, splices, and the like, when used, shall be listed.
9.5* Listed Electrical Circuit Protective System to Controller Wiring.
9.5.1* Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with NFPA 70.
9.5.2 Single (individual conductors) shall not enter the fire pump enclosure separately.
9.5.3* Where required by the manufacturer of a listed Electrical Circuit Protective System or by NFPA 70 or by the Listing agency, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer or listing agency.
9.5.4 Standard wiring between junction box and controller is acceptable.
9.6* Raceway Terminations.
9.6.1 Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.
9.6.2 The NEMA Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.
9.6.3 The installation instructions of the manufacturer of the fire pump controller shall be followed.
9.6.4 No alterations to the fire pump controller, other than conduit entry as allowed by NFPA 70, shall be approved by the authority having jurisdiction.
9.7* Voltage Drop.
9.7.1 Unless the requirements of 9.4.2 are met, the voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor-starting conditions.
9.7.2 The requirements of 9.7.1 shall not apply to emergency run mechanical starting. (See 10.5.3.2.)
9.7.3 The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.
9.8 Motors.
9.8.1 General.
9.8.1.1 All motors shall comply with NEMA MG-1, Motors and Generators, shall be marked as complying with NEMADesign B standards, and shall be specifically listed for fire pump service. (See Table 9.8.1.1.)
Table 9.8.1.1 Horsepower and Locked Rotor Current Motor Designation for NEMA Design B Motors
9.8.1.2 The requirements of 9.8.1.1 shall not apply to direct-current, high-voltage (over 600 V), large-horsepower [over 373 kW (500 hp)], single-phase, universal-type, or wound-rotor motors, which shall be permitted to be used where approved.
9.8.1.3 Motors used with variable speed controllers shall additionally meet the applicable requirements of NEMA MG1, Part 31 and shall be marked for inverter duty.

9.8.1.4* The corresponding values of locked rotor current for motors rated at other voltages shall be determined by multiplying the values shown by the ratio of 460 V to the rated voltage in Table 9.8.1.1.

9.8.1.5 Code letters of motors for all other voltages shall conform with those shown for 460 V in Table 9.8.1.1.

9.8.1.6 All motors shall be rated for continuous duty.

9.8.1.7 Electric motor–induced transients shall be coordinated with the provisions of 10.4.3.3 to prevent nuisance tripping of motor controller protective devices.

9.8.1.8 Motors for Vertical Shaft Turbine–Type Pumps.

9.8.1.8.1 Motors for vertical shaft turbine–type pumps shall be dripproof, squirrel-cage induction type.

9.8.1.8.2 The motor shall be equipped with a nonreverse ratchet.

9.8.2 Current Limits.

9.8.2.1 The motor capacity in horsepower shall be such that the maximum motor current in any phase under any condition of pump load and voltage unbalance shall not exceed the motor-rated full-load current multiplied by the service factor.

9.8.2.2 Where the motor is used with a variable speed pressure limiting controller, the service factor shall not be used.

9.8.2.3 The maximum service factor at which a motor shall be used is 1.15.

9.8.2.4 These service factors shall be in accordance with NEMA MG-1, Motors and Generators.

9.8.2.5 General-purpose (open and dripproof) motors, totally enclosed fan-cooled (TEFC) motors, and totally enclosed nonventilated (TENV) motors shall not have a service factor larger than 1.15.

9.8.2.6 Motors used at altitudes above 1000 m (3300 ft) shall be operated or derated according to NEMA MG-1, Motors and Generators, Part 14.

9.8.3 Marking.

9.8.3.1 Marking of motor terminals shall be in accordance with NEMA MG-1, Motors and Generators, Part 2.

9.8.3.2 A motor terminal connecting diagram for multiple lead motors shall be furnished by the motor manufacturer.

9.9 On-Site Standby Generator Systems.

9.9.1 Capacity.

9.9.1.1 Where on-site generator systems are used to supply power to fire pump motors to meet the requirements of 9.3.2, they shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s) while meeting the requirements of Section 9.7.

9.9.1.2 A tap ahead of the on-site generator disconnecting means shall not be required.

9.9.2* Power Sources.

9.9.2.1 These power sources shall comply with Section 9.7 and shall meet the requirements of Level 1, Type 10, Class X systems of NFPA 110, Standard for Emergency and Standby Power Systems.

9.9.2.2 The fuel supply capacity shall be sufficient to provide 8 hours of fire pump operation at 100 percent of the rated pump capacity in addition to the supply required for other demands.

9.9.3 Sequencing. Automatic sequencing of the fire pumps shall be permitted in accordance with 10.5.2.5.

9.9.4 Transfer of Power. Transfer of power to the fire pump controller between the normal supply and one alternate supply shall take place within the pump room.

9.9.5* Protective Devices. Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump.

Submitter: James S. Nasby, Master Control Systems, Inc.

Recommendation: Revise the text of the TCC write-up in the A2007 ROP to read as follows.

ARTICLE 695 Fire Pumps

FPN: Rules that are followed by a reference in brackets contain text that has been extracted from NFPA 20-2006, Standard for the Installation of Stationary Pumps for Fire Protection. Only editorial changes were made to the extracted text to make it consistent with this Code.

695.1 Scope.

(A) Covered. This article covers the installation of the following:

(1) Electric power sources and interconnecting circuits

(2) Switching and control equipment dedicated to fire pump drivers

(3) Associated fire pump accessory equipment

(B) Not Covered. This article does not cover the performance, maintenance, and acceptance testing of the fire pump system, and the internal wiring of the components of the system.

FPN: See NFPA 20-2006, Standard for the Installation of Stationary Pumps for Fire Protection, for further information.

695.2 Definitions.

Fault Tolerant External Control Circuit. Those control circuits entering or leaving the fire pump controller enclosure, which if broken, disconnected, or shorted will not prevent the controller from starting the fire pump from all other internal or external means and may cause the controller to start the pump under these conditions.

On-Site Power Production Facility. The normal supply of electric power for the site that is expected to be constantly producing power.

On-Site Standby Generator. A facility producing electric power on site as the alternate supply of electric power. It differs from an on-site power production facility, in that it is not constantly producing power.

695.3 Power Source(s) for Electric Motor-Driven Fire Pumps.

Electric motor-driven fire pumps shall have a reliable source of power.

FPN: NFPA 20-2006, *Standard for the Installation of Stationary Pumps for Fire Protection,* covers characteristics of reliable of reliable sources. Also see the cross-reference in Annex J.

(A) Scope. This section covers the minimum performance and testing requirements of the sources and transmission of electrical power to motors driving fire pumps.

(B) Equipment. Also covered are the minimum performance requirements of all intermediate equipment between the source(s) and the pump, including the motor(s) but excepting the electric fire pump controller, transfer switch, and accessories

FPN: See Chapter 10 of NFPA 20.

(C) General. All electrical equipment and installation methods shall comply with this Code except as modified by Article 695.

(D) Hazards. All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.

FPN: Where the power supply involves an on-site power production facility, the protection is required for the facility in addition to the wiring and equipment.

(E) Continuous Duty. All power supplies shall have the capacity to run the fire pump on a continuous basis.

(F) Voltage Drop. All power supplies shall comply with the voltage drop requirements of Section 695.8

(G) Phase Converters. Phase converters shall not be permitted to be used for fire pump service.

695.4 Continuity of Power.

(A) Continuously Available. An electric motor driven fire pump shall be provided with a normal source of power as a continually available source.

(B) Arrangement. The normal source of power required in 695.4(A) and its routing shall be arranged in accordance with one of the following:

(1) Service connection dedicated to the fire pump installation.

(2) On-site power production facility connection dedicated to the fire pump installation.

(3) A dedicated feeder connection derived directly from the dedicated service to the fire pump installation.

(4) As a feeder connection where all of the following conditions are met:

a. The protected facility is part of a multi-building campus style arrangement.

b. A back-up source of power is provided from a source independent of the normal source of power

c. It is impractical to supply the normal source of power through arrangement 695.4(B)(1), 695.4(B)(2), 695.4(B)(3) or ~~695.4(B)(4)~~ 695.4(B)(5)

d. The arrangement is acceptable to the authority having jurisdiction.

e. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).

(5) A dedicated transformer connection directly from the service meeting the requirements of Article 695.6.

(C) Connections. For fire pump installations using the arrangement of 695.4(B)(1), 695.4(B)(2), 695.4(B)(3), 695.4(B)(5) for the normal source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller.

(D) Disconnecting Means. Where the disconnecting means permitted by ~~695.4(A)~~ 695.4(C) is installed, the disconnecting means shall meet all of the following:

(1) Identified as being suitable for use as service equipment.

(2) Lockable in the closed position.

(3) Located remote from other building disconnecting means.

FPN: ~~The disconnecting means should be located such that inadvertent simultaneous operation is not likely.~~ This is to avoid the inadvertent simultaneous operation of the building and fire pump disconnect switches.

(4) Located remote from other fire pump source disconnecting means.

FPN: ~~The disconnecting means should be located such that inadvertent simultaneous operation is not likely.~~ This is to avoid the inadvertent simultaneous operation of the disconnect switches of other fire pumps.

(5) Marked "Fire Pump Disconnecting Means" in letters that are no less than one inch (25 mm) in height and that can be seen without opening enclosure doors or covers.

(E) Placard. Where the disconnecting means permitted by 695.4(C) is installed, a placard shall be placed adjacent to the fire pump controller stating the location of this disconnection means and the location of any key needed to unlock the disconnect.

(F) Supervision. Where the disconnecting means permitted by 695.4(C) is installed, the disconnect shall be supervised in the closed position by one of the following methods:

(1) Central station, proprietary or remote station signal device

(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended location

(3) Locking the disconnecting means in the closed position

(4) Sealing of disconnecting means and approved weekly recorded inspections where the disconnecting means are located within fenced enclosures or in buildings under the control of the owner

(G) Overcurrent Protection Where the overcurrent protection permitted by 695.4(C) is installed, the overcurrent protection device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment. The next standard overcurrent device shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).

695.5 Alternate Power.

(A) When Required. Except for an arrangement described in 695.5(C), at least one alternate source of power shall be provided when the height of the structure is beyond the pumping capacity of the fire department <u>or when required by the AHJ. The alternate source shall, as a minimum, comply with the requirements of this section.</u>

FPN: <u>Local codes and/or AHJ often require alternate power for certain occupancies, such as high rise buildings, places of assembly and etc. These alternate power sources are considered to be the Emergency Source of Power for a motor driven fire pump as opposed to the Normal Source of Power.</u>

(B) Unreliable Source. Except for an arrangement described in 695.5(C), at least one alternate source of power shall be provided where the normal source is not reliable.

FPN: ~~The conditions identified are conditions that would make the normal source of power be considered not reliable.~~ See Alternate Power. Other Sources in NFPA-20, *Standard for the Installation of Stationary Pumps for Fire Protection*, for specifics.

~~(1) NFPA 25 begins to require special undertakings (i.e., fire watches) when a water based fire protection system is taken out of service for longer than 4 hours. If the normal source power plant has been intentionally shut down for longer than 4 hours in the past, it is reasonable to require a back-up source of power.~~

~~(2) The standard does not require that the normal source of power is infallible. NFPA 20 does not intend to require a back-up source of power for every installation using an electric motor driven fire pump. Should the normal source of power fail due to a natural disaster (hurricane) or due to a problem with electric grid management (regional blackout), the fire protection system could be supplied through the fire department connection. However, if the power grid is known to have had problems in the past (i.e., switch failures or animals shorting a substation), it is reasonable to require a back-up source of power.~~

~~(3) Fire departments responding to an incident at the protected facility will not operate aerial apparatus near live overhead power lines, without exception. A back-up source of power is required in case this scenario occurs and the normal source of power must be shut off. Additionally, many utility providers will remove power to the protected facility by physically cutting the overhead conductors. If the normal source of power is provided by overhead conductors, which will not be identified, the utility provider could mistakenly cut the overhead conductor supplying the fire pump.~~

~~(4) Power disconnection and activated overcurrent protection should only occur in the fire pump controller. The provisions of 9.2.2 for the disconnect switch and overcurrent protection essentially require disconnection and overcurrent protection to occur in the fire pump controller. If unanticipated disconnect switches or overcurrent protection devices are installed in the normal source of power that do not meet the requirements of 9.2.2, the normal source of power must be considered not reliable and a back-up source of power is necessary.~~

(C) Back-up Pump. An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard.

<u>FPN: See NFPA-20 for requirements of engine driven or steam turbine fire pumps. In either case, operation of the pump is intended to be independent of the source of electrical power.</u>

(D) Alternate Source. When provided, the alternate source of power shall be supplied from one of the following sources:

(1) A generator installed in accordance with 695.9.

(2) One of the sources identified in 695.4(B)(1); 695.4(B)(2); 695.4(B)(3); or 695.4(B)(5) when the power is provided independent of the normal source of power.

(E) Overhead Lines. When provided, the alternate supply shall be arranged so that the power to the fire pump is not disrupted when overhead lines are de-energized for fire department operations.

695.6 Transformers. Where the service or system voltage is different from the utilization voltage of the fire pump motor, transformer(s) protected by disconnecting means and overcurrent protective devices shall be permitted to be installed between the system supply and the fire pump controller in accordance with 695.6(A) and (B), or (C). Only transformers covered in 695.6(C) shall be permitted to supply loads not directly associated with the fire pump system.

<u>FPN: This may apply to low voltage and medium voltage installations as well as when the service is high voltage.</u>

(A) Size. Where a transformer supplies an electric motor-driven fire pump, it shall be rated at a minimum of 125 percent of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the associated fire pump accessory equipment supplied by the transformer.

(B) Overcurrent Protection. The primary overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. Secondary overcurrent protection shall not be permitted. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).

(C) Feeder Source. Where a feeder source is provided in accordance with 695.4(B)(4), transformers supplying the fire pump system shall be permitted to supply other loads. All other loads shall be calculated in accordance with Article 220, including demand factors as applicable.

(1) Size. Transformers shall be rated at a minimum of 125 percent of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the remaining load supplied by the transformer.

(2) Overcurrent Protection. The transformer size, the feeder size, and the overcurrent protective device(s) shall be coordinated such that overcurrent protection is provided for the transformer in accordance with 450.3 and for the feeder in accordance with 215.3, and such that the overcurrent protective device(s) is selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s), the pressure maintenance pump motor(s), the full-load current of the associated fire pump accessory equipment, and 100 percent of the remaining loads supplied by the transformer. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).

695.7 Power Wiring. Power circuits and wiring methods shall comply with the requirements in 695.7(A) through (H), and as permitted in 230.90(A), Exception No. 4; 230.94, Exception No. 4; 230.95, Exception No. 2; 240.13; 230.208; 240.4(A); and 430.31.

(A) ~~Supply~~ <u>Supply</u> Conductors.

(1) Services and On-Site Power Production ~~Facility~~ <u>Facility</u>. Service conductors and conductors supplied by an on-site power production facility shall be physically routed outside a building(s) and shall be installed as service conductors in accordance with Part III and Part IV of Article 230. Where supply conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).

(2) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.4(B)(4), all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).

Exception to (A) (2): Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement for routing outside of the building(s) shall apply only to those conductors on the load side of that point automatic connection between sources.

(3) Supervised or On-Site Standby Generator Connections. Fire pump supply conductors on the load side of the final disconnecting means and ~~overcurent~~ <u>overcurrent</u> device(s) permitted by 695.4(C) or conductors that connect directly to an on-site generator shall comply with all of the following:

a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.

b. Associated Fire Pump Loads. The conductors shall supply only loads that are directly associated with the fire pump system.

c. Protection from Potential Damage. The conductors shall be protected to resist potential damage by fire, structural failure, or operational accident.

d. Inside a Building. When routed through a building, the conductors shall be installed using one of the following methods;

(1) Be encased in a minimum 50 mm (2 in.) of concrete

(2) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 2-hour and dedicated to the fire pump circuit(s).

(3) Be a listed electrical circuit protective system with a minimum 2-hour fire rating

FPN: UL guide information for electrical circuit protective systems (FHIT) contains information on proper installation requirements to maintain fire rating.

Exception to (3)(d): The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 1-hour fire separation or fire resistance rating, unless otherwise required by 700. 9(D) of this Code.

(B) Conductor Size.

(1) Fire Pump Motors and Other Equipment. Conductors supplying a fire pump motor(s), pressure maintenance pumps, and associated fire pump accessory equipment shall have a rating not less than 125 percent of the sum of the fire pump motor(s) and pressure maintenance motor(s) full-load current(s), and 100 percent of the associated fire pump accessory equipment.

(2) Fire Pump Motors Only. Conductors supplying only a fire pump motor shall have a minimum ampacity in accordance with 430.22 and shall comply with the voltage drop requirements in 695.8.

(C) Overload Protection. Power circuits shall not have automatic protection against overloads. Except for protection of transformer primaries provided in 695.6(C)(2), branch-circuit and feeder conductors shall be protected against short circuit only. Where a tap is made to supply a fire pump, the wiring shall be treated as service conductors in accordance with 230.6. The applicable distance and size restrictions in 240.21 shall not apply.

Exception No. 1: Conductors between storage batteries and the engine shall not require overcurrent protection or disconnecting means.

Exception No. 2: For on-site standby generator(s) rated to produce continuous current in excess of 225 percent of the full-load amperes of the fire pump motor, the conductors between the on-site generator(s) and the combination fire pump transfer switch controller or separately mounted transfer switch shall be installed in accordance with 695.7(A)(3)d.

The protection provided shall be in accordance with the short-circuit current rating of the combination fire pump transfer switch controller or separately mounted transfer switch.

(D) Pump Wiring. All wiring from the controllers to the pump motors shall be in rigid metal conduit, intermediate metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit Type LFNC-B, listed Type MC cable with an impervious covering, or Type MI cable.

(E) Junction Points. Where wire connectors are used in the fire pump circuit, the connectors shall be listed. A fire pump controller or fire pump power transfer switch, where provided, shall not be used as a junction box to supply other equipment, including a pressure maintenance (jockey) pump(s). A fire pump controller and fire pump power transfer switch, where provided, shall not serve any load other than the fire pump for which it is intended.

(F) Mechanical Protection. All wiring from engine controllers and batteries shall be protected against physical damage and shall be installed in accordance with the controller and engine manufacturer's instructions.

(G) Ground Fault Protection of Equipment. Ground fault protection of equipment shall not be permitted for fire pumps.

(H) Onsite Standby Generator Disconnecting Means. Where the power source is supplied by on-site generator(s), the supply conductors shall connect to a generator disconnecting means dedicated for the purpose of serving the fire pump. The disconnecting means shall be located in a separate enclosure from other generator disconnecting means.

695.8 Voltage Drop.

(A) Starting Voltage Drop. The voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor starting conditions.

(B) Mechanical Operator. The requirements of 695.8(A) shall not apply to emergency- run mechanical starting.

(C) Running Voltage Drop. The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.

695.9 On-Site Standby Generator Systems.

(A) Capacity.

(1) Where on-site generator systems are used to supply power to fire pump motors to meet the requirements of 695.5(B), they shall be of sufficient capacity to allow normal starting and rung of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s) while meeting the requirements of 695.8

(2) A tap ahead of the on-site generator disconnecting means shall not be required.

(B) Power Sources.

~~(1)~~ These power sources shall comply with 695.8 and shall meet the requirements of Level 1, Type 10 emergency power systems. ~~, Class X systems of NFPA 110, Standard for Emergency and Standby Power Systems.~~

~~(2) The fuel supply capacity shall be sufficient to provide 8 hours of fire pump operation at 100 percent of the rated pump capacity in addition to the supply required for other demands.~~

FPN: Type 10 systems are required to make emergency power available in 10 or less seconds. See NFPA -110 *Standard for Emergency and Standby Power Systems* for definition of Level 1 Emergency Power System. See NFPA-20 for fuel capacity requirements.

(C) Sequencing. Automatic sequencing of the fire pumps shall be permitted as a means of meeting the voltage drop requirements of 695.8.

(D) Transfer of Power. Transfer of power to the fire pump controller between the normal supply and one alternate supply shall take place within the pump room.

(E) Protective Devices. Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump room load (See NFPA 20, 9.6.5)

FPN: This is to prevent any Generator Protective Devices from tripping when the fire pump load is transferred to the generator. The subject protective device(s), where used, need to be sized to allow the The generator to allow will instantaneous pickup of the full pump room load. ~~This includes~~ , including the staring any and all connected fire pumps in the across-the-line (direct on line) full voltage staring mode. This is always the case when the fire pump(s) is running by use of the Emergency Mechanical Operator of the fire pump controller(s). (See NFPA-20 9.6, On-Site Standby Generator Systems.). ~~(Not applicable here. (Emergency Run Mechanical Control at Controller).~~

695.10 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.

(A) Mounting. The junction box shall be securely mounted.

(B) Controller Enclosure Integrity. Mounting and installing of a junction box shall not violate the enclosure type (NEMA) rating of the fire pump controller(s).

(C) Controller Short Circuit Rating Integrity. Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the short-circuit rating of the controller(s).

(D) Type Rating. As a minimum, a ~~*National Electrical Manufacturer's Association*~~ (NEMA) Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed for the subject to match the fire pump controller enclosure Type rating.

(E) Terminals. Terminals, junction blocks, splices, and the like, when used, shall be listed.

695.11 Listed Electrical Circuit Protective System to Controller Wiring.

(A) Single Conductors. Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with this code.

FPN: This is to avoid ~~Cutting slots or rectangular cutouts in a fire pump controller will violate the manufacturer's~~ violating the enclosure type rating, ~~and~~ and/or the ~~controller's~~ controller short-circuit (withstand) rating ~~and will void the manufacturer's warrantee.~~ See also 300.20 and Article 322.

(B) Single conductors (individual conductors) shall not enter the fire pump enclosure separately.

(C) Smoke Seal. Where required by the listing of the electrical circuit protective system, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer or listing agency.

FPN When so required, this seal is to prevent flammable gases from entering into the fire pump controller.

(D) Standard wiring between junction box and controller is acceptable.

695.12 Raceway Terminations.

(A) Hubs. Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.

(B) Type Rating. The NEMA Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.

(C) Installation. The installation instructions of the manufacturer of the fire pump controller shall be followed.

(D) Controller Alterations. No alterations to the fire pump controller, other than conduit entry as allowed by this code, shall be made without the approval of ~~approved by~~ the authority having jurisdiction.

695.13 Listed Equipment. Diesel engine fire pump controllers, electric fire pump controllers, electric motors, fire pump power transfer switches, foam pump controllers, and limited service controllers shall be listed for fire pump service. [NFPA 20:9.5.1.1, 10.1.2.1, 12.1.3.1]

695.14 Equipment Location.

(A) Controllers and Transfer Switches. Electric motor-driven fire pump controllers and power transfer switches shall be located as close as practicable to, and within sight of, the motors that they control.

(B) Engine-Drive Controllers. Engine-drive fire pump controllers shall be located as close as is practical to, and within sight of, the engines that they control.

(C) Storage Batteries. Storage batteries for fire pump engine drives shall be supported above the floor, secured against displacement, and located where they are not subject to physical damage, flooding with water, excessive temperature, or excessive vibration.

(D) Energized Equipment. All energized equipment parts shall be located at least 300 mm (12 in.) above the floor level.

(E) Protection Against Pump Water. Fire pump controllers and power transfer switches shall be located or protected so that they are not damaged by water escaping from pumps or pump connections.

(F) Mounting. All fire pump control equipment shall be mounted in a substantial manner on noncombustible supporting structures.

695.15 Control Wiring.

(A) Control Circuit Failures. External control circuits that extend outside the fire pump room shall be arranged so that failure of any external circuit (open or short circuit) shall not prevent the operation of a pump(s) from all other internal or external means. Breakage, disconnecting, shorting of the wires, or loss of power to these circuits could cause continuous running of the fire pump but shall not prevent the controller(s) from starting the fire pump(s) due to causes other than these external control circuits. All control conductors within the fire pump room that are not fault tolerant shall be protected against physical damage. [NFPA 20:10.5.2.6, 12.5.2.5]

(B) Sensor Functioning. No undervoltage, phase-loss, frequency-sensitive, or other sensor(s) shall be installed that automatically or manually prohibit actuation of the motor contactor. [NFPA 20:10.4.5.6]

Exception: A phase loss sensor(s) shall be permitted only as a part of a listed fire pump controller.

(C) Remote Device(s). No remote device(s) shall be installed that will prevent automatic operation of the transfer switch. [NFPA 20:10.8.1.3]

(D) Engine-Drive Control Wiring. All wiring between the controller and the diesel engine shall be stranded and sized to continuously carry the charging or control currents as required by the controller manufacturer. Such wiring shall be protected against physical damage. Controller manufacturer's specifications for distance and wire size shall be followed. [NFPA 20:12.3.5.1]

(E) Electric Fire Pump Control Wiring Methods. All electric motor-driven fire pump control wiring shall be in rigid metal conduit, intermediate metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit Type B (LFNC-B), listed Type MC cable with an impervious covering, or Type MI cable.

(F) Generator Control Wiring Methods. Control conductors installed between the fire pump power transfer switch and the standby generator supplying the fire pump during normal power loss shall be kept entirely independent of all other wiring. They shall be protected to resist potential damage by fire or structural failure. They shall be permitted to be routed through a building(s) encased in 50 mm (2 in.) of concrete or within enclosed construction dedicated to the fire pump circuits and having a minimum 1-hour fire resistance rating, or circuit protective systems with a minimum of 1-hour fire resistance. The installation shall comply with any restrictions provided in the listing of the electrical circuit protective system used.

Substantiation: The recommended text is based upon the TCC write-up in the A2007 ROP.

Revisions are also per the NEMA Explanation of Negative Vote Comments printed in the NEC ROP.

Revisions are also per R. Swayne's Explanation as follows:

Revisions to the ROP Version of

Article 695 for the
2008 Edition of NFPA-70

ARTICLE 695 Fire Pumps

Responses to Explanations of Negative Vote Comments

NEMA C & S Rejection Text:

NASBY, J.: NEMA disagrees with the rewrite outlined in this proposal. The arrangement of the material introduces new confusion to an Article that was already not clear in its intent. In addition, the revision adds material that is in NFPA 20 and should remain in NFPA 20. The responsibility of the NEC is for the installation requirements for the fire pump. Design requirements related to performance should not be moved to the NEC. An example of this problem is in proposed 695.5(A) to require an alternate source when the pumping capacity is beyond that of fire department apparatus. This is not an installation requirement, but is information that should remain in NFPA 20 only. – Text of 695.5(A) revised. Also, Fine Print Note (FPN) added to 695.5(A) and 695.5(C). Also corrected some missed spelling and typo. errors.

In addition, the revisions add a number of Fine Print Notes that are unacceptable and in violation of the NEC Style Manual. Examples of these notes include:

1. 695.4(D)(3) FPN – Contains a recommendation -- Done.
2. 695.4(D)(4) FPN – Contains a recommendation -- Done.
3. 695.5(B) FPN – Contains recommendations as well as an attempted interpretation of the requirement --Done .
4. 695.9(E) FPN – contains recommendations -- Done.
5. 695.11(E) FPN – deals with warranty issues and is inappropriate in the NEC and in a FPN -- Done.

Other technical issues include (but are not limited to):

1. 695.6(I) – does not recognize installations where large generator sets are paralleled and supply switchboards or switchgear that then serves the various connected loads. -- There is no clause "695.6(I)".
2. 695.4(C) – limits the installation to one disconnect between the source and the controller. Should a transfer switch be installed ahead of the controller, another disconnect would not be permitted. This is contrary to typical installation where a remote disconnect is applied at the normal source of supply and then supplies the transfer switch. – Correct. Only a single disconnect and OCPD is allowed ahead of the Normal Source and the fire pump controller. This is illustrated in NFPA-20 FIGURE A.9.3.2 "Typical Power Supply Arrangements from Source to Motor" "Arrangement B" and in FIGURE A.10.8 "Typical Fire Pump Controller and Transfer Switch Arrangements" "ARRANGEMENT II". A single disconnect (with or without OCPD) is allowed ahead of an upstream transfer switch.
3. 695.4(D) – it would appear that the requirement to not locate the disconnecting means in with other equipment has been lost in the revision without any substantiation. – Noted. The only four connections allowed are (#1) Direct Connection via: Dedicated Service (695.4(B)(1), On-Site Power Plant (695.4(B)(2), Dedicated Fire Pump Feeder (695.4(B)(3)); #2 Campus style feeder (695.4(B)(4); #3 Supervised Connection (695.4(D)); and Transformer Connection (695.4(B)(5)). Made editorial correction to incorrect reference to 695.4(A) which should be 695.4(C). Done.
4. 695.4(B)(4)(e) – the requirement for selective coordination creates significant technical concern. It may be impossible to design a system where the overcurrent protection for the fire pump circuit (size very large to carry locked rotor current) could be selectively coordinated with an upstream device that is part of the normal distribution system protection. It may also end up causing the other parts of the distribution system equipment to be oversized to simply accomplish the selectivity requirement. This is not justified or substantiated and decreases safety because of the increase in arc flash hazard. This is part of the requirements for multi-building campus style connection where allowed. Fire pump equipment is considered expendable while fighting a fire. The equipment is designed to and intended to run to destruction. No other loads are allowed to pose a hazard to the power supply for a fire pump or pumps. Arc-flash protection is part of NFPA-70E. Fire pump controllers very often have high short circuit current rating with 100,000 Amp Symmetrical be the most common. This is due to their use in large buildings or facilities. **[Thru buildings clause missing?]**

Other requirements that are inappropriate for the NEC include:

1. 695.9(A)(1) – a direct mandatory reference to NFPA 110, which is prohibited by the NEC Style Manual -- Done. Moved reference to new FPN.
2. 695.9(B)(2) – requirements for fuel supply capacity for a generator which is not an NEC installation issue – Done. Deleted. Moved reference to NFPA-20 to new FPN.
3. 695.10(D) – A mandatory reference to NEMA Type 2 – which is reference to another standard that is prohibited by the NEC Style Manual. – Done. Moved to new FPN.
4. 695.12(D) – is in conflict with the provisions of 90.4 – Done. Wording was incorrect.
5. 5.695.3(C) – this material is redundant with 90.3 – Clause isn't redundant with 90.3. This clause is for inspection and enforcement agencies to prevent installation materials and equipment not complying with this standard. This is important for both low voltage and medium voltage installations since auxiliary and ancillary equipment is often installed in the power path or signal paths. Said equipment varies widely.

The complete concept of this revision needs to be addressed in the comment phase with the objective of keeping Article 695 limited to installation requirements necessary for the application of the NEC. – Done.

Swane Rejection Text:

SWAYNE, R.: This proposal should be rejected for many reasons. NFPA 20 has its place and Article 695 has its place, the two should not become one. The Scope of Article 695 covers the installation of power sources and interconnecting units and the installation of switching and control equipment dedicated to fire pump drives. It does not cover performance, maintenance, and testing of the fire pump system. The Scope of NFPA 20 covers minimum performance and testing requirements of the sources and transmission of electric power to motors driving fire pumps. The two scopes are not the same and each is necessary. – Noted. Note that these installations are usually reviewed by at least two plan approval agencies and two inspection groups, namely electrical and fire prevention. This section (695) has carried the power supply extracted text from NFPA-20 since the NFPA-70 (NEC) has wider circulation than NFPA-20, the extracted text helps prevent rejections and delays and unreliable installations. The wholesale replacement of one standard by another will leave electricians and Authorities Having Jurisdiction without the guidance necessary to provide safe installations of fire pumps. If it is felt that Article 695 is lacking in some of the requirements that NFPA 20 indicates as being important, then a paragraph by paragraph review should be performed. In this way, there will not be any danger in deleting any of the safe practices that exist today. – Also noted. This is the purpose of Article 695. The purpose is not to replicate NFPA-20; but, to carry over only those clauses pertinent to plan approval agencies, installers, and inspectors.

As examples of where the proposed action is deficient:

1) Section 695.3(G) prohibits phase converters which was not accepted by NFPA 20 as documented in the substantiation to Proposal 13-81. See Negative Comment on Proposal 13-81. – See the somewhat confusing history of this topic in NFPA-20 copied below. At this time, Phase Converters are not allowed by the NFPA-20 Technical Committee.

20-71 Log #59 **Final Action: Reject**
(9.2.1.1)

SUBMITTER: Kevin J. Kelly, National Fire Sprinkler Association

RECOMMENDATION: State whether or not phase converters are allowed where a 3-phase motor is being used for the fire pump, but three-phase electricity isn't available.

SUBSTANTIATION: The users of NFPA 20 need guidance on whether or not the use of phase converters constitutes "a reliable source" of power. The situation occurs frequently where three-phase power is not available. How is this problem intended to be addressed?

Is there a need to list phase converters for fire pump service? Is there a need to regulate how phase reversal will be monitored and annunciated?

Users of the standard need answers to these questions.

COMMITTEE MEETING ACTION: Reject

COMMITTEE STATEMENT: Performance of this equipment is not suitable for this service.

NUMBER ELIGIBLE TO VOTE: 27

BALLOT RESULTS: Affirmative: 24 Negative: 1

BALLOT NOT RETURNED: 2 LEICHT, MEZSICK

EXPLANATION OF NEGATIVE:

HAAGENSEN: If the Committee strongly considers that phase converters are not suitable for this purpose, then the provisions of NFPA 20 should clearly state that sentiment.

20- 8 Log #38 **Final Action: Accept in Principle**
(9.2.1)

Submitter: Jon Nisja, Northcentral Regional Fire Code Development Committee
Comment on Proposal No: 20-71
Recommendation: Add a new section to read:
9.2.x Phase converters shall not be permitted to be used for fire pump service.
Substantiation: Based on the committee statement to the proposal and the negative comment of Mr. Haagensen we have submitted a comment to include the prohibition of the converters to clarify the issue.
Committee Meeting Action: Accept in Principle
See Committee Action and Statement on 20-42 (Log #37).
Committee Statement: See Committee Action and Statement on 20-42 (Log #37).
Number Eligible to Vote: 27
Ballot Results: Affirmative: 26
Ballot Not Returned: Mezsick, S.

20-42 Log #37 **Final Action: Accept**
(A.9.2.1.1)

Submitter: Kenneth E. Isman, National Fire Sprinkler Association
Comment on Proposal No: 20-71
Recommendation: Add an annex note to 9.2. . as follows:
A.9.2 Phase converters that take single phase power and convert it to three phase power for the use of fire pump motors are not recommended because of the imbalance in the voltage between the phases when there is no load on the equipment. If the power utility installs a phase converters in their own power transmission lines, such phase converters are outside the scope of this standard and need to be evaluated by the AHJ to determine the reliability of the electric supply.
Substantiation: This was our understanding from the discussion at the ROP meeting as to the reason for the rejection of our proposal. If this information is true, it should be recorded in the annex.
Committee Meeting Action: Accept
Number Eligible to Vote: 27
Ballot Results: Affirmative: 26
Ballot Not Returned: Mezsick, S.

2) Section 695.4(B)(4)(c) refers to itself as being impractical. – Done. Clause corrected. This is a numbering error carried forward.

3) Section 695.4(B)(5) refers to "service" whereas the facility does not have to be a campus to have a primary service with a low voltage supply feeding the building or structure. – Although place last, this clause, 695.4(B)(5) does not relate to the campus style method of 695.4(B)(4). It also applies service at low voltage, medium voltage or high voltage. For example: 480 Vac to 208 Vac, 7,000 Vac to 480 Vac or 13.8 KVac to 240 Vac.

4) Section 695.4(F)(4) refers to weekly recorded inspections which are proper for NFPA 20, but not for NFPA 70 which is an installation code. – Although periodic inspections and maintenance are generally covered in NFPA-25 for sprinkler systems, this clause is separate and does not fall in the realm of normal inspection of fire pumps or sprinkler systems. It applies directly to the assurance of power being available for the fire pump. This is important to plan approval agencies, installers and inspectors to know of this provision along with the other electrical requirements so that provisions can be made.

5) Section 695.5(A) is a new requirement that may be enforced by the Fire Marshal, but not by the electrical AHJ. Noted. Clause revised.

6) Section 695.5(B) requires an alternate source when the normal source is not reliable without defining "reliable". "Reliable" is not defined in Article 100 and the attempt to define it by the unenforceable FPN is confusing. Noted. Clause modified.

7) Section 695.5(B), FPN No. 4 refers to conditions that are not permitted. This may signal the installer that it may not be permitted, but you can do it anyway if you provide an alternate source. This sends the wrong signal. Noted. FPN deleted.

8) Editorially, "when" should be replaced by "where" in several locations to meet the Style Manual – Noted. I'm asking for direction from NFPA staff I'm trying to minimize differences in extracted text compared to the source document.

9) It is not apparent what is included in Section 695.7(A) and what is in Section 695.7(B). – Corrected spelling error and missing text in title of 695.7 and sub-clause (A). Proposed 695.7 [Power Wiring] (A) [Supply Conductors] is essentially similar to extant [2005] 695.6 [Power Wiring] sub-clauses (A) [Service Conductors] and (B) [Circuit Conductors]. 695.7(B) [Conductor Sizes] is essentially similar to extant 695.6(C) [Conductor Size].

10) Section 695.7(A)(B)(3) refers to load side of the "service" disconnecting means. A multi-building campus or a facility with a primary service generally does not have a "service" to each of its buildings. – Acknowledge. The term "service" here means the campus service equipment, such as double ended switchgear (main-tie-main). A FPN may be in order to help clarify since the campus distribution, while typically medium voltage, is also typically down stream of transformers, and where the primary side, the secondary side, or both may be arranged as double ended.

11) Section 695.7(A)(B)(3) refers to disconnecting means and overcurrent devices permitted by Section 695.4(B). Section 695.4(B) does not cover these items. Correct. Corrected reference to read "695.4(C)".

This proposal is premature and should be rejected. The Proposer should come back with a detailed comparison for consideration. Noted. Revisions made accordingly with appreciation for these observations and corrections.

Panel Meeting Action: Reject
Panel Statement: The panel has looked at this proposed revision of Article 695 as a collective body of work and determined that there are too many correlation, style, and technical issues that cannot be resolved within the time frame of the ROP meeting. This proposal is similar in nature to Proposal 13-77 for the 2008 NEC, which also proved too cumbersome for the panel to act on and ensure proper technical correlation with NFPA 20. To that end, CMP-13 has acted on Proposals 13-60a, 13-77a, and 13-95a to provide correlation between important sections of NFPA 20 and Article 695. These actions are based on the recommended changes for the 2010 edition of NFPA 20 as accepted by the NFPA 20 technical committee in their ROP and ROC actions.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-48 Log #71 NEC-P13 **Final Action: Accept**
(695)

Note: This Proposal appeared as Comment 13-105 on Proposal 13-77 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-77 was:
Revise extracted text from NFPA 20 to reflect 2006 edition revisions. Following is the NFPA 20 - Chapter 9 text as it has been voted on by the NFPA 20 Committee to date.
NFPA 20 - DRAFT
Chapter 9 Electric Drive for Pumps
9.1 General.
9.1.1 This chapter covers the minimum performance and testing requirements of the sources and transmission of electrical power to motors driving fire pumps.
9.1.2 Also covered are the minimum performance requirements of all intermediate equipment between the source(s) and the pump, including the motor(s) but excepting the electric fire pump controller, transfer switch, and accessories (see Chapter 10).
9.1.3 All electrical equipment and installation methods shall comply with NFPA 70, National Electrical Code, Article 695, and other applicable articles.
9.1.4* All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.
9.1.5 All power supplies shall have the capacity to run the fire pump on a continuous basis.
9.1.6 All power supplies shall comply with the voltage drop requirements of Section 9.7.
9.2 Normal Power.
9.2.1 An electric motor driven fire pump shall be provided with a normal source of power as a continually available source.
9.2.2 The normal source of power required in 9.2.1 and its routing shall be arranged in accordance with one of the following:
(1) Service connection dedicated to the fire pump installation.
(2) On-site power production facility connection dedicated to the fire pump installation.
(3) A dedicated feeder connection derived directly from the dedicated service to the fire pump installation.

(4) As a feeder connection where all of the following conditions are met:
a. The protected facility is part of a multi-building campus style arrangement.
b. A back-up source of power is provided from a source independent of the normal source of power.
c. It is impractical to supply the normal source of power through arrangement 9.2.2(1), 9.2.2(2), 9.2.2(3) or 9.2.2(5).
d. The arrangement is acceptable to the authority having jurisdiction.
e. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).
(5) A dedicated transformer connection directly from the service meeting the requirements of Article 695 of NFPA 70.
9.2.3 For fire pump installations using the arrangement of 9.2.2(1), 9.2.2(2),9.2.2(3), 9.2.2(5) for the normal source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller.
9.2.3.1 Where the disconnecting means permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following:
(1) Identified as being suitable for use as service equipment.
(2) Lockable in the closed position.
(3) * Located remote from other building disconnecting means.
(4) * Located remote from other fire pump source disconnecting means.
(5) Marked "Fire Pump Disconnecting Means" in letters that are no less than one inch (25 mm) in height and that can be seen without opening enclosure doors or covers.
9.2.3.2 Where the disconnecting means permitted by 9.2.3 is installed, a placard shall be placed adjacent to the fire pump controller stating the location of this disconnection means and the location of any key needed to unlock the disconnect.
9.2.3.3 Where the disconnecting means permitted by 9.2.3 is installed, the disconnect shall be supervised in the closed position by one of the following methods:
(1) Central station, proprietary or remote station signal device
(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended location
(3) Locking the disconnecting means in the closed position
(4) Sealing of disconnecting means and approved weekly recorded inspections where the disconnecting means are located within fenced enclosures or in buildings under the control of the owner
9.2.3.4 Where the overcurrent protection permitted by 9.2.3 is installed, the overcurrent protection device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment.
9.3 Alternate power.
9.3.1 Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided when the height of the structure is beyond the pumping capacity of the fire department apparatus.
9.3.2* Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided where the normal source is not reliable.
9.3.3 An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard.
9.3.4 When provided, the alternate source of power shall be supplied from one of the following sources:
(1) A generator installed in accordance with Section 9.8.
(2) One of the sources identified in 9.2.2(1); 9.2.2(2); 9.2.2(3); or 9.2.2(5) when the power is provided independent of the normal source of power.
9.3.5 When provided, the alternate supply shall be arranged so that the power to the fire pump is not disrupted when overhead lines are de-energized for fire department operations.
9.4 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.
9.4.1 The junction box shall be securely mounted.
9.4.2* Mounting and installing of a junction box shall not violate the enclosure Type (NEMA) rating of the fire pump controller(s).
9.4.3* Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the Short Circuit Rating of the controller(s).
9.4.4 As a minimum, a National Electrical Manufacturers Association (NEMA) Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed f or the subject to match the fire pump controller enclosure Type rating.
9.4.5 Terminals, junction blocks, splices, and the like, when used, shall be listed.
9.5* Listed Electrical Circuit Protective System to Controller Wiring.
9.5.1* Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with NFPA 70.
9.5.2 Single (individual conductors) shall not enter the fire pump enclosure separately.
9.5.3* Where required by the manufacturer of a listed Electrical Circuit Protective System or by NFPA 70 or by the Listing agency, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer or listing agency.
9.5.4 Standard wiring between junction box and controller is acceptable.
9.6* Raceway Terminations.
9.6.1 Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.
9.6.2 The NEMA Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.
9.6.3 The installation instructions of the manufacturer of the fire pump controller shall be followed.
9.6.4 No alterations to the fire pump controller, other than conduit entry as allowed by NFPA 70, shall be approved by the authority having jurisdiction.
9.7* Voltage Drop.
9.7.1 Unless the requirements of 9.4.2 are met, the voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor-starting conditions.
9.7.2 The requirements of 9.7.1 shall not apply to emergency run mechanical starting. (See 10.5.3.2.)
9.7.3 The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.
9.8 Motors.
9.8.1 General.
9.8.1.1 All motors shall comply with NEMA MG-1, Motors and Generators, shall be marked as complying with NEMADesign B standards, and shall be specifically listed for fire pump service. (See Table 9.8.1.1.)
Table 9.8.1.1 Horsepower and Locked Rotor Current Motor Designation for NEMA Design B Motors
9.8.1.2 The requirements of 9.8.1.1 shall not apply to direct-current, high-voltage (over 600 V), large-horsepower [over 373 kW (500 hp)], single-phase, universal-type, or wound-rotor motors, which shall be permitted to be used where approved.
9.8.1.3 Motors used with variable speed controllers shall additionally meet the applicable requirements of NEMA MG1, Part 31 and shall be marked for inverter duty.
9.8.1.4* The corresponding values of locked rotor current for motors rated at other voltages shall be determined by multiplying the values shown by the ratio of 460 V to the rated voltage in Table 9.8.1.1.
9.8.1.5 Code letters of motors for all other voltages shall conform with those shown for 460 V in Table 9.8.1.1.
9.8.1.6 All motors shall be rated for continuous duty.
9.8.1.7 Electric motor–induced transients shall be coordinated with the provisions of 10.4.3.3 to prevent nuisance tripping of motor controller protective devices.
9.8.1.8 Motors for Vertical Shaft Turbine–Type Pumps.
9.8.1.8.1 Motors for vertical shaft turbine–type pumps shall be dripproof, squirrel-cage induction type.
9.8.1.8.2 The motor shall be equipped with a nonreverse ratchet.
9.8.2 Current Limits.
9.8.2.1 The motor capacity in horsepower shall be such that the maximum motor current in any phase under any condition of pump load and voltage unbalance shall not exceed the motor-rated full-load current multiplied by the service factor.
9.8.2.2 Where the motor is used with a variable speed pressure limiting controller, the service factor shall not be used.
9.8.2.3 The maximum service factor at which a motor shall be used is 1.15.
9.8.2.4 These service factors shall be in accordance with NEMA MG-1, Motors and Generators.
9.8.2.5 General-purpose (open and dripproof) motors, totally enclosed fan-cooled (TEFC) motors, and totally enclosed nonventilated (TENV) motors shall not have a service factor larger than 1.15.
9.8.2.6 Motors used at altitudes above 1000 m (3300 ft) shall be operated or derated according to NEMA MG-1, Motors and Generators, Part 14.
9.8.3 Marking.
9.8.3.1 Marking of motor terminals shall be in accordance with NEMA MG-1, Motors and Generators, Part 2.
9.8.3.2 A motor terminal connecting diagram for multiple lead motors shall be furnished by the motor manufacturer.
9.9 On-Site Standby Generator Systems.
9.9.1 Capacity.
9.9.1.1 Where on-site generator systems are used to supply power to fire pump motors to meet the requirements of 9.3.2, they shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s) while meeting the requirements of Section 9.7.
9.9.1.2 A tap ahead of the on-site generator disconnecting means shall not be required.
9.9.2* Power Sources.

9.9.2.1 These power sources shall comply with Section 9.7 and shall meet the requirements of Level 1, Type 10, Class X systems of NFPA 110, Standard for Emergency and Standby Power Systems.

9.9.2.2 The fuel supply capacity shall be sufficient to provide 8 hours of fire pump operation at 100 percent of the rated pump capacity in addition to the supply required for other demands.

9.9.3 Sequencing. Automatic sequencing of the fire pumps shall be permitted in accordance with 10.5.2.5.

9.9.4 Transfer of Power. Transfer of power to the fire pump controller between the normal supply and one alternate supply shall take place within the pump room.

9.9.5* Protective Devices. Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump.

Submitter: Jim Pauley, Square D Company

Recommendation: This Proposal should remain Rejected.

Substantiation: The TCC was correct to return this proposal back to the panel. It has so many problems introduced by the revision that the panel should not try to salvage any type of significant rewrite during the comment phase. The panel should revisit the individual proposals for Article 695 and review each one based on its merit for inclusion in Article 695. The revision proposed by Proposal 13-77 is completely unacceptable for the NEC.

Panel Meeting Action: Accept

Panel Statement: See the panel action and statement on Proposal 13-47.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-49 Log #72 NEC-P13 **Final Action: Accept**
(695)

Note: This Proposal appeared as Comment 13-107 on Proposal 13-77 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-77 was:

Revise extracted text from NFPA 20 to reflect 2006 edition revisions. Following is the NFPA 20 - Chapter 9 text as it has been voted on by the NFPA 20 Committee to date.

NFPA 20 - DRAFT

Chapter 9 Electric Drive for Pumps

9.1 General.

9.1.1 This chapter covers the minimum performance and testing requirements of the sources and transmission of electrical power to motors driving fire pumps.

9.1.2 Also covered are the minimum performance requirements of all intermediate equipment between the source(s) and the pump, including the motor(s) but excepting the electric fire pump controller, transfer switch, and accessories (see Chapter 10).

9.1.3 All electrical equipment and installation methods shall comply with NFPA 70, National Electrical Code, Article 695, and other applicable articles.

9.1.4* All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.

9.1.5 All power supplies shall have the capacity to run the fire pump on a continuous basis.

9.1.6 All power supplies shall comply with the voltage drop requirements of Section 9.7.

9.2 Normal Power.

9.2.1 An electric motor driven fire pump shall be provided with a normal source of power as a continually available source.

9.2.2 The normal source of power required in 9.2.1 and its routing shall be arranged in accordance with one of the following:

(1) Service connection dedicated to the fire pump installation.

(2) On-site power production facility connection dedicated to the fire pump installation.

(3) A dedicated feeder connection derived directly from the dedicated service to the fire pump installation.

(4) As a feeder connection where all of the following conditions are met:

a. The protected facility is part of a multi-building campus style arrangement.

b. A back-up source of power is provided from a source independent of the normal source of power.

c. It is impractical to supply the normal source of power through arrangement 9.2.2(1), 9.2.2(2), 9.2.2(3) or 9.2.2(5).

d. The arrangement is acceptable to the authority having jurisdiction.

e. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).

(5) A dedicated transformer connection directly from the service meeting the requirements of Article 695 of NFPA 70.

9.2.3 For fire pump installations using the arrangement of 9.2.2(1), 9.2.2(2),9.2.2(3), 9.2.2(5) for the normal source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller.

9.2.3.1 Where the disconnecting means permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following:

(1) Identified as being suitable for use as service equipment.

(2) Lockable in the closed position.

(3) * Located remote from other building disconnecting means.

(4) * Located remote from other fire pump source disconnecting means.

(5) Marked "Fire Pump Disconnecting Means" in letters that are no less than one inch (25 mm) in height and that can be seen without opening enclosure doors or covers.

9.2.3.2 Where the disconnecting means permitted by 9.2.3 is installed, a placard shall be placed adjacent to the fire pump controller stating the location of this disconnection means and the location of any key needed to unlock the disconnect.

9.2.3.3 Where the disconnecting means permitted by 9.2.3 is installed, the disconnect shall be supervised in the closed position by one of the following methods:

(1) Central station, proprietary or remote station signal device

(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended location

(3) Locking the disconnecting means in the closed position

(4) Sealing of disconnecting means and approved weekly recorded inspections where the disconnecting means are located within fenced enclosures or in buildings under the control of the owner

9.2.3.4 Where the overcurrent protection permitted by 9.2.3 is installed, the overcurrent protection device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment.

9.3 Alternate power.

9.3.1 Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided when the height of the structure is beyond the pumping capacity of the fire department apparatus.

9.3.2* Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided where the normal source is not reliable.

9.3.3 An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard.

9.3.4 When provided, the alternate source of power shall be supplied from one of the following sources:

(1) A generator installed in accordance with Section 9.8.

(2) One of the sources identified in 9.2.2(1); 9.2.2(2); 9.2.2(3); or 9.2.2(5) when the power is provided independent of the normal source of power.

9.3.5 When provided, the alternate supply shall be arranged so that the power to the fire pump is not disrupted when overhead lines are de-energized for fire department operations.

9.4 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.

9.4.1 The junction box shall be securely mounted.

9.4.2* Mounting and installing of a junction box shall not violate the enclosure Type (NEMA) rating of the fire pump controller(s).

9.4.3* Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the Short Circuit Rating of the controller(s).

9.4.4 As a minimum, a National Electrical Manufacturers Association (NEMA) Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed f or the subject to match the fire pump controller enclosure Type rating.

9.4.5 Terminals, junction blocks, splices, and the like, when used, shall be listed.

9.5* Listed Electrical Circuit Protective System to Controller Wiring.

9.5.1* Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with NFPA 70.

9.5.2 Single (individual conductors) shall not enter the fire pump enclosure separately.

9.5.3* Where required by the manufacturer of a listed Electrical Circuit Protective System or by NFPA 70 or by the Listing agency, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer or listing agency.

9.5.4 Standard wiring between junction box and controller is acceptable.

9.6* Raceway Terminations.

9.6.1 Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.

9.6.2 The NEMA Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.

9.6.3 The installation instructions of the manufacturer of the fire pump controller shall be followed.

9.6.4 No alterations to the fire pump controller, other than conduit entry as allowed by NFPA 70, shall be approved by the authority having jurisdiction.

9.7* Voltage Drop.

9.7.1 Unless the requirements of 9.4.2 are met, the voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor-starting conditions.

9.7.2 The requirements of 9.7.1 shall not apply to emergency run mechanical starting. (See 10.5.3.2.)

9.7.3 The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.

9.8 Motors.

9.8.1 General.

9.8.1.1 All motors shall comply with NEMA MG-1, Motors and Generators, shall be marked as complying with NEMADesign B standards, and shall be specifically listed for fire pump service. (See Table 9.8.1.1.)

Table 9.8.1.1 Horsepower and Locked Rotor Current Motor Designation for NEMA Design B Motors

9.8.1.2 The requirements of 9.8.1.1 shall not apply to direct-current, high-voltage (over 600 V), large-horsepower [over 373 kW (500 hp)], single-phase, universal-type, or wound-rotor motors, which shall be permitted to be used where approved.

9.8.1.3 Motors used with variable speed controllers shall additionally meet the applicable requirements of NEMA MG1, Part 31 and shall be marked for inverter duty.

9.8.1.4* The corresponding values of locked rotor current for motors rated at other voltages shall be determined by multiplying the values shown by the ratio of 460 V to the rated voltage in Table 9.8.1.1.

9.8.1.5 Code letters of motors for all other voltages shall conform with those shown for 460 V in Table 9.8.1.1.

9.8.1.6 All motors shall be rated for continuous duty.

9.8.1.7 Electric motor–induced transients shall be coordinated with the provisions of 10.4.3.3 to prevent nuisance tripping of motor controller protective devices.

9.8.1.8 Motors for Vertical Shaft Turbine–Type Pumps.

9.8.1.8.1 Motors for vertical shaft turbine–type pumps shall be dripproof, squirrel-cage induction type.

9.8.1.8.2 The motor shall be equipped with a nonreverse ratchet.

9.8.2 Current Limits.

9.8.2.1 The motor capacity in horsepower shall be such that the maximum motor current in any phase under any condition of pump load and voltage unbalance shall not exceed the motor-rated full-load current multiplied by the service factor.

9.8.2.2 Where the motor is used with a variable speed pressure limiting controller, the service factor shall not be used.

9.8.2.3 The maximum service factor at which a motor shall be used is 1.15.

9.8.2.4 These service factors shall be in accordance with NEMA MG-1, Motors and Generators.

9.8.2.5 General-purpose (open and dripproof) motors, totally enclosed fan-cooled (TEFC) motors, and totally enclosed nonventilated (TENV) motors shall not have a service factor larger than 1.15.

9.8.2.6 Motors used at altitudes above 1000 m (3300 ft) shall be operated or derated according to NEMA MG-1, Motors and Generators, Part 14.

9.8.3 Marking.

9.8.3.1 Marking of motor terminals shall be in accordance with NEMA MG-1, Motors and Generators, Part 2.

9.8.3.2 A motor terminal connecting diagram for multiple lead motors shall be furnished by the motor manufacturer.

9.9 On-Site Standby Generator Systems.

9.9.1 Capacity.

9.9.1.1 Where on-site generator systems are used to supply power to fire pump motors to meet the requirements of 9.3.2, they shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s) while meeting the requirements of Section 9.7.

9.9.1.2 A tap ahead of the on-site generator disconnecting means shall not be required.

9.9.2* Power Sources.

9.9.2.1 These power sources shall comply with Section 9.7 and shall meet the requirements of Level 1, Type 10, Class X systems of NFPA 110, Standard for Emergency and Standby Power Systems.

9.9.2.2 The fuel supply capacity shall be sufficient to provide 8 hours of fire pump operation at 100 percent of the rated pump capacity in addition to the supply required for other demands.

9.9.3 Sequencing. Automatic sequencing of the fire pumps shall be permitted in accordance with 10.5.2.5.

9.9.4 Transfer of Power. Transfer of power to the fire pump controller between the normal supply and one alternate supply shall take place within the pump room.

9.9.5* Protective Devices. Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump.

Submitter: Barry F. O'Connell, Tyco Thermal Controls
Recommendation: Continue to Reject.
Substantiation: The material introduces new confusion to an Article that was already confusing, as pointed out in the NEMA negative comment.
Panel Meeting Action: Accept
Panel Statement: See the panel action and statement on Proposal 13-47.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-50 Log #3826 NEC-P13 **Final Action: Reject**
(695)

Submitter: James S. Nasby, Skokie, IL
Recommendation: If the extracted text relating to power supplies cannot be made to agree with the 2007 Edition of NFPA-20 it should be deleted, leaving only the text relating to Installation that is native to NFPA-70 (the NEC).
Substantiation: 1) The Extant Article 695 extracted text is from the 2003 Edition of NFPA-20 which has been extensively rewritten in the 2007 Edition.

2) 90.9(C)(2), although related to Units of Measure requires that extracted text not be compromised.

3) Since I don't know the status of the work by the NFPA-20 – NEC task group on this topic, I'm submitting this Public Proposal as a contingency proposal.

4) The statement in the Scope that the text is extracted from NFPA 20-2007 is not correct. It's still at the 2003 version.

Note that I'm also submitting another Public Proposal to synchronize (update) the extracted text. This is an important life safety issue. There is significant confusion in the field due to the substantial difference between the two documents.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided specific text. This proposal does not meet the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-51 Log #4307 NEC-P13 **Final Action: Reject**
(695)

Submitter: James S. Nasby, Skokie, IL
Recommendation: Synchronize (update) the extract text from 2007 Edition of NFPA-20 Chapter 9 in accordance with CMP-13 Panel Meeting Action on my Public Comment # 13-103, Log, # 1037 of the A2007 Report on Comments.

Revise text as shown below with updated NFPA-20 Reference clause numbering:

ARTICLE 695 Fire Pumps

FPN: Rules that are followed by a reference in brackets contain text that has been extracted from NFPA 20-2007 ~~3~~, *Standard for the Installation of Stationary Pumps for Fire Protection*. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

695.1 Scope.

(A) Covered. This article covers the installation of the following:

(1) Electric power sources and interconnecting circuits

(2) Switching and control equipment dedicated to fire pump drivers

(3) Associated fire pump accessory equipment which includes wiring and overcurrent protection of other loads connected to the power supply.

(B) Not Covered. This article does not cover the following:

(1) The performance, maintenance, and acceptance testing of the fire pump system, and the internal wiring of the components of the system

(2) Pressure maintenance (jockey or makeup) pumps

FPN: See NFPA 20-~~2003~~ 2007, *Standard for the Installation of Stationary Pumps for Fire Protection,* for further information.

695.2 Definitions.

Fault Tolerant External Control Circuits. Those control circuits either entering or leaving the fire pump controller enclosure, which if broken, disconnected, or shorted will not prevent the controller from starting the fire pump from all other internal or external means and may cause the controller to start the pump under these conditions. [NFPA 20:3.3.7.2]

On-Site Power Production Facility. The normal supply of electric power for the site that is expected to be constantly producing power. [NFPA 20:3.3.34]

On-Site Standby Generator. A facility producing electric power on site as the alternate supply of electric power. It differs from an on-site power production facility, in that it is not constantly producing power. [NFPA 20:3.3.35]

695.3 Power Source(s) for Electric Motor-Driven Fire Pumps.
Electric motor-driven fire pumps shall have a reliable source of power. [NFPA 20:9.2.1]

FPN: NFPA 20-2007, *Standard for the Installation of Stationary Pumps for Fire Protection*, covers characteristics of reliable of reliable sources. Also see the cross-reference in Annex J.

(A) Individual Sources. Where reliable, and where capable of carrying indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply, the power source for an electric motor-driven fire pump shall be one or more of the following.

(1) Electric Utility Service Connection. A fire pump shall be permitted to be supplied by a separate service, or from a connection located ahead of and not within the same cabinet, enclosure, or vertical switchboard section as the service disconnecting means. The connection shall be located and arranged so as to minimize the possibility of damage by fire from within the premises and from exposing hazards. A tap ahead of the service disconnecting means shall comply with 230.82(5). The service equipment shall comply with the labeling requirements in 230.2 and the location requirements in 230.72(B). ~~[NFPA 20:9.2.2]~~

(2) On-Site Power Production Facility. A fire pump shall be permitted to be supplied by an on-site power production facility. The source facility shall be located and protected to minimize the possibility of damage by fire. ~~[NFPA 20:9.2.3]~~

(3) Dedicated Feeder. A dedicated feeder shall be permitted where it is derived from a service connection as described in 695.3(A)(1).

(B) Multiple Sources. Where reliable power cannot be obtained from a source described in 695.3(A), power shall be supplied one of the following:

(1) Two Individual Sources. ~~from a~~ An approved combination of two or more of ~~either of such sources~~ the sources from 695.3(A).

(2) Individual Source and Generator. An approved combination of one or more of the sources in 695.3(A) and an on-site generator complying with 695.3(D). ~~or from an approved combination of feeders constituting two or more power sources as covered in 695.3(B)(2), or from an approved combination of one or more of such power sources in combination with an on-site standby generator complying with 695.3(B)(1) and (B)(3).~~

(C) Multibuilding Campus-Style Complexes. Where the sources in 695.3(A) are not practicable and the installation is part of a multibuilding campus style complex, feeder sources shall be permitted where approved by the authority having jurisdiction and installed in accordance with (1) or (2).

(1) Two Feeder Sources. Two feeders shall be permitted as more than one power source where such feeders are connected to or derived from separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B).

(2) Feeder and Alternate Source. A feeder shall be permitted as a normal source of power when an alternate source of power independent from the feeder is provided. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B).

~~**(1) Generator Capacity.** An on-site generator(s) used to comply with this section shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted. A tap ahead of the on-site generator disconnecting means shall not be required. The requirements of 430.113 shall not apply. [NFPA 20:9.6.1]~~

~~**(2) Feeder Sources.** This section applies to multibuilding campus-style complexes with fire pumps at one or more buildings. Where sources in 695.3(A) are not practicable, and with the approval of the authority having jurisdiction, two or more feeder sources shall be permitted as one power source or as more than one power source where such feeders are connected to or derived from separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B). [NFPA 20:9.2.5.3]~~

~~**(3) Arrangement.** The power sources shall be arranged so that a fire at one source will not cause an interruption at the other source. [NFPA 20:9.2.5.1]~~

(~~1~~D) Generator ~~Capacity~~ as Alternate Source. ~~An~~ Where an on-site generator(s) is used ~~to comply with this section~~ as an alternate source of power. The following shall apply:

(1) Capacity. The generator shall have ~~shall be of~~ sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted. [NFPA 20:9.6.1.1]

(2) Connection. A tap ahead of the on-site generator disconnecting means shall not be required. [NFPA 20:9.6.1.2]

(3) Adjacent Disconnects. The requirements of 430.113 shall not apply.

(4) Phase Converters. Phase converters shall not be permitted to be used in the fire pump circuit. [NFPA 20:A.9.9.2] {Note that 695.3(D)(4) as 695.19 should be renumber as 695.19 (or 695.8, or 695.9 or 695.13. Phase Converters are not related to gen-set alternate power. I've used 695.19 in the cross reference} [NFPA 20:A.9.9.2]

~~**(3)**~~ **(E) Arrangement.** ~~The power sources shall be arranged so that a fire at one source will not cause an interruption at the other source. [NFPA 20:9.2.5.1]~~

The normal source of power required in 695.4(A) and its routing shall be arranged in accordance with one of the following:

(1) Service connection dedicated to the fire pump installation.

(2) On-site power production facility connection dedicated to the fire pump installation.

(3) A dedicated feeder connection derived directly from the dedicated service to the fire pump installation.

(4) As a feeder connection where all of the following conditions are met:

a. The protected facility is part of a multi-building campus style arrangement.

b. A back-up source of power is provided from a source independent of the normal source of power.

c. It is impractical to supply the normal source of power through arrangement 695.3(E)(4)(a), 695.3(E)(4)(b), 695.3(C)(4)(c) or 695.3(E)(4)(e).

d. The arrangement is acceptable to the authority having jurisdiction.

e. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).

(5) A dedicated transformer connection directly from the service meeting the requirements of Article 695.5. [NFPA 20:9.2.2]

695.4 Continuity of Power.

Circuits that supply electric motor-driven fire pumps shall be supervised from inadvertent disconnection as covered in 695.4(A) or 695.4(B).

~~(A) Direct Connection. The supply conductors shall directly connect the power source to either a listed fire pump controller or listed combination fire pump controller and power transfer switch. [NFPA 20:9.3.2.2.2]~~

(A) Continuously Available. An electric motor driven fire pump shall be provided with a normal source of power as a continually available source. [NFPA 20:9.2.1]

(B) Supervised Connection. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between a remote power source and one of the following:

(1) A listed fire pump controller

(2) A listed fire pump power transfer switch

(3) A listed combination fire pump controller and power transfer switch

For systems installed under the provisions of 695.3(B)(2) only, such additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this *Code*. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized according to 430.62 to provide short-circuit protection only. All disconnecting devices and overcurrent protective devices that are unique to the fire pump loads shall comply with 695.4(B)(1) and 695.4(B)(2). ~~through (B)(5).~~ [NFPA 20:9.2.3]

(1) Overcurrent Device Selection. The overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s). [NFPA 20:9.2.3.4]

~~**(2)** Disconnecting Means. The disconnecting means shall comply with all the following:~~

~~**(1)** Be identified as suitable for use as service equipment~~

~~**(2)** Be lockable in the closed position~~

~~**(3)** Not be located within equipment that feeds loads other then the fire pump~~

~~**(4)** Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent contemporaneous operation would be unlikely~~

~~**(3)** Disconnect Marking. The disconnecting means shall be marked "Fire Pump Disconnecting Means." The letters shall be at least 25 mm (1 in.) in height, and they shall be visible without opening enclosure doors or covers.~~

~~**(4)** Controller Marking. A placard shall be placed adjacent o the fire pump controller, stating the location of this disconnecting means and the location of the key (if the disconnecting means is locked).~~

(2) ~~**(5)**~~ **Supervision.** The disconnecting means shall be supervised in the closed position by one of the following methods:

(1) Central station, proprietary, or remote station signal device

(2) Local signaling service that causes the sounding of an audible signal at a constantly attended point [NFPA 20:9.2.3.3]

(3) Locking the disconnecting means in the closed position

(4) Sealing of disconnecting means and approved weekly recorded inspections when the disconnecting means are located within fenced enclosures or in buildings under the control of the owner. [NFPA 20:9.3.2.2.3]

(C) Connections. For fire pump installations using the arrangement of 695.3(E)(4)(a), 695.3(E)(4)(b), 695.3(E)(4)(c), 695.3(E)(4)(e), for the normal source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller. [NFPA 20:9.2.3]

(D) Disconnecting Means. Where the disconnecting means permitted by 695.4(C) is installed, the disconnecting means shall meet all of the following:

(1) Identified as being suitable for use as service equipment.

(2) Lockable in the closed position.

(3) Located remote from other building disconnecting means.

FPN: This is to avoid the inadvertent simultaneous operation of the building and fire pump disconnect switches.

(4) Located remote from other fire pump source disconnecting means.

FPN: This is to avoid the inadvertent simultaneous operation of the disconnect switches of other fire pumps.

(5) Marked "Fire Pump Disconnecting Means" in letters that are no less than one inch (25 mm) in height and that can be seen without opening enclosure doors or covers. [NFPA 20:9.2.3.1]

(E) Placard. Where the disconnecting means permitted by 695.4(C) is installed, a placard shall be placed adjacent to the fire pump controller stating the location of this disconnection means and the location of any key needed to unlock the disconnect.

(F) Supervision. Where the disconnecting means permitted by 695.4(C) is installed, the disconnect shall be supervised in the closed position by one of the following methods:
(1) Central station, proprietary or remote station signal device
(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended location
(3) Locking the disconnecting means in the closed position
(4) Sealing of disconnecting means and approved weekly recorded inspections where the disconnecting means are located within fenced enclosures or in buildings under the control of the owner. [NFPA 20:9.2.3.3]
(G) Overcurrent Protection. Where the overcurrent protection permitted by 695.4(C) is installed, the overcurrent protection device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment. The next standard overcurrent device shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s). [NFPA 20:9.2.3.4]
695.5 Transformers.
Where the service or system voltage is different from the utilization voltage of the fire pump motor, transformer(s) protected by disconnecting means and overcurrent protective devices shall be permitted to be installed between the system supply and the fire pump controller in accordance with 695.5(A) and (B), or (C). Only transformers covered in 695.5(C) shall be permitted to supply loads not directly associated with the fire pump system.
(A) Size. Where a transformer supplies an electric motor-driven fire pump, it shall be rated at a minimum of 125 percent of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the associated fire pump accessory equipment supplied by the transformer.
(B) Overcurrent Protection. The primary overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. Secondary overcurrent protection shall not be permitted. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
(C) Feeder Source. Where a feeder source is provided in accordance with 695.3(B)(2), transformers supplying the fire pump system shall be permitted to supply other loads. All other loads shall be calculated in accordance with Article 220, including demand factors as applicable.
(1) Size. Transformers shall be rated at a minimum of 125 percent of the sum of the fire pump motor(s) and pressure maintenance pump(s) motor loads, and 100 percent of the remaining load supplied by the transformer.
(2) Overcurrent Protection. The transformer size, the feeder size, and the overcurrent protective device(s) shall be coordinated such that overcurrent protection is provided for the transformer in accordance with 450.3 and for the feeder in accordance with 215.3, and such that the overcurrent protective device(s) is selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s), the pressure maintenance pump motor(s), the full-load current of the associated fire pump accessory equipment, and 100 percent of the remaining loads supplied by the transformer. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
695.6 Power Wiring.
Power circuits and wiring methods shall comply with the requirements in 695.6(A) through (H), and as permitted in 230.90(A), Exception No. 4; 230.94, Exception No. 4; 230.95, Exception No. 2; 240.13; 230.208; 240.4(A); and 430.31.
(A) ~~Service~~ Supply Conductors. ~~Supply conductors shall be physically routed outside a building(s) and shall be installed as service entrance conductors in accordance with Article 230. Where supply conductors cannot be physically routed outside buildings, they shall be permitted to be routed through buildings where installed in accordance with 230.6(1) or 230.6(2). Where a fire pump is wired under the provisions of 695.3(B)(2), this requirement shall apply to all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump.~~
(1) Services and On-Site Power Production Facility. Service conductors and conductors supplied by an on-site power production facility shall be physically routed outside a building(s) and shall be installed as service conductors in accordance with 230.6, 230.9 and Part III and Part IV of Article 230. Where supply conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
(2) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.4(B)(4), all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
Exception: Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement shall apply only to those conductors on the load side of that point of automatic connection between sources.

(3) ~~(B)~~ **~~Circuit Conductors.~~ Supervised or On-Site Standby Generator Connections.** Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) or conductors that connect directly to an onsite generator shall comply with all the following:
a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.
b. Associated Fire Pump Loads. The conductors ~~They~~ shall supply only loads that are directly associated with the fire pump system.
c. Protection From Potential Damage. The conductors ~~and they~~ shall be protected to resist potential damage by fire, structural failure, or operational accident.
d. Inside a Building. When routed through a building the conductors ~~They~~ shall be ~~permitted~~ installed to be routed ~~through a building(s)~~ using one of the following methods:
(1) Be encased in a minimum 50 mm (2 in.) of concrete
(2) Be ~~within an enclosed construction~~ protected by a fire rated assembly listed to achieve a minimum fire rating of two hours and dedicated to the fire pump circuit(s). ~~and having a minimum of a 1 hour fire resistive rating~~
(3) Be a listed electrical circuit protective system with a minimum ~~1~~ 2-hour fire rating
Exception: The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum ~~1~~ 2-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.
FPN: UL guide information for electrical circuit protective systems (FHIT) contains information on proper installation requirements to maintain the fire rating.
~~(C)~~ (B) Conductor Size.
(1) Fire Pump Motors and Other Equipment. Conductors supplying a fire pump motor(s), pressure maintenance pumps, and associated fire pump accessory equipment shall have a rating not less than 125 percent of the sum of the fire pump motor(s) and pressure maintenance motor(s) full-load current(s), and 100 percent of the associated fire pump accessory equipment.
(2) Fire Pump Motors Only. Conductors supplying only a fire pump motor shall have a minimum ampacity in accordance with 430.22 and shall comply with the voltage drop requirements in 695.7
~~(D)~~ (C) Overload Protection. Power circuits shall not have automatic protection against overloads. Except for protection of transformer primaries provided in 695.5(C)(2), ~~Branch~~ branch-circuit and feeder conductors shall be protected against short circuit only. Where a tap is made to supply a fire pump, the wiring shall be treated as service conductors in accordance with 230.6. The applicable distance and size restrictions in 240.21 shall not apply.
Exception No. 1: Conductors between storage batteries and the engine shall not require overcurrent protection or disconnecting means.
Exception No. 2: For on-site standby generator(s) rated to produce continuous current in excess of 225 percent of the full-load amperes of the fire pump motor, the conductors between the on-site generator(s) and the combination fire pump transfer switch controller or separately mounted transfer switch shall be installed in accordance with 695.6(B). ~~or protected in accordance with 430.52.~~The protection provided shall be in accordance with the short-circuit current rating of the combination fire pump transfer switch controller or separately mounted transfer switch.
~~(E)~~ (D) Pump Wiring. All wiring from the controllers to the pump motors shall be in rigid metal conduit, intermediate metal conduit, liquidtight flexible metal conduit, or liquidtight flexible nonmetallic conduit Type LFNC-B, listed Type MC cable with an impervious covering, or Type MI cable.
~~(F)~~ (E) Junction Points. Where wire connectors are used in the fire pump circuit, the connectors shall be listed. A fire pump controller or fire pump power transfer switch, where provided, shall not be used as a junction box to supply other equipment, including a pressure maintenance (jockey) pump(s). A fire pump controller and fire pump power transfer switch, where provided, shall not serve any load other than the fire pump for which it is intended.
~~(G)~~ (F) Mechanical Protection. All wiring from engine controllers and batteries shall be protected against physical damage and shall be installed in accordance with the controller and engine manufacturer's instructions.
~~(H)~~ (G) Ground Fault Protection of Equipment. Ground fault protection of equipment shall not be permitted for fire pumps.
(H) Onsite Standby Generator Disconnecting Means. Where the power source is supplied by on-site generator(s), the supply conductors shall connect to a generator disconnecting means dedicated for the purpose of serving the fire pump. The disconnecting means shall be located in a separate enclosure from other generator disconnecting means.
695.7 Voltage Drop.
~~The voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor starting conditions. The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.~~
~~*Exception: This limitation shall not apply for emergency run mechanical starting. [NFPA 20:9.4]*~~
(A) Starting Voltage Drop. The voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor starting conditions.
(B) Mechanical Operator. The requirements of 695.7(A) shall not apply to emergency- run mechanical starting.
(C) Running Voltage Drop. The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor. [NFPA 20:9.4]

695.10 Listed Equipment.
Diesel engine fire pump controllers, electric fire pump controllers, electric motors, fire pump power transfer switches, foam pump controllers, and limited service controllers shall be listed for fire pump service. [NFPA 20:9.5.1.1, 10.1.2.1, 12.1.3.1] . [NFPA 20:9.5.1.1, 10.1.2.1, 10.8.3.1, 12.1.3.1]

695.11 Listed Electrical Circuit Protective System to Controller Wiring.
(A) Single Conductors. Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box in accordance with this Code. [NFPA 20:9.3.7.1]
FPN This is to avoid violating the enclosure type rating, and/or the controller short-circuit (withstand) rating. See also 300.20 and Article 322. [NFPA 20:A.9.3.7.1]
(B) Single conductors (individual conductors) shall not enter the fire pump enclosure separately. [NFPA 20:9.3.7.2]
(C) Smoke Seal. Where required by the listing of the electrical circuit protective system, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer or listing agency. [NFPA 20:9.3.7.2]
FPN When so required, this seal is to prevent flammable gases from entering into the fire pump controller. [NFPA 20:A.9.3.7.2]
(D) Standard wiring between junction box and controller is acceptable. [NFPA 20:9.3.7.3]

695.12 Equipment Location.
(A) Controllers and Transfer Switches. Electric motor-driven fire pump controllers and power transfer switches shall be located as close as practicable to, and within sight of, the motors that they control. [NFPA 20:10.2.1]
(B) Engine-Drive Controllers. Engine-drive fire pump controllers shall be located as close as is practical to, and within sight of, the engines that they control. [NFPA 20:12.2.1]
(C) Storage Batteries. Storage batteries for fire pump engine drives shall be supported above the floor, secured against displacement, and located where they are not subject to physical damage, flooding with water, excessive temperature, or excessive vibration. [NFPA 20:11.2.5.2.5]
(D) Energized Equipment. All energized equipment parts shall be located at least 300 mm (12 in.) above the floor level. [NFPA 20:11.2.5.2.6]
(E) Protection Against Pump Water. Fire pump controllers and power transfer switches shall be located or protected so that they are not damaged by water escaping from pumps or pump connections. [NFPA 20:10.2.2, 12.2.2]
(F) Mounting. All fire pump control equipment shall be mounted in a substantial manner on noncombustible supporting structures. [NFPA 20:10.3.2, 12.3.2]

695.14 Control Wiring.
(A) Control Circuit Failures. External control circuits that extend outside the fire pump room shall be arranged so that failure of any external circuit (open or short circuit) shall not prevent the operation of a pump(s) from all other internal or external means. Breakage, disconnecting, shorting of the wires, or loss of power to these circuits could cause continuous running of the fire pump but shall not prevent the controller(s) from starting the fire pump(s) due to causes other than these external control circuits. All control conductors within the fire pump room that are not fault tolerant shall be protected against physical damage. [NFPA 20:10.5.2.6, 12.5.2.5]
(B) Sensor Functioning. No undervoltage, phase-loss, frequency-sensitive, or other sensor(s) shall be installed that automatically or manually prohibit actuation of the motor contactor. [NFPA 20:10.4.5.6]
Exception: A phase loss sensor(s) shall be permitted only as a part of a listed fire pump controller.
(C) Remote Device(s). No remote device(s) shall be installed that will prevent automatic operation of the transfer switch. [NFPA 20:10.8.1.3]
(D) Engine-Drive Control Wiring. All wiring between the controller and the diesel engine shall be stranded and sized to continuously carry the charging or control currents as required by the controller manufacturer. Such wiring shall be protected against physical damage. Controller manufacturer's specifications for distance and wire size shall be followed. [NFPA 20:12.3.5.1, 12.6.4.1]
(E) Electric Fire Pump Control Wiring Methods. All electric motor-driven fire pump control wiring shall be in rigid metal conduit, intermediate metal conduit, liquidtight flexible metal conduit, liquidtight flexible nonmetallic conduit Type B (LFNC-B), listed Type MC cable with an impervious covering, or Type MI cable.
(F) Generator Control Wiring Methods. Control conductors installed between the fire pump power transfer switch and the standby generator supplying the fire pump during normal power loss shall be kept entirely independent of all other wiring. They shall be protected to resist potential damage by fire or structural failure. They shall be permitted to be routed through a building(s) encased in 50 mm (2 in.) of concrete or within enclosed construction dedicated to the fire pump circuits and having a minimum 1-hour fire resistance rating, or circuit protective systems with a minimum of 1-hour fire resistance. The installation shall comply with any restrictions provided in the listing of the electrical circuit protective system used. [NFPA 20:A.9.2.4(3)]

695. 15 Alternate Power.
(A) When Required. Except for an arrangement described in 695.15(C), at least one alternate source of power shall be provided when the height of the structure is beyond the pumping capacity of the fire department apparatus or when required by the AHJ. The alternate source shall, as a minimum, comply with the requirements of this section. [NFPA 20:9.3.1]
FPN: Local codes and/or AHJ often require alternate power for certain occupancies, such as high rise buildings, places of assembly and etc. These alternate power sources are considered to be the Emergency Source of Power for a motor driven fire pump as opposed to the Normal Source of Power.
(B) Unreliable Source. Except for an arrangement described in 695.15(C), at least one alternate source of power shall be provided where the normal source is not reliable. [NFPA 20:9.3.2]
FPN: See Alternate Power, Other Sources in NFPA-20, *Standard for the Installation of Stationary Pumps for Fire Protection*, for specifics. [NFPA 20:A.9.3.2]
(C) Back-up Pump. An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard. [NFPA 20:9.3.3]
FPN: See NFPA-20 for requirements of engine driven or steam turbine fire pumps. In either case, operation of the pump is intended to be independent of the source of electrical power.
(D) Alternate Source. When provided, the alternate source of power shall be supplied from one of the following sources:
(1) A generator installed in accordance with 695.16.
(2) One of the sources identified in 695.3(E)(4)(a), 695.3(E)(4)(b), 695.3(E)(4)(c) or 695.3(E)(4)(e) when the power is provided independent of the normal source of power. [NFPA 20:9.3.4]
(E) Overhead Lines. When provided, the alternate supply shall be arranged so that the power to the fire pump is not disrupted when overhead lines are de-energized for fire department operations. [NFPA 20:9.3.5]

695.16 On-Site Standby Generator Systems.
(A) Capacity.
(1) Where on-site generator systems are used to supply power to fire pump motors to meet the requirements of 695.15(B), they shall be of sufficient capacity to allow normal starting and rung of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s) while meeting the requirements of 695.7 [NFPA 20:9.6.1]
(2) A tap ahead of the on-site generator disconnecting means shall not be required.
(B) Power Sources.
These power sources shall comply with 695.7 and shall meet the requirements of Level 1, Type 10 emergency power systems. [NFPA 20:9.6.2.1]
FPN: Type 10 systems are required to make emergency power available in 10 or less seconds. See NFPA-110 *Standard for Emergency and Standby Power Systems* for definition of Level 1Emergency Power System. See NFPA-20 for fuel capacity requirements. [NFPA 20:9.6.2.2]
(C) Sequencing. Automatic sequencing of the fire pumps shall be permitted as a means of meeting the voltage drop requirements of 695.7. [NFPA 20:9.6.3]
(D) Transfer of Power. Transfer of power to the fire pump controller between the normal supply and one alternate supply shall take place within the pump room.
(E) Protective Devices. Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump room load. [NFPA 20:9.6.4]
FPN: This is to prevent any Generator Protective Devices from tripping when the fire pump load is transferred to the generator. The generator will instantaneous pickup the full pump room load, including the starting any and all connected fire pumps in the across-the-line (direct on line) full voltage staring mode. This is always the case when the fire pump(s) is running by use of the Emergency Mechanical Operator of the fire pump controller(s). (See NFPA-20 9.6 On-Site Standby Generator Systems).

695.17 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met. [NFPA 20:9.3.6]
(A) Mounting. The junction box shall be securely mounted. [NFPA 20:9.3.6(1)]
(B) Controller Enclosure Integrity. Mounting and installing of a junction box shall not violate the enclosure type (NEMA) rating of the fire pump controller(s). [NFPA 20:9.3.6(2)]
(C) Controller Short Circuit Rating Integrity. Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the
short-circuit rating of the controller(s). [NFPA 20:9.3.6(3)]
(D) Type Rating. As a minimum, a Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed for the subject to match the fire pump controller enclosure Type rating. [NFPA 20:9.3.6(4)]
FPN See Article 430.91 Motor Controller Enclosure Types for further information. See UL-50, *Standard for Enclosures for Electrical Equipment*, for requirements.
(E) Terminals. Terminals, junction blocks, splices, and the like, when used, shall be listed. [NFPA 20:9.3.6(5)]

695.18 Raceway Terminations.

(A) Hubs. Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller. [NFPA 20:9.3.8.1]
(B) Type Rating. The type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller. [NFPA 20:9.3.8.2]
(C) Installation. The installation instructions of the manufacturer of the fire pump controller shall be followed. [NFPA 20:9.3.8.3]
(D) Controller Alterations. No alterations other than installation of raceway(s) and multiconductor cable(s) shall be made to the fire pump controller. [NFPA 20:9.3.8.4]
Substantiation: 1) The Extant Article 695 extracted text is from the 2003 Edition of NFPA-20 which has been extensively rewritten in the 2007 Edition.
2) Article (Clause) 90.9(C)(2), although related to Units of Measure requires that extracted text not be compromised.
3) Since I don't know the status of the work by the NFPA-20 – NEC task group on this topic, I'm submitting this Public Proposal as a contingency proposal.
4) The statement in the Scope that the test is extracted from NFPA 20-2007 is not correct. It's still at the 2003 version.
Note that I'm also submitting another Public Proposal to eliminate the extracted text if it can not, or will not, be made to agree with that in NFPA-20 since the difference is causing field confusion. This is an important life safety issue.
Panel Meeting Action: Reject
Panel Statement: The panel has looked at this proposed revision of Article 695 as a collective body of work and determined that there are too many correlation, style, and technical issues that cannot be resolved within the time frame of the ROP meeting. This proposal is similar in nature to Proposal 13-77 for the 2008 NEC, which also proved too cumbersome for the panel to act on and ensure proper technical correlation with NFPA 20. To that end, CMP-13 has acted on Proposals 13-60a, 13-77a, and 13-95a to provide correlation between important sections of NFPA 20 and Article 695. These actions are based on the recommended changes for the 2010 edition of NFPA 20 as accepted by the NFPA 20 technical committee in their ROP and ROC actions.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-52 Log #4308 NEC-P13 **Final Action: Reject**
(695)

Submitter: James S. Nasby, Columbia Engineering
Recommendation: If the extracted text relating to power supplies can not be made to agree with the 2007 Edition of NFPA-20 it should be deleted, leaving only the text relating to Installation that is native to NFPA-70 (the NEC).
Substantiation: 1) The Extant Article 695 extracted text is from the 2003 Edition of NFPA-20 which has been extensively rewritten in the 2007 Edition.
2) Article (Clause) 90.9(C)(2), although related to Units of Measure requires that extracted text not be compromised.
3) Since I don't know the status of the work by the NFPA-20 – NEC task group on this topic, I'm submitting this Public Proposal as a contingency proposal.
4) The statement in the Scope that the test is extracted from NFPA 20-2007 is not correct. It's still at the 2003 version.
Note that I'm also submitting another Public Proposal to synchronize (update) the extracted text. This is an important life safety issue. There is significant confusion in the field due to the substantial difference between the two documents.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided specific text. This proposal does not meet the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-53 Log #4181 NEC-P13 **Final Action: Reject**
(695.1)

Submitter: James E. Degnan, Sparling
Recommendation: Revise text to read as follows:
695.1 Scope
(A) Covered This article covers the installation of the following:
(1) Electric power sources and interconnecting circuits.
(2) Switching and control equipment dedicated to the fire pump drivers.
(3) Pressure maintenance (jockey or makeup) pumps, when these pumps are connected to the same utility service connection as the fire pump.
(B) Not Covered. This article does not cover the following
(1) The performance …(retain text)…the system.
(2) Pressure maintenance (jockey or makeup) pumps, when these pumps are not connected to the same utility service connection as the fire pump.
Substantiation: Section 695.1 (B) now states that Article 695 does not apply to the pressure maintenance pump. This is appropriate because the pressure maintenance pump does not require the same level of integrity under various circumstances that is needed by the fire pump. However there is text throughout Article 695 covering the pressure maintenance pump. This change clarifies when the text in 695 applies to the pressure maintenance pump. In effect, it leaves the choice of feeding the pressure maintenance pump from the same source as the fire pump up to the design engineer.
Panel Meeting Action: Reject
Panel Statement: The choice of the power supply for the jockey pump remains with the designer, installer, or inspector. A jockey pump can be treated as any other motor, based on Article 430, and does not require the separation and continuity of power requirements based on Article 695 for the fire pump and other related critical loads.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
DEGNAN, J.: My substantiation statement and the panel statement agree on the intent of the code, however the language of the code could be made more readily understandable through the addition of text within Article 695 that clearly explains why 695.1(B)(2) states that the pressure maintenance pump is not within the scope of the article, and yet the article contains numerous references to it. I will evaluate language that permits the panel to accept this proposal in principle, as the code development process continues.

13-54 Log #73 NEC-P13 **Final Action: Reject**
(695.1(A) and (B))

Note: This Proposal appeared as Comment 13-109 on Proposal 13-79 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-79 was:
Revise text to read as follows:
695.1 Scope.
(A) Covered. This article covers the installation of the following:
(1) Electric power sources and interconnecting circuits
(2) Switching and control equipment dedicated to fire pump drivers
(3) Pressure maintenance (jockey or makeup) pumps
(4) Associated fire pump accessory equipment
(B) Not Covered. This article does not cover the following:
(1) The performance, maintenance, and acceptance testing of the fire pump system, and the internal wiring of the components of the system
~~**(2) Pressure maintenance (Jockey or makeup) pumps**~~
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Suggested revision:
Replace (3) with "Wiring, Overcurrent Protection and other aspects of loads connected to the power supply or interconnecting circuits."
Substantiation: Direction of the TCC to clarify panel action. Suggested wording.
The intent is to indicate that there is proscriptive code regarding other connected loads, but, not the loads themselves. Also note that most, but not all, fire pump systems have pressure maintenance (jockey) pumps which may or may not be connected to the fire pump power supply.
Panel Meeting Action: Reject
Panel Statement: The suggested text covering overcurrent protection is already adequately covered in the scope in existing (A)(1) and (2) so the additional text is unnecessary. See the panel action and statement on Proposal 13-54. The panel understands that their actions on scope statements are advisory to the Technical Correlating Committee.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MOUTON, C.: The panel statement should have the sentence "See the panel action and statement on Proposal 13-54." removed, since it does not apply to this Proposal.

13-55 Log #74 NEC-P13 **Final Action: Reject**
(695.1(A) and (B))

Note: This Proposal appeared as Comment 13-110 on Proposal 13-79 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-79 was:
Revise text to read as follows:
695.1 Scope.
(A) Covered. This article covers the installation of the following:
(1) Electric power sources and interconnecting circuits
(2) Switching and control equipment dedicated to fire pump drivers
(3) Pressure maintenance (jockey or makeup) pumps
(4) Associated fire pump accessory equipment
(B) Not Covered. This article does not cover the following:
(1) The performance, maintenance, and acceptance testing of the fire

pump system, and the internal wiring of the components of the system
~~(2) Pressure maintenance (Jockey or makeup) pumps~~
Submitter: Joseph C. Warren, Joseph C. Warren Electrical Consulting Services
Recommendation: Revise text to read as follows:
695.1 Scope.
(A) Covered. This article covers the installation of the following:
(1) Electric power sources and interconnecting circuits.
(2) Switching and control equipment dedicated to fire pump drivers.
<u>(3) Pressure maintenance (jockey or makeup) pumps.</u>
<u>(4) Associated fire pump accessory equipment for alarms that signal an alarm for improper conditions that exist in a fire pump.</u>
(B) Not Covered. This article does not cover the following:
(1) The performance, maintenance, and acceptance testing of the fire pump system, and the internal wiring of the components of the system
~~(2) Pressure maintenance (jockey or makeup) pumps.~~
Substantiation: We DO need to state that jockey or makeup pump motors are covered because they do exist in fire pump installations. The present language, by not including them, is a very bad format even if we do go to Article 430 for jockey pumps. Accessory equipment also needs to be covered because the alarms that are part of the fire pump installation indicate improper conditions in fire pump equipment if something occurs that is wrong. 695.5(A), (B), and (C)(2) tell us to include jockey and makeup pumps in load calculations.
Panel Meeting Action: Reject
Panel Statement: The suggested text covering overcurrent protection is already adequately covered in the scope in existing (A)(1) and (2) so the additional text is unnecessary. See the panel action and statement on Proposal 13-54. The panel understands that their actions on scope statements are advisory to the Technical Correlating Committee. Adding a new (4) covering associated fire pump accessory equipment for alarm is already covered in existing (2) for switching and control equipment dedicated to fire pump drivers. The alarm equipment is part of the accessory equipment for the fire pump controller.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
DEGNAN, J.: I agree with the submitter that the current language within Article 695 should be improved.
MOUTON, C.: The panel statement should have the first sentence removed, since it does not apply to the recommendation of the Proposal. Also, the reference to panel action and statement should have 13-53 added. Both 13-53 and 13-54 have components that address the recommendation.

13-56 Log #75 NEC-P13 **Final Action: Reject**
(695.1(A) and (B))

Note: This Proposal appeared as Comment 13-111 on Proposal 13-79 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-79 was:
Revise text to read as follows:
695.1 Scope.
(A) Covered. This article covers the installation of the following:
(1) Electric power sources and interconnecting circuits
(2) Switching and control equipment dedicated to fire pump drivers
<u>(3) Pressure maintenance (jockey or makeup) pumps</u>
<u>(4) Associated fire pump accessory equipment</u>
(B) Not Covered. This article does not cover the following:
(1) The performance, maintenance, and acceptance testing of the fire pump system, and the internal wiring of the components of the system
~~(2) Pressure maintenance (Jockey or makeup) pumps~~
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Suggest revision:
Replace (3) with "Wiring, Overcurrent Protection and other aspects of loads connected to the power supply or interconnecting circuits."
Substantiation: Direction of the TCC to clarify panel action. Suggested wording.
The intent is to indicate that there is proscriptive code regarding other connected loads, but, not the loads themselves.
Also note that most, but not all, fire pump systems have pressure maintenance (jockey) pumps which may or may not be connected to the fire pump power supply.
Panel Meeting Action: Reject
Panel Statement: The suggested text covering overcurrent protection is already adequately covered in the scope in existing (A)(1) and (2) so the additional text is unnecessary. See the panel action and statement on Proposal 13-54. The panel understands that their actions on scope statements are advisory to the Technical Correlating Committee.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-57 Log #76 NEC-P13 **Final Action: Reject**
(695.1(A) & (B))

Note: This Proposal appeared as Comment 13-112 on Proposal 13-79 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-79 was:
Revise text to read as follows:
695.1 Scope.
(A) Covered. This article covers the installation of the following:
(1) Electric power sources and interconnecting circuits
(2) Switching and control equipment dedicated to fire pump drivers
<u>(3) Pressure maintenance (jockey or makeup) pumps</u>
<u>(4) Associated fire pump accessory equipment</u>
(B) Not Covered. This article does not cover the following:
(1) The performance, maintenance, and acceptance testing of the fire pump system, and the internal wiring of the components of the system
~~(2) Pressure maintenance (Jockey or makeup) pumps~~
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee rejects the Panel Action until the Panel Action has been clarified regarding the deletion of (B)(2) and acceptance of the underlined (4).
The Technical Correlating Committee directs the Panel to clarify the Panel Action relative to the addition of Item 4, associated fire pump accessory equipment, since that equipment appears to be related to mechanical equipment rather than the electrical installation.
This action will be considered by the panel as a public comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Reject
Panel Statement: The suggested text covering overcurrent protection is already adequately covered in the scope in existing (A)(1) and (2) so the additional text is unnecessary. See the panel action and statement on Proposal 13-54. The panel understands that their actions on scope statements are advisory to the Technical Correlating Committee. The committee notes that this is a recommendation from the Technical Correlating Committee.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MOUTON, C.: The reference to panel action and statement should have 13-55 added. Both 13-54 and 13-55 have components that address the recommendation.

13-58 Log #1411 NEC-P13 **Final Action: Reject**
(695.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may" to "can".
Substantiation: Edit. "May" is subjective and a term to be avoided per the Style Manual. "Can" is more readily determined.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided specific reasons that the term "may" is incorrect in the context it is used in 695.2. The NEC Style Manual does not prohibit the use of the term "may" provided it is not used to denote a requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-59 Log #3957 NEC-P13 **Final Action: Reject**
(695.2.On-Site Standby Generator)

Submitter: James E. Degnan, Sparling
Recommendation: Revise text to read as follows:
695.2 Definitions
On -Site Standby Generator A facility producing ~~electric power~~ <u>electricity</u> on site as the ~~alternate supply of electric~~ <u>emergency source of</u> power. It differs from an on-site power production facility in that it is not constantly producing <u>electrical</u> power.
Substantiation: The term "On-Site Standby Generator" is used in NFPA 20, *Installation of Stationary Pumps for Fire Protection*, however the term "Standby" has unwanted linkage to Article 702.
The desired linkage is to Article 700, see Section 700.1, FN 3. In Section 700.12 the closest term is "emergency source of power". This proposal provides a clearer link between Article 695 and Article 700, while retaining ties to the terms in NFPA 20.
In NFPA 110, *Emergency and Standby Power Systems*, the closest formal term is "Energy Converter", although "generator" is also used. "Energy Converter" is not recommended due to the complexity of the definition.
Panel Meeting Action: Reject

Panel Statement: The correct term is an "on-site standby generator." The fact that the standby generator supplies an emergency system does not impact the name of the power source. The panel disagrees that there is confusion with Article 702. The panel notes that this definition in the NEC correlates with Section 3.3.35 in the 2007 edition of NFPA 20.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-60 Log #3956 NEC-P13 **Final Action: Reject**
(695.2.On-Site Standby Generator and 695.3(B))

Submitter: James E. Degnan, Sparling
Recommendation: Revise text to read as follows:
695.2 Definitions
~~**On -Site Standby**~~ **Emergency Generator** A facility producing ~~electric power~~ electricity on site as the ~~alternate supply of electric~~ emergency source of power. It differs from an on-site power production facility in that it is not constantly producing electrical power.695.3(B) Where reliable…(retain existing text)…in combination with an emergency ~~on-site standby~~ generator complying with 695.3(B)1) and (B)(3).
Similarly: " emergency ~~on-site standby~~ generator" where it appears in the balance of Article 695.
Substantiation: The term "On-Site Standby Generator" is used in NFPA 20, *Installation of Stationary Pumps for Fire Protection*, however the term "Standby" has unwanted linkage to Article 702.
The desired linkage is to Article 700, see Section 700.1, FN 3. In Section 700.12. The term "Emergency Generator" provides a clear link to Article 700. This moves away from NFPA 20. The term "On-Site" is superfluous when it comes to emergency generators.
In NFPA 110, *Emergency and Standby Power Systems*, the closest formal term is "Energy Converter", although "generator" is also used. "Energy Converter" is not recommended due to the complexity of the definition.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-59.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-60a Log #CP1300 NEC-P13 **Final Action: Accept**
(695.3)

Submitter: Code-Making Panel 13,
Recommendation: Revise Section 695.3 to read:
695.3 Power Source(s) for Electric Motor-Driven Fire Pumps. Electric motor-driven fire pumps shall have a reliable source of power.
(A) Individual Sources. Where reliable, and where capable of carrying indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply, the power source for an electric motor driven fire pump shall be one or more of the following.
(1) Electric Utility Service Connection. A fire pump shall be permitted to be supplied by a separate service, or from a connection located ahead of and not within the same cabinet, enclosure, or vertical switchboard section as the service disconnecting means. The connection shall be located and arranged so as to minimize the possibility of damage by fire from within the premises and from exposing hazards. A tap ahead of the service disconnecting means shall comply with 230.82(5). The service equipment shall comply with the labeling requirements in 230.2 and the location requirements in 230.72(B). [20:9.2.2(1)]
(2) On-Site Power Production Facility. A fire pump shall be permitted to be supplied by an on-site power production facility. The source facility shall be located and protected to minimize the possibility of damage by fire. [20:9.2.2(3)]
(3) Dedicated Feeder. A dedicated feeder shall be permitted where it is derived from a service connection as described in 695.3(A)(1). [20:9.2.2(3)]
(B) Multiple Sources. If reliable power cannot be obtained from a source described in 695.3(A), power shall be supplied by one of the following:[20:9.3.2]
(1) Individual Sources. An approved combination of two or more of the sources from 695.3(A).
(2) Individual Source and On-site Standby Generator. An approved combination of one or more of the sources in 695.3(A) and an on-site standby generator complying with 695.3(D).[20:9.3.4]
(C) Multibuilding Campus-Style Complexes. If the sources in 695.3(A) are not practicable and the installation is part of a multibuilding campus style complex, feeder sources shall be permitted if approved by the authority having jurisdiction and installed in accordance with (C)(1) through (C)(3).
(1) Feeder Sources. Two or more feeders shall be permitted as more than one power source if such feeders are connected to or derived from separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B).
(2) Feeder and Alternate Source. A feeder shall be permitted as a normal source of power if an alternate source of power independent from the feeder is provided. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B).
(3) Selective Coordination. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).
(D) On-site Standby Generator as Alternate Source. An on-site standby generator(s) used as an alternate source of power shall comply with (D)(1) through (D)(3):[20:9.6.2.1]
(1) Capacity. The generator shall have sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s). [20:9.6.1.1]
Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted.
(2) Connection. A tap ahead of the generator disconnecting means shall not be required. [NFPA 20:9.6.1.2]
(3) Adjacent Disconnects. The requirements of 430.113 shall not apply.
(E) Arrangement. All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards. [NFPA 20:9.1.4]
Multiple power sources shall be arranged so that a fire at one source will not cause an interruption at the other source.
Substantiation: This revision incorporates the concepts contained in the public proposals on which the panel accepted in whole, in part or in principle. The revision provides correlation and proper extract attribution between Article 695 and the recommendation for Chapter 9 in the 2010 edition of NFPA 20 based on the ROP and ROC actions of the NFPA 20 Technical Committee.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-61 Log #77 NEC-P13 **Final Action: Accept**
(695.3)

Note: This Proposal appeared as Comment 13-114 on Proposal 13-81 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-81 was:
~~**9.2.1.x**~~ **Phase Converters. Phase converters shall not be permitted to be used for fire pump service.**
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: The Technical Correlating Committee directs that the Panel clarify the Panel Action on this Proposal. It was the action of the Technical Correlating Committee that further consideration be given to the comments expressed in the voting.
This action will be considered by the Panel as a Public Comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
Add the following text as a new first level subdivision at the end of 695.3. It is the intent of the panel that this be the last first level subdivision that appears in Section 695.3.
Phase Converters. Phase converters shall not be permitted to be used for fire pump service. [20:9.1.7]
Panel Statement: The panel accepts the TCC direction to clarify their action. This action correlates with NFPA 20 to prohibit the use of phase converters for fire pump service. This requirement was accepted unanimously by the NFPA 20 committee on Proposal 20-54 in the ROP for the 2010 edition of NFPA 20. No comments were submitted to supplement, modify, or reject the unanimous action of the NFPA 20 TC to prohibit the use of phase converters for fire pump service.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MOUTON, C.: The panel action on this proposal needs to be coordinated with the revision to 695.3 provided in Panel Proposal 13-60a. The recommended addition accepted in this proposal is not currently included in the revision proposed in 13-60a.

13-62 Log #78 NEC-P13 **Final Action: Reject**
(695.3)

Note: This Proposal appeared as Comment 13-115 on Proposal 13-82 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-82 was:

Revise 695.3, 695.4, 695.5, as required to match corresponding text from NFPA-20 Clauses 9.2 and etc.

Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle per CMP-13 Panel Action. Do not Reject the proposal.
Substantiation: This proposal does meet the requirements of Section 4-3.3 Regulations Governing Committee Projects since five pages of supporting material were on file with the NFPA as stated in the ROP. This material was part of the proposal material sent to CMP-13 members. This material is essentially identical with the text proposed in Proposal 13-77.

I don't know why the TCC changed the Panel vote from AIP to Reject. TCC doesn't state how 4.3.3 is violated.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided text to be added after the scope of each article. This proposal does not meet the requirements of 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-63 Log #79 NEC-P13 **Final Action: Accept in Principle**
(695.3)

Note: This Proposal appeared as Comment 13-116 on Proposal 13-77 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-77 was:

Revise extracted text from NFPA 20 to reflect 2006 edition revisions. Following is the NFPA 20 - Chapter 9 text as it has been voted on by the NFPA 20 Committee to date.

NFPA 20 - DRAFT

Chapter 9 Electric Drive for Pumps

9.1 General.

9.1.1 This chapter covers the minimum performance and testing requirements of the sources and transmission of electrical power to motors driving fire pumps.

9.1.2 Also covered are the minimum performance requirements of all intermediate equipment between the source(s) and the pump, including the motor(s) but excepting the electric fire pump controller, transfer switch, and accessories (see Chapter 10).

9.1.3 All electrical equipment and installation methods shall comply with NFPA 70, National Electrical Code, Article 695, and other applicable articles.

9.1.4* All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.

9.1.5 All power supplies shall have the capacity to run the fire pump on a continuous basis.

9.1.6 All power supplies shall comply with the voltage drop requirements of Section 9.7.

9.2 Normal Power.

9.2.1 An electric motor driven fire pump shall be provided with a normal source of power as a continually available source.

9.2.2 The normal source of power required in 9.2.1 and its routing shall be arranged in accordance with one of the following:

(1) Service connection dedicated to the fire pump installation.

(2) On-site power production facility connection dedicated to the fire pump installation.

(3) A dedicated feeder connection derived directly from the dedicated service to the fire pump installation.

(4) As a feeder connection where all of the following conditions are met:

a. The protected facility is part of a multi-building campus style arrangement.

b. A back-up source of power is provided from a source independent of the normal source of power.

c. It is impractical to supply the normal source of power through arrangement 9.2.2(1), 9.2.2(2), 9.2.2(3) or 9.2.2(5).

d. The arrangement is acceptable to the authority having jurisdiction.

e. The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s).

(5) A dedicated transformer connection directly from the service meeting the requirements of Article 695 of NFPA 70.

9.2.3 For fire pump installations using the arrangement of 9.2.2(1), 9.2.2(2),9.2.2(3), 9.2.2(5) for the normal source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller.

9.2.3.1 Where the disconnecting means permitted by 9.2.3 is installed, the disconnecting means shall meet all of the following:

(1) Identified as being suitable for use as service equipment.

(2) Lockable in the closed position.

(3) * Located remote from other building disconnecting means.

(4) * Located remote from other fire pump source disconnecting means.

(5) Marked "Fire Pump Disconnecting Means" in letters that are no less than one inch (25 mm) in height and that can be seen without opening enclosure doors or covers.

9.2.3.2 Where the disconnecting means permitted by 9.2.3 is installed, a placard shall be placed adjacent to the fire pump controller stating the location of this disconnection means and the location of any key needed to unlock the disconnect.

9.2.3.3 Where the disconnecting means permitted by 9.2.3 is installed, the disconnect shall be supervised in the closed position by one of the following methods:

(1) Central station, proprietary or remote station signal device

(2) Local signaling service that will cause the sounding of an audible signal at a constantly attended location

(3) Locking the disconnecting means in the closed position

(4) Sealing of disconnecting means and approved weekly recorded inspections where the disconnecting means are located within fenced enclosures or in buildings under the control of the owner

9.2.3.4 Where the overcurrent protection permitted by 9.2.3 is installed, the overcurrent protection device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment.

9.3 Alternate power.

9.3.1 Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided when the height of the structure is beyond the pumping capacity of the fire department apparatus.

9.3.2* Except for an arrangement described in 9.3.3, at least one alternate source of power shall be provided where the normal source is not reliable.

9.3.3 An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard.

9.3.4 When provided, the alternate source of power shall be supplied from one of the following sources:

(1) A generator installed in accordance with Section 9.8.

(2) One of the sources identified in 9.2.2(1); 9.2.2(2); 9.2.2(3); or 9.2.2(5) when the power is provided independent of the normal source of power.

9.3.5 When provided, the alternate supply shall be arranged so that the power to the fire pump is not disrupted when overhead lines are de-energized for fire department operations.

9.4 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.

9.4.1 The junction box shall be securely mounted.

9.4.2* Mounting and installing of a junction box shall not violate the enclosure Type (NEMA) rating of the fire pump controller(s).

9.4.3* Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the Short Circuit Rating of the controller(s).

9.4.4 As a minimum, a National Electrical Manufacturers Association (NEMA) Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed f or the subject to match the fire pump controller enclosure Type rating.

9.4.5 Terminals, junction blocks, splices, and the like, when used, shall be listed.

9.5* Listed Electrical Circuit Protective System to Controller Wiring.

9.5.1* Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with NFPA 70.

9.5.2 Single (individual conductors) shall not enter the fire pump enclosure separately.

9.5.3* Where required by the manufacturer of a listed Electrical Circuit Protective System or by NFPA 70 or by the Listing agency, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer or listing agency.

9.5.4 Standard wiring between junction box and controller is acceptable.

9.6* Raceway Terminations.

9.6.1 Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.

9.6.2 The NEMA Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.

9.6.3 The installation instructions of the manufacturer of the fire pump controller shall be followed.

9.6.4 No alterations to the fire pump controller, other than conduit entry as allowed by NFPA 70, shall be approved by the authority having jurisdiction.

9.7* Voltage Drop.

9.7.1 Unless the requirements of 9.4.2 are met, the voltage at the controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor-starting conditions.

9.7.2 The requirements of 9.7.1 shall not apply to emergency run mechanical starting. (See 10.5.3.2.)

9.7.3 The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.

9.8 Motors.

9.8.1 General.

9.8.1.1 All motors shall comply with NEMA MG-1, Motors and Generators, shall be marked as complying with NEMADesign B standards, and shall be specifically listed for fire pump service. (See Table 9.8.1.1.)

Table 9.8.1.1 Horsepower and Locked Rotor Current Motor Designation for NEMA Design B Motors

9.8.1.2 The requirements of 9.8.1.1 shall not apply to direct-current, high-voltage (over 600 V), large-horsepower [over 373 kW (500 hp)], single-phase, universal-type, or wound-rotor motors, which shall be permitted to be used where approved.

9.8.1.3 Motors used with variable speed controllers shall additionally meet the applicable requirements of NEMA MG1, Part 31 and shall be marked for inverter duty.

9.8.1.4* The corresponding values of locked rotor current for motors rated at other voltages shall be determined by multiplying the values shown by the ratio of 460 V to the rated voltage in Table 9.8.1.1.

9.8.1.5 Code letters of motors for all other voltages shall conform with those shown for 460 V in Table 9.8.1.1.

9.8.1.6 All motors shall be rated for continuous duty.

9.8.1.7 Electric motor–induced transients shall be coordinated with the provisions of 10.4.3.3 to prevent nuisance tripping of motor controller protective devices.

9.8.1.8 Motors for Vertical Shaft Turbine–Type Pumps.

9.8.1.8.1 Motors for vertical shaft turbine–type pumps shall be dripproof, squirrel-cage induction type.

9.8.1.8.2 The motor shall be equipped with a nonreverse ratchet.

9.8.2 Current Limits.

9.8.2.1 The motor capacity in horsepower shall be such that the maximum motor current in any phase under any condition of pump load and voltage unbalance shall not exceed the motor-rated full-load current multiplied by the service factor.

9.8.2.2 Where the motor is used with a variable speed pressure limiting controller, the service factor shall not be used.

9.8.2.3 The maximum service factor at which a motor shall be used is 1.15.

9.8.2.4 These service factors shall be in accordance with NEMA MG-1, Motors and Generators.

9.8.2.5 General-purpose (open and dripproof) motors, totally enclosed fan-cooled (TEFC) motors, and totally enclosed nonventilated (TENV) motors shall not have a service factor larger than 1.15.

9.8.2.6 Motors used at altitudes above 1000 m (3300 ft) shall be operated or derated according to NEMA MG-1, Motors and Generators, Part 14.

9.8.3 Marking.

9.8.3.1 Marking of motor terminals shall be in accordance with NEMA MG-1, Motors and Generators, Part 2.

9.8.3.2 A motor terminal connecting diagram for multiple lead motors shall be furnished by the motor manufacturer.

9.9 On-Site Standby Generator Systems.

9.9.1 Capacity.

9.9.1.1 Where on-site generator systems are used to supply power to fire pump motors to meet the requirements of 9.3.2, they shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load(s) while meeting the requirements of Section 9.7.

9.9.1.2 A tap ahead of the on-site generator disconnecting means shall not be required.

9.9.2* Power Sources.

9.9.2.1 These power sources shall comply with Section 9.7 and shall meet the requirements of Level 1, Type 10, Class X systems of NFPA 110, Standard for Emergency and Standby Power Systems.

9.9.2.2 The fuel supply capacity shall be sufficient to provide 8 hours of fire pump operation at 100 percent of the rated pump capacity in addition to the supply required for other demands.

9.9.3 Sequencing. Automatic sequencing of the fire pumps shall be permitted in accordance with 10.5.2.5.

9.9.4 Transfer of Power. Transfer of power to the fire pump controller between the normal supply and one alternate supply shall take place within the pump room.

9.9.5* Protective Devices. Where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump.

Submitter: Jim Pauley, Square D Company

Recommendation: Revise 695.3 from the ROP Draft to read as follows:

695.3 Power Source(s) for Electric Motor-Driven Fire Pumps. Electric motor-driven fire pumps shall have a reliable source of power.

(A) Individual Sources. Where reliable, and where capable of carrying indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply, the power source for an electric motor driven fire pump shall be one or more of the following.

(1) Electric Utility Service Connection. A fire pump shall be permitted to be supplied by a separate service, or from a connection located ahead of and not within the same cabinet, enclosure, or vertical switchboard section as the service disconnecting means. The connection shall be located and arranged so as to minimize the possibility of damage by fire from within the premises and from exposing hazards. A tap ahead of the service disconnecting means shall comply with 230.82(5). The service equipment shall comply with the labeling requirements in 230.2 and the location requirements in 230.72(B). [NFPA 20:9.2.2]

(2) On-Site Power Production Facility. A fire pump shall be permitted to be supplied by an on-site power production facility. The source facility shall be located and protected to minimize the possibility of damage by fire. [NFPA 20:9.2.3]

(3) Dedicated Feeder. A dedicated feeder shall be permitted where it is derived from a service connection as described in 695.3(A)(1).

(B) Multiple Sources. Where reliable power cannot be obtained from a source described in 695.3(A), power shall be supplied one of the following:

(1) Two Individual Sources. ~~from a~~ An approved combination of two or more of ~~either of such sources~~ the sources from 695.3(A).

(2) Individual Source and Generator. An approved combination of one or more of the sources in 695.3(A) and an on-site generator complying with 695.3(D). ~~or from an approved combination of feeders constituting two or more power sources as covered in 695.3(B)(2), or from an approved combination of one or more of such power sources in combination with an on-site standby generator complying with 695.3(B)(1) and (B)(3).~~

(C) Multibuilding Campus-Style Complexes. Where the sources in 695.3(A) are not practicable and the installation is part of a multibuilding campus style complex, feeder sources shall be permitted where approved by the authority having jurisdiction and installed in accordance with (1) or (2).

(1) Two Feeder Sources. Two feeders shall be permitted as more than one power source where such feeders are connected to or derived from separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B).

(2) Feeder and Alternate Source. A feeder shall be permitted as a normal source of power when an alternate source of power independent from the feeder is provided. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B).

~~**(1) Generator Capacity.** An on-site generator(s) used to comply with this section shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted. A tap ahead of the on-site generator disconnecting means shall not be required. The requirements of 430.113 shall not apply. [NFPA 20:9.6.1]~~

~~**(2) Feeder Sources.** This section applies to multibuilding campus-style complexes with fire pumps at one or more buildings. Where sources in 695.3(A) are not practicable, and with the approval of the authority having jurisdiction, two or more feeder sources shall be permitted as one power source or as more than one power source where such feeders are connected to or derived from separate utility services. The connection(s), overcurrent protective device(s), and disconnecting means for such feeders shall meet the requirements of 695.4(B). [NFPA 20:9.2.5.3]~~

~~**(3) Arrangement.** The power sources shall be arranged so that a fire at one source will not cause an interruption at the other source. [NFPA 20:9.2.5.1]~~

(~~1~~D) Generator ~~Capacity~~ as Alternate Source. ~~An~~ Where an on-site generator(s) is used ~~to comply with this section~~ as an alternate source of power. The following shall apply:

(1) Capacity. The generator shall have ~~shall be of~~ sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted.

(2) Connection. A tap ahead of the on-site generator disconnecting means shall not be required.

(3) Adjacent Disconnects. The requirements of 430.113 shall not apply.

~~**(3)**~~ **(E) Arrangement.** The power sources shall be arranged so that a fire at one source will not cause an interruption at the other source. [NFPA 20:9.2.5.1]

Substantiation: This comment is to revise the layout and arrangement of 695.3 to provide a more logical approach to the power sources. The following list explains each of the revisions:

1. 695.3(A)(1) and (2) are unchanged from the present text
2. 695.3(A)(3) is new and intended to pick up the provision that recognizes a feeder derived from a service connection. The reference to 695.3(A)(1) would recognize that the feeder may come from a dedicated service (but the service conductors don’t go directly to the FP controller) or from a tap ahead of the main. This is the same provision accepted by the panel in Proposal 13-77 as 695.4(B)(3)
3. 695.3(B) is rearranged to create a list of the two provisions dealing with combinations of sources. Item 1 captures the combination of two of the sources

recognized in 695.3(A). Item 2 captures the basic combination of a 695.3(A) source and an on-site generator. The provisions for the generator are moved to create a new 695.3(D), so that reference is given here. These two provisions of this list are recognized in the current text of 695.3(B).
4. 695.3(C) is a new section to cover the multi-building campus installations with more clarity. The intro paragraph captures the three requirements in the present text that the sources in 695.3(A) are not practicable, that the AHJ approve the use of the feeder source and that you have a multi-building campus application. The paragraph then allows either of two options to be used
a. Item (1) covers the application of two feeder sources. This provision is already allowed in the current 695.3(B) and recognizes that you can utilize two feeders from separate utility services as more than one power source. The provision that any disconnects and overcurrent devices comply with 695.4(B) is captured.
b. Item (2) will recognize a feeder along with an alternate source. This provision was accepted by the panel in Proposal 13-77 as section 695.4(B)(4). This addition will correct what has been a significant issue in Article 695 since the present article did not recognize a feeder and on-site generator as an acceptable combination. It should be noted that the text maintains the panel accepted text (from Proposal 13-77) of "alternate power source independent of the feeder" instead of referencing an on-site generator specifically.
c. It is also important to point out that the provision from Proposal 13-77 regarding selective coordination of the overcurrent devices is specifically omitted. This provision (regardless of whether it is in NFPA 20 or not) creates significant technical concern. Keep in mind that the overcurrent devices in the fire pump feeder must be capable of carrying locked rotor current. So a 100A fire pump would have a 600A overcurrent device upstream. If for example, this were an 800A service, the next feeder device upstream (which may be shared with other parts of the system) may have to be 1200A to gain pure selectivity. This could potentially require that the entire system be much larger than needed for the installation, just to accomplish selective coordination. There is no technical basis for requiring that the fire pump feeder be selectively coordinated.
5. The "Generator Capacity" section is moved from 695.3(B)(1) to become 695.3(D). This section is also editorially rearranged to break the three requirements of the generator into three sections titled "Capacity", "Connection" and "Adjacent Disconnects".
695.3(E) is the old 695.3(B)(3) regarding arrangement of the power sources. This placement will allow it to apply to the multiple sources of both (B) and (C).
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on panel proposal 13-60a meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-64 Log #80 NEC-P13 **Final Action: Accept in Principle**
(695.3)

Note: This Proposal appeared as Comment 13-117 on Proposal 13-81 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-81 was:
~~9.2.1.x~~ **Phase Converters. Phase converters shall not be permitted to be used for fire pump service.**
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept the Proposal to prohibit phase converters.
Substantiation: Phase converters are prohibited by NFPA-20. My substantiation is confusing; but, the NFPA-20 Technical Committee via Action on Proposal 20-71 (Log #59) and on Comments 20-8 (Log #38) and 20-42 (Log #37) prohibits phase converters as unsuitable for fire pump service. One reason is imbalances that occur with varying loads. Another is adding another energy converter in the critical path. Another problem is keeping the controller energized at all times.
This is consistent with Panel Action on Proposal 13-77 and also with my Comment suggesting revisions to 13-77.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-61 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-65 Log #81 NEC-P13 **Final Action: Accept**
(695.3, FPN (New))

Note: This Proposal appeared as Comment 13-119 on Proposal 13-83 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-83 was:
Insert a fine print note ahead of 695.3(A) as follows:
FPN: NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, provides information on the characteristics of reliable power sources in Annex A, item A.9.2.4.
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77. This action will be considered by the Panel as a Public Comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
The panel affirms their actions on the subject proposal and comment from the 2008 NEC revision cycle.
Panel Statement: The panel accepts the recommendation of the TCC to review their action on Proposal 13-83 and Comment 13-119 in the 2008 NEC ROP and ROC, and the panel continues to reject the proposal and comment. Section 695.1 contains a fine print note referencing NFPA 20, and it is unnecessary to create repetitive fine print notes.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-66 Log #82 NEC-P13 **Final Action: Reject**
(695.3, FPN (New))

Note: This Proposal appeared as Comment 13-120 on Proposal 13-83 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-83 was:
Insert a fine print note ahead of 695.3(A) as follows:
FPN: NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection, provides information on the characteristics of reliable power sources in Annex A, item A.9.2.4.
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle Public Proposal 13-83.
Substantiation: At the risk of a small amount of redundancy, this reference back to NFPA-20 on characteristics of a "reliable power source" is vital and a source of daily confusion and conflicts. The intent is to aid plan approval and inspection agencies and other AHJs in resolving conflicts. Note that the submitter of Proposal 13-81, F. Hartwelll, is both an AHJ and is also very familiar with fire pump installations; but, is seeking this additional guidance. This is also important since NFPA-70 has far wider distribution than NFPA-20. Hopefully, this reference will lead readers to NFPA-20 clause A.9.3.2 which has several paragraphs of guidance on this topic.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 13-65.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-67 Log #83 NEC-P13 **Final Action: Accept**
(695.3(A)(3) (New))

Note: This Proposal appeared as Comment 13-121 on Proposal 13-84 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-84 was:
Revise text to read:
695.3(A)(3) In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, a fire pump shall be permitted to be supplied by a single feeder from a site-wide power distribution system.
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Reject this proposal.
Substantiation: This is extract text from NFPA-20. The proposal should go to the NFPA-20 Technical Committee.
Five methods are now allowed for supplying fire pump controllers. Included is the transformer connection which can be and is used at low voltage, medium voltage and high voltage.
Panel Meeting Action: Accept
Panel Statement: This panel action is to reject the concept recommended in Proposal 13-84 in the 2008 NEC ROP. The panel continues to reject the intent of Proposal 13-84. The power supply for a fire pump is under the purview of NFPA 20. A single feeder is not considered a reliable source of power.
A single feeder supply from a site wide power distribution system must still have appropriate reliability and this reliability is not dependent upon an industrial facility or any other facility. The reliability is determined on the power source and how often loss of power occurs.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
DEGNAN, J.: The panel should refine the statement " A single feeder is not considered a reliable source of power" to agree with the intent of 695.3(A).

13-68 Log #84 NEC-P13 **Final Action: Accept**
(695.3(A)(3) (New))

Note: This Proposal appeared as Comment 13-122 on Proposal 13-85 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-85 was:
Add new text to read:
695.(A)(3): Where redundant fire pumps are installed to protect a facility, and where the power source to each fire pump is independent (or where a diesel fire pump serves as the redundant pump for an electric pump), a single feeder shall be permitted as a reliable source.
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Reject this proposal.
Substantiation: This is extract text from NFPA-20. The proposal should go to the NFPA-20 Technical Committee.
Five methods are now allowed for supplying fire pump controllers. Included is the transformer connection which can be and is used at low voltage, medium voltage and high voltage.
The issue of deviation being justified by a redundant pump is proper matter for the AHJ and the specific installation.
Panel Meeting Action: Accept
Panel Statement: See the panel action and statement on Proposal 13-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-69 Log #85 NEC-P13 **Final Action: Reject**
(695.3(A)(3) (New))

Note: This Proposal appeared as Comment 13-123 on Proposal 13-84 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-84 was:
Revise text to read:
695.3(A)(3) In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, a fire pump shall be permitted to be supplied by a single feeder from a site-wide power distribution system.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add text to read as follows:
<u>695.3(A)(3) In industrial establishments only, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, a fire pump controller shall be permitted to be supplied power by a single feeder from disconnect dedicated to the fire water pump in a site-wide power distribution system located sufficiently remote from the facilities served as to minimize the possibility of damage to the fire pump service by fire from within the facilities.</u>
Substantiation: This comment modifies the original proposal to address comments concerning security, segregation and safety of the feeder to the fire pump controller during a fire. The intent of this change is to address the needs of large industrial concerns which purchase power at a high voltage where a second disconnect and transformer for a fire pump service as required 695.3(A)(1) is impractical while still maintaining the ability of the fire fighters to quickly isolate power to the facility on fire while retaining a power supply to the fire pumps. This proposal permits these large industrial concerns to provide service to fire water pumps which is identical physically to that used by concerns which purchase power at a medium voltage. This modified proposal adds the requirement that the service be separate from the disconnect for power to the facilities and is sufficiently remote from the facilities to not be at risk of damage by the fire. Since power purchased at higher voltage is generally more reliable and the additional high voltage disconnect and transformer are not required, this installation is actually more reliable than what is permitted.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-67.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept the proposal. The panel action and statement references to the action taken on Proposal 13-67 which is not appropriate for this proposal. Proposal 13-69 has substantial additions to the referenced 2008 Proposal 13-84 referenced in Proposal 13-67. Proposal 13-69 provides additional language to address concerns for security, segregation, and safety of the feeder to the fire pump controller for industrial establishments. The panel action taken on Proposal 13-67 should not have been carried over to this proposal without greater consideration and discussion about the particular aspects of this proposal. Industrial establishments have a long history of highly reliable electrical power distribution on single feeders to very important services. Industrial power systems are frequently served by two power sources, with a low frequency of loss of power to the facility. Qualified persons service the installation, which maintains a high degree of reliability in the supply to dedicated important services. The panel statement says that the "power supply is under the purview of NFPA 20. This is correct, but in many situations the AHJ judges specifically on the literal wording of the NEC, and does not reference NFPA 20.

13-70 Log #86 NEC-P13 **Final Action: Reject**
(695.3(A)(3) (New))

Note: This Proposal appeared as Comment 13-124 on Proposal 13-85 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-85 was:
Add new text to read:
695.(A)(3): Where redundant fire pumps are installed to protect a facility, and where the power source to each fire pump is independent (or where a diesel fire pump serves as the redundant pump for an electric pump), a single feeder shall be permitted as a reliable source.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add text to read as follows:
<u>695.3 (A)(3) An alternative source of power to the electric fire pump motor is not required where a back-up engine or back-up steam turbine driven fire pump is installed. [NFPA 20:9.3.3]</u>
Substantiation: The revised wording is a direct quote from NFPA 20 and addresses part of the intent of the original proposal.
Panel Meeting Action: Reject
Panel Statement: The requirements of Article 695 cover electrically driven fire pumps. Coordination between the power supply performance requirements in Chapter 9 of NFPA 20 with the electrical installation requirements in Article 695 has to occur during the design phase of the project. NFPA 20 contains several performance based requirements in addition to the one that is being proposed. Approval of fire pump installations is typically not the sole responsibility of the electrical AHJ.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
LITTLE, L.: We agree with the part of the panel statement that states: coordination between the performance requirements in Chapter 9 of NFPA 20 and the electrical installation requirements in Article 695 must occur during the design phase of a project.
However, the submitter is correct. NFPA 20 does not require an alternate source of electrical power if a back-up engine driven or back-up steam turbine driven fire pump is installed as follows:
"NFPA 20, 9.3.3. An alternate source of power is not required where a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with this standard."
This information should be inserted in Article 695 as a fine print note for clarity and usability. Users of the NEC do not necessarily own a copy of NFPA 20, nor are they familiar with this document. Users of the NEC including the enforcement community, rely on Article 695 for all prescriptive electrical requirements necessary. We believe that it is necessary to inform the user of the NEC that an alternate source of electrical power is not required if a back-up engine driven or back-up steam turbine driven fire pump is installed in accordance with NFPA 20.

13-71 Log #87 NEC-P13 **Final Action: Reject**
(695.3(B))

Note: This Proposal appeared as Comment 13-125 on Proposal 13-95 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-95 was:
Add new text to read:
695(B)(3) Phase Converters. Where the only source of utility power is a single-power source, a phase converter may be utilized as one of the multiple sources of supply to a three-phase fire pump motor. [Note: Change current B(3) to B(4).]
Submitter: Patrick Gaffney, Ronk Electrical Industries, Inc.
Recommendation: New text as proposed in Proposal 13-95 should be Accepted. "Reliable" sources are defined in 695.3(A). All other sources by definition, are not "reliable", and, therefore, require multiple sources. If no utility supplied three-phase source is available but a single-phase source is, a phase converter could be utilized as one of the "unreliable" multiple sources, either as back-up or primary to the generator source(s). Many rural or suburban areas do not have readily available three-phase sources of utility power available, and at least with a phase converter, they would have a utility supplied source available. Also, the proposal limits their use, by stating "where the only source of utility power is a single-phase source,...".
Substantiation: Generators, unless considered an "on-site power production facility" [per 695.3(A)], are also considered "unreliable" by definition. If multiple sources are required, wouldn't a utility supplied source be preferable to multiple generators? Maintenance of generator systems is not always as it should be, and even if it is, that is not always a guarantee of proper performance. Phase converters at least give the option of using a utility

supplied source as either a back-up (or primary) source to a generator system. Phase converters have been utilized in many pumping systems, including fire pumps, for many decades with success, and are a recognized part of the code (Article 455).

Panel Meeting Action: Reject

Panel Statement: See panel actions and statements on Proposals 13-61 and 13-64. NFPA 20 prohibits the use of phase converters for fire pump service. This requirement is under the purview of the NFPA 20 technical committee and any action on this requirement has to be addressed to the committee.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-72 Log #660 NEC-P13 **Final Action: Reject**
(695.3(B)(1))

Submitter: Harold F. Willman, Colorado Code Consulting

Recommendation: Revise text to read as follows:

(1) Generator Capacity. An onsite generator(s) used to comply with this section shall be of sufficient capacity to <u>indefinitely carry the locked-rotor current of the fire pump motors(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment</u> ~~allow normal starting and running of the motor(s) driving the fire pump(s)~~ while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted. A tap ahead of the onsite generator disconnecting means shall not be required. The requirements of 430.113 shall not apply. [20:9.6.1]

Substantiation: The current text of 695.4(B)(1) requires the overcurrent protective device(s) to be the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment. The generator cannot provide this amount of power if the capacity is only normal starting and running of the motor(s) driving the fire pump(s). Why would the capacity of the generator not be at least equal to the overcurrent protective device requirements? When the generator also supplies other emergency loads with separate transfer switches, the generator should not fail if the fire pump goes into a locked-rotor condition.

Panel Meeting Action: Reject

Panel Statement: Section 9.6.1.1 of NFPA 20-2007 does not require a standby generator to carry locked rotor current indefinitely.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-73 Log #2318 NEC-P13 **Final Action: Reject**
(695.3(B)(1))

Submitter: Dale Rooney, Municipality of Anchorage

Recommendation: Add a second paragraph to read - <u>Where an on-site standby generator also supplies an Emergency System, a legally Required Standby System or both the generator capacity shall not be less than 225% of the fire pump motor plus 100% the calculated loads of the required systems.</u>

Substantiation: The present language, based on NFPA 20, is only intended to insure operation of the fire pump itself and does not recognize the importance of protecting other systems. This prescriptive requirement will provide a margin of safety that will help protect required systems.

Panel Meeting Action: Reject

Panel Statement: Requirements for standby generators supplying emergency and legally required standby systems are addressed in Articles 700 and 701. The substantiation does not provide the technical basis for the recommended sizing requirements.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-74 Log #2909 NEC-P13 **Final Action: Reject**
(695.3(B)(1))

Submitter: Thomas Guida, TJG Services, Inc.

Recommendation: Revise text to read as follows:

695.3(B)(1) Generator Capacity. An onsite generator(s) used to comply with this section shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted. ~~A tap ahead of the onsite generator disconnecting means shall not be required. The requirements of 430.113 shall not apply.~~ [**20:**9.6.1]

Substantiation: 695.4(A) requires a dedicated disconnect at the generator source, which implies a tap ahead of the generator disconnecting means is required.

Panel Meeting Action: Reject

Panel Statement: The purpose of not requiring a tap ahead of the generator disconnecting means is so the generator complies with the requirements in Section 445.18 for disconnecting the power from the generator for maintenance purposes. A single disconnect can be installed in the generator and the feeder to the fire pump transfer switch can be supplied from the load side of the generator disconnecting means. See the panel action on Panel Proposal 13-77a.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-75 Log #4043 NEC-P13 **Final Action: Reject**
(695.3(B)(1))

Submitter: Michael Kirchner, Generac Power Systems

Recommendation: Revise text to read as follows:

(1) Generator Capacity. An on-site generator(s) used to comply with this section shall be of sufficient capacity to allow normal starting and running of the motor(s) driving the fire pump(s) while supplying all other simultaneously operated load. Automatic shedding of one or more optional standby loads in order to comply with this capacity requirement shall be permitted. A tap ahead of the on-site generator disconnecting means shall not be required. <u>The on-site generator overcurrent protective device(s) for the electric-drive fire pump are not required to be sized for locked-rotor current of the fire pump motor(s). Rather, the circuit components of the alternative source are permitted to be sized according to Article 430, provided they are selected or set to allow instantaneous pickup and running of the fire pump load. The requirements of 430.113 shall not apply.</u>

Substantiation: As a generator manufacturer, we see a significant amount of confusion on this section of code in the market. We receive numerous requests for fire pump breakers on the generator that are mag-only or thermal magnetic breakers sized to carry locked rotor amps indefinitely. We believe that this confusion is caused by the various other statements in 695 seeming to call for this action. In particular, statements like “set to carry indefinitely the sum of locked rotor current” (695.4(B)(1)) and “power circuits shall not have automatic protection against overloads...conductors shall be protected against short circuit only” (695.6(D)) are driving the confusion about breaker(s) sizing from the generator source to the fire pump controller. In general, it is our opinion that the market is not understanding that the requirements from the alternative generator source are significantly different than the utility source.

We are particularly concerned that the market is often using mag-only breakers in fire pump applications. This concerns us because mag-only breakers are only UL listed to be used in motor starters which utilize associated overcurrent protection.

To rectify this confusion, we are requesting that the text that has been in the NEC handbook since 1996 be moved into the code to clarify the codes intent in relative to overcurrent devices from the alternative power source.

Panel Meeting Action: Reject

Panel Statement: In the second to the last sentence in the second paragraph of Section 695.4(B), it is already stated: “Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized according to 430.62 (for motor feeder applications) to provide short circuit protection only,” so adding the recommended text to 695.3(B)(1) is unnecessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-76 Log #1410 NEC-P13 **Final Action: Reject**
(695.3(B)(1) and (3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text of as follows:

(1) An onsite generator(s) used to comply with this section shall be ~~of sufficient capacity~~ <u>capable of allowing</u> normal starting and running of the motors...”. (remainder unchanged).

(3) The power sources shall be <u>located</u> ~~arranged~~ so that a <u>localized</u> fire <u>or other occurrence</u> at one source <u>is not likely to</u> cause an interruption at the other source <u>or the circuits supplied from it.</u>

Substantiation: Occurrences other than fire should be included. Locations cannot ensure that a fire at one source will not spread to another location. "Likely" is a term used in many sections.
Panel Meeting Action: Reject
Panel Statement: The existing text in (1) is the text from Section 9.6.1.1 in NFPA 20-2007 covering "sufficient capacity" and is necessary for continuity between the two documents on this issue. The proposed changes to (3) are specifically dealing with fire at a power source not affecting another source. There was no technical substantiation provided to justify these changes.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-77 Log #3756 NEC-P13 **Final Action: Accept in Principle**
(695.3(B)(2))

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Replace the text of 695.3(B)(2) with the following:
(2) Feeder Sources. The normal power source to supply a fire pump installation shall be permitted to be a feeder in accordance with a or b [20:9.2.2]:
a. Dedicated Feeder. Where the feeder is dedicated to the fire pump and the feeder derived from a service that is dedicated to the fire pump. b. Multi-Building Campus Style Arrangements. Where installed in accordance with all of the following conditions:
1. The protected building is part of a multi-building campus style arrangement.
2. An additional power source is supplied that is independent of the normal power source
3. It is impractical to supply the normal source of power through arrangement specified in 695.3(A)
4. The arrangement is acceptable to the authority having jurisdiction.
Substantiation: The provisions for 695.3(B) are currently out of sync with the requirements of NFPA 20. Originally in FNPA 20, there were a number of convoluted rules involving feeder sources to fire pumps that were carried over to the NEC. Since that time, the NFPA 20 committee has revised the feeder requirements to be more practical but the NEC provisions have not been revised.

This proposal will replace the current NEC text dealing with feeder sources with text extracted from NFPA 20. The extract reference is shown directly after the main paragraph language in proposed (2).

Item "a" is added to recognize that a fire pump can be supplied by a dedicated service, but through a feeder arrangement. This is what happens each time a service connection specified in 695.3(A)(1) becomes a supervised connection with a disconnect and overcurrent device as recognized in 695.4(B). When the OCP is placed in the circuit, it now becomes a feeder and this new text simply recognizes that as an acceptable source.

Item "b" becomes the multi-building campus arrangement text. In the current NEC, the text requires that you have two feeders for the single normal power source. This need for two feeders is now eliminated from NFPA 20 and the text here can be simplified. The list of items 1 through 4 comes directly from NFPA 20 9.2.2(4).

This greatly simplifies the feeder source requirements and makes it consistent with NFPA 20.

It is important to note that there is an additional 5th provision in NFPA 20 9.2.2 that was not extracted. The provision states: "The overcurrent protection device(s) in each disconnecting means shall be selectively coordinated with any other supply side overcurrent protective device(s)."

The rational for not extracting this provision into the NEC is that it creates significant electrical system issues. Keep in mind that that Article 695 requires that devices installed in the circuit dedicated to the fire pump be sized at locked rotor current. So for a 100A fire pump the first overcurrent device upstream would be a 600A circuit breaker. If this 600a circuit breaker was being supplied from an 800a service (which is not impractical a size for a building with a 100A fire pump) – you would have to upsize the entire service to the building just to accommodate the selective coordination aspect of the fire pump. This is a huge expense for absolutely no gain in safety. When would the selectivity requirement add any value? The fire pump controller already handles overloads and even high short circuits that would occur on the fire pump itself. If the actual normal feeder is the source of the fault, selectivity for purposes of the fire pump is irrelevant because either the 600A CB is going to open or the main is going to open. Either way, there is still no normal power to the fire pump.

In short, this provision needs to be removed from NFPA 20 – not extracted into the NEC. The NFPA 20 committee has created a rule that significantly impacts the balance of the electrical system which is outside of their committee scope.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel accepts the recommendation to revise 695.3(B). See the panel action on panel proposal 13-60a. The selective coordination requirement exists as part of the performance requirements in Section 9.2.2 in NFPA 20, and this panel cannot amend those requirements.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-77a Log #CP1301 NEC-P13 **Final Action: Accept**
(695.4)

Submitter: Code-Making Panel 13,
Recommendation: Revise Section 695.4 to read:
695.4 Continuity of Power.
Circuits that supply electric motor-driven fire pumps shall be supervised from inadvertent disconnection as covered in 695.4(A) or (B).
(A) Direct Connection. The supply conductors shall directly connect the power source to either a listed fire pump controller or listed combination fire pump controller and power transfer switch.
(B) Connection Through Disconnecting Means and Overcurrent Device.
(1) Number of Disconnecting Means.
a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between the fire pump power source(s) and one of the following: [20:9.1.2]
(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch
b. Feeder Sources. For systems installed under the provisions of 695.3(B)(2) only, additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.
c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted.
(2) Overcurrent Device Selection. Overcurrent devices shall comply with a or b.
a. Individual Sources. Overcurrent protective device(s)shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. Where the locked rotor current value does not correspond to a standard overcurrent device size, the next standard overcurrent device size shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).[20:9.2.3.4]
b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with 430.62 to provide short-circuit protection only. [20:9.6.1.1]
(3) Disconnecting Means. All disconnecting devices that are unique to the fire pump loads shall comply with items a through d. [20:9.2.3.1]
a. Features and Location. The disconnecting means shall comply with all of the following:
(1) Be identified as suitable for use as service equipment
(2) Be lockable in the closed position
(3) Not be located within equipment that feeds loads other than the fire pump
(4) Be located sufficiently remote from other building or other fire pump source disconnecting means such that inadvertent operation at the same time would be unlikely
b. Disconnect Marking. The disconnecting means shall be marked "Fire Pump Disconnecting Means." The letters shall be at least 25 mm (1 in.) in height, and they shall be visible without opening enclosure doors or covers. [20:9.2.3.1(5)
c. Controller Marking. A placard shall be placed adjacent to the fire pump controller, stating the location of this disconnecting means and the location of the key (if the disconnecting means is locked). [20:9.2.3.2]
d. Supervision. The disconnecting means shall be supervised in the closed position by one of the following methods: [20:9.2.3.3]
(1) Central station, proprietary, or remote station signal device
(2) Local signaling service that causes the sounding of an audible signal at a constantly attended point
(3) Locking the disconnecting means in the closed position
(4) Sealing of disconnecting means and approved weekly recorded inspections when the disconnecting means are located within fenced enclosures or in buildings under the control of the owner [20:9.2.3.3]
Substantiation: This revision incorporates the concepts contained in the public proposals on which the panel accepted in whole, in part or in principle. The revision provides correlation and proper extract attribution between Article 695 and the recommendation for Chapter 9 in the 2010 edition of NFPA 20 based on the ROP and ROC actions of the NFPA 20 Technical Committee.

Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
CARON, D.: Although I agree with the panel decision and statement, the revised section 695.4 (B)(3) now requires the disconnecting means from an on-site standby generator to comply with the provisions of "sufficiently remote". I do not believe this is the intent of NFPA 20. Additional wording, or an exception should be provided to clarify the requirements for the disconnecting means from an on-site standby generator.

13-78 Log #464 NEC-P13 **Final Action: Accept**
(695.4(A))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Delete text to read as follows:
(A) Direct Connection. The supply conductors shall directly connect the power source to either a listed fire pump controller or listed combination fire pump controller and power transfer switch. ~~Where the power source is supplied by on-site generator(s), the supply conductors shall connect to a generator disconnecting means dedicated for the purposes of serving the fire pump. The disconnecting means shall be located in a separate enclosure from the other generator disconnecting means.~~
Substantiation: The above text (strikethrough) was added to this section during the 2008 NEC process. Unfortunately, it was placed under direct connection and is in conflict with the intent and requirements of the section. The section is specific to a direct connection. Once a disconnecting means is placed in the circuit, it is no longer a direct connection. More appropriately, it is a supervised connection. The requirements for a supervised connection are noted in Section 695.4(B). In addition, the general requirements of the strikethrough text are already noted in subsection (B), so this is redundant text (See Section 695.4(B)(2)). If necessary, this text should have been incorporated into subsection (B) for Supervised Connection.
Panel Meeting Action: Accept
Panel Statement: See the panel action and statement on panel proposal 13-77a.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Explanation of Negative:

13-79 Log #2157 NEC-P13 **Final Action: Accept**
(695.4(A))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
(A) Direct Connection. The supply conductors shall directly connect the power source to either a listed fire pump controller or listed combination fire pump controller and power transfer switch. ~~Where the power source is supplied by on-site generator(s), the supply conductors shall connect to a generator disconnecting means dedicated for the purposes of serving the fire pump. The disconnecting means shall be located in a separate enclosure from the other generator disconnecting means.~~
Substantiation: The above text (strikethrough) was added to this section during the 2008 NEC process. Unfortunately, it was placed under direct connection and is in conflict with the intent and requirements of the section. The section is specific to a direct connection. Once a disconnecting means is placed in the circuit, it is no longer a direct connection. More appropriately, it is a supervised connection. The requirements for a supervised connection are noted in Section 695.4(B). In addition, the general requirements of the strikethrough text are already noted in sebsection (B), so this is redundant text (See 695.4(B)(2)). If necessary, this text should have been incorporated into subsection (B) for Supervised Connection.
Panel Meeting Action: Accept
Panel Statement: See the panel action and statement on panel proposal 13-77a.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-80 Log #788 NEC-P13 **Final Action: Reject**
(695.4(A) Exception)

Submitter: Lawrence W. Forshner, Town of Natick
Recommendation: Add an exception at the end of the second paragraph of 695.4(A):
Exception: Individual disconnect enclosures, shall not be required when a single enclosure, factory or field installed, on gen-sets, containing two or more circuit breakers supplying feeders, are equipped with barriers, that provide separation for the load side conductors.
Substantiation: It is common practice to have multiple feeder breakers mounted on the side of Gen-Set alternators. There are space limitations making it difficult to comply with the requirements for separate enclosures. The line side of the multiple feeder disconnects are fed with short feeder tap conductors from a common bus on the generator alternator. They are common in the alternator housing which is the common voltage source. I am in agreement with the addition of 700.9(B (5)c. to the 2008 Code, however, how far back to the source is it practical to require separation. Partitioning on the load side of the breakers, separating the load side feeder conductors, satisfies the intent of this section.
Panel Meeting Action: Reject
Panel Statement: The text added in the 2008 NEC cycle is removed. There is no need for this exception. See panel action on Proposals 13-78 and 13-79.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-81 Log #88 NEC-P13 **Final Action: Accept**
(695.4(B))

Note: This Proposal appeared as Comment 13-126 on Proposal 13-89 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-89 was:
Revise 695.4(B) as shown below to read as follows:
(B) Supervised Connection.
(1) Number of Disconnecting Means.
a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between ~~a remote~~ the fire pump power source(s) and one of the following:
(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch
b. Feeder Sources. For systems installed under the provisions of 695.3(B)(2) only, ~~such~~ additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.
c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted to be located on or at the generator.
(2) Overcurrent Device Selection.
a. General. ~~The overcurrent~~ Overcurrent protective device(s), other than those installed between the on-site generator and the fire pump controller or fire pump transfer switch, that are unique to the fire pump loads shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with ~~according to~~ 430.62 to provide short-circuit protection only.
(3) Disconnecting Means. All disconnecting devices ~~and overcurrent protective devices~~ that are unique to the fire pump loads shall comply with items a through d. ~~695.4(B)(1) through (B)(5).~~
a. ~~(2)~~ Features and Location. [keep existing 2005 text]
b. ~~(3)~~ Disconnect Marking. [keep existing 2005 text]
c. ~~(4)~~ Controller Marking. [keep existing 2005 text]
d. ~~(5)~~ Supervision. [keep existing 2005 text]
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.
This action will be considered by the Panel as a Public Comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
The panel accept the recommendation of the Technical Correlating Committee to review the action on Proposal 13-89 from the 2008 NEC revision process and accepts the recommendation of that proposal in principle.
Panel Statement: The intent of the recommendation of Proposal 13-89 from the 2008 NEC revision cycle is met by the panel action on panel proposal 13-77a. The panel notes that the revisions made in 13-77a are based on the 2008 edition of the NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-82 Log #89 NEC-P13 **Final Action: Accept in Principle**
(695.4(B))

Note: This Proposal appeared as Comment 13-127 on Proposal 13-89 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-89 was:
Revise 695.4(B) as shown below to read as follows:
(B) Supervised Connection.
(1) Number of Disconnecting Means.
a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between ~~a remote~~ the fire pump power source(s) and one of the following:
(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch
b. Feeder Sources. For systems installed under the provisions of 695.3(B)(2) only, ~~such~~ additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.
c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted to be located on or at the generator.
(2) Overcurrent Device Selection.
a. General. ~~The overcurrent~~ Overcurrent protective device(s), other than those installed between the on-site generator and the fire pump controller or fire pump transfer switch, that are unique to the fire pump loads shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with ~~according to~~ 430.62 to provide short-circuit protection only.
(3) Disconnecting Means. All disconnecting devices ~~and overcurrent protective devices~~ that are unique to the fire pump loads shall comply with items a through d. ~~695.4(B)(1) through (B)(5).~~
a. ~~(2)~~ Features and Location. [keep existing 2005 text]
b. ~~(3)~~ Disconnect Marking. [keep existing 2005 text]
c. ~~(4)~~ Controller Marking. [keep existing 2005 text]
d. ~~(5)~~ Supervision. [keep existing 2005 text]
Submitter: Jim Pauley, Square D Company
Recommendation: Accept the Proposal as submitted.
Substantiation: Rather than attempt to rewrite the entire article through a panel proposal or comment, the panel should accept proposals that were submitted to correct deficiencies in the current Article. Proposal 13-89 provides a logical rearrangement of the current text to make the article easier to use and to remove some ambiguity in the text. The substantiation to make these changes is well detailed.
Panel Meeting Action: Accept in Principle
Panel Statement: The intent of this recommendation is met by the panel action on panel proposal 13-77a. The panel notes that the revisions made in 13-77a are based on the 2008 edition of the NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-83 Log #90 NEC-P13 **Final Action: Accept in Principle**
(695.4(B))

Note: This Proposal appeared as Comment 13-128 on Proposal 13-89 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-89 was:
Revise 695.4(B) as shown below to read as follows:
(B) Supervised Connection.
(1) Number of Disconnecting Means.
a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between ~~a remote~~ the fire pump power source(s) and one of the following:
(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch
b. Feeder Sources. For systems installed under the provisions of 695.3(B)(2) only, ~~such~~ additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.
c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted to be located on or at the generator.
(2) Overcurrent Device Selection.
a. General. ~~The overcurrent~~ Overcurrent protective device(s), other than those installed between the on-site generator and the fire pump controller or fire pump transfer switch, that are unique to the fire pump loads shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with ~~according to~~ 430.62 to provide short-circuit protection only.
(3) Disconnecting Means. All disconnecting devices ~~and overcurrent protective devices~~ that are unique to the fire pump loads shall comply with items a through d. ~~695.4(B)(1) through (B)(5).~~
a. ~~(2)~~ Features and Location. [keep existing 2005 text]
b. ~~(3)~~ Disconnect Marking. [keep existing 2005 text]
c. ~~(4)~~ Controller Marking. [keep existing 2005 text]
d. ~~(5)~~ Supervision. [keep existing 2005 text]
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle Public Proposal 13-89.
Substantiation: The Proposer, J. Pauley proposes clarification of extant Article 695.4(B) "Supervised Connection." However, this is extracted text and is part of the Power Supply section which has been completely re-written and submitted as Proposal 13-77. My Public Comment in P13-77 hopes to clarify the new text sufficiently to satisfy the proposer.
Panel Meeting Action: Accept in Principle
Panel Statement: The intent of this recommendation is met by the Panel action on Panel Proposal 13-77a. The panel notes that the revisions made in 13-77a are based on the 2008 edition of the NEC.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-84 Log #465 NEC-P13 **Final Action: Reject**
(695.4(B))

Submitter: Lanny G. McMahill, Phoenix, AZ
Recommendation: Delete text to read as follows:
For systems installed under the provisions of 695.3(B)(2) only, such additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code. ~~Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized according to 430.62 to provide shortcircuit protection only.~~ All disconnecting devices and overcurrent protective devices that are unique to the fire pump loads shall comply with 695.4(B)(1) through (B)(5).
Substantiation: The above text (strikethrough) is unnecessary and in conflict with the last sentence of the paragraph that requires the overcurrent protective device to comply with sections 695.4(B)(1) through (B)(5). In particular, subsection 695.4(B)(1) requires that "The overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply." Allowing any overcurrent protection in the motor circuit that is sized at less than required by this section is a code violation. It can also cause conflicts with selective coordination issues noted in Articles 700 and 701, and conflicts with feeder installations, such as for multibuilding campus-style complexes. In addition, the allowance to size per 430.62 can create a violation when a transformer is inserted into the system too (see Section 695.5(B)) — does the more restrictive requirement for transformers apply or the less restrictive requirement as presently allowed apply? In the interest of consistency in code enforcement, eliminate the confusing and conflicting text of this section. Removing this text will not change minimum code requirements! It will also correlate with requirements of NFPA 20 for Fire Pump Installations.
Panel Meeting Action: Reject
Panel Statement: Section 9.6.1.1 of NFPA 20-2007 does not require a standby generator to carry locked rotor current indefinitely.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-85 Log #2319 NEC-P13 **Final Action: Reject**
(695.4(B))

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Delete the second sentence in the second paragraph which starts with '~~Overcurrent protective devices between and on-site standby generator...~~'

Add a second paragraph to sub-section (B)(1) to read... 'Overcurrent devices between an on-site standby generator and a fire pump controller shall not be smaller than 225 % of the full load current of the fire pump but shall not exceed the maximum permitted by 430.62.
Substantiation: The present language referring to 430.62 provides a maximum size overcurrent device but not a minimum size and creates confusion since the last sentence also refers to sub-part (B)(1). Based on present language any device that exceeds the overload requirements of 430.32 could be construed as meeting the requirement of only providing short current protection. This change will specify a minimum OCP for generator supplied fire pumps and clarify that the locked rotor requirement should not apply to on-site stand-by generators.
Panel Meeting Action: Reject
Panel Statement: The minimum and maximum sizing will be determined by the requirements in 430.62. There was no technical substantiation provided for the 225 percent minimum size overcurrent protective device.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-86 Log #3757 NEC-P13 **Final Action: Accept in Principle**
(695.4(B))

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise 695.4(B) as shown below to read as follows:
(B) Supervised Connection.
(1) Number of Disconnecting Means.
a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between ~~a remote~~ the fire pump power source(s) and one of the following:
(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch
b. Feeder Sources. For systems installed under the provisions of 695.3(B)(2) only, ~~such~~ additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.
c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted to be located on or at the generator.
(2) Overcurrent Device Selection.
a. General. ~~The overcurrent~~ Overcurrent protective device(s), other than those installed between the on-site generator and the fire pump controller or fire pump transfer switch, that are unique to the fire pump loads shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. Where the locked rotor current value does not correspond to a standard overcurrent device size, the next standard overcurrent device size shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with ~~according to~~ 430.62 to provide short-circuit protection only.
(3) Disconnecting Means. All disconnecting devices ~~and overcurrent protective devices~~ that are unique to the fire pump loads shall comply with items a through d. ~~695.4(B)(1) through (B)(5).~~
a. ~~(2)~~ **Features and Location.** [keep existing 2008 text from 695.4(B)(2)]
b. ~~(3)~~ **Disconnect Marking.** [keep existing 2008 text from 695.4(B)(3)]
c. ~~(4)~~ **Controller Marking.** [keep existing 2008 text from 695.4(B)(4)]
~~(5)~~ **Supervision.** [keep existing 2008 text from 695.4(B)(5)]
Substantiation: The objective of this proposal is to provide the user with an easier means to find the rules applicable to a supervised disconnect and overcurrent device. The current language of 695.4(B) mixes the following elements in an unclear manner:
1) Number of disconnecting means allowed (B – main paragraph)
2) Overcurrent protection for generator supplied circuits (B – last paragraph)
3) Feeder requirements (B – last paragraph)
4) Overcurrent protection (again) – (B)(1)
5) Disconnecting means features and markings (B)(2), (3), (4) and (5)

The user is left with a few potential conflicts and some gaps to fill. For example, the requirement for generator OCP sizing is in conflict with (B)(1) – which applies. It is unclear whether the "single disconnecting means" requirement includes or excludes a disconnect that may be on the generator itself.

The proposal is an effort to rearrange the material to make it more usable and remove the perceived conflicts. Titles have been provided to better direct the user to the specific rule they are looking for. In the existing text, it is very difficult to even find the requirement for sizing the overcurrent devices between the stand-by gen set and the FP controller because it is buried in a paragraph at the end of 695.4(B) main text, even though the issue deals with OCP sizing which is covered in (B)(1).

Here is a synopsis of the changes:

1) The requirements are split into three basic sets of rules. Those for the number of disconnecting means, those for the overcurrent protection and those for the disconnecting means itself. They are split in this manner to avoid having more than three levels of subdivision which is prohibited in the style manual.

2) Number of disconnecting means is split into the General Requirements and uses the existing text from 695.4 (B). The words "remote" were deleted from the source because it is redundant. All sources are remote unless the electric fire pump generates its own power.

3) The "Feeder Source" provisions that were in the last paragraph of 695.4(B) are now their own sublevel and the text from the existing code is used. The word "such" is deleted because it is no longer needed since the text is in its own identified rule.

4) A new item "c" is added to clarify that the "single disconnecting means" is not intended to prohibit the on-site generator from having its own disconnect. This is a point of confusion today. If you interpret the current language literally, a disconnect would not be permitted downstream of the generator supplied disconnect. The general interpretation today is that the "single disconnecting means" referred to in the main rule is in addition to a disconnect at the generator.

5) Proposed (B)(2) is intended to cover the rules applicable to overcurrent protective devices. The main rule in item "a" is the existing rule requiring that the OCP be sized to carry locked rotor current. The additional underlined wording in this rule is to eliminate the conflict between locked rotor sizing and 430.62 sizing for the generator circuit OCP. In addition the words "that are unique to the fire pump loads" come from the last sentence of 695.4(B) last sentence. Text is also added to clarify the requirement to round up to the next standard overcurrent device. Currently, the text just says use the next standard size – what if the LRC equals a standard size? The revision applies the rule as it is applied elsewhere – if the calc results in a nonstandard size, you round up.

6) New item (B)(2)b is a relocation of the text from the second sentence of existing 695.4(B) last paragraph regarding the sizing of the OCP in the generator circuits. A revision has been made to this text to pick up the requirement in NFPA 20 [9.6.5] that the OCP in the generator circuit be sized to pick up the instantaneous pump room load. However, the maximum sizing of the OCP should still be directed by the reference to 430.62 as in the present code.

7) New item (B)(3) is to pick up all of the rules associated with the Disconnecting Means itself. The main paragraph is the text from the last sentence of the last paragraph of 695.4(B). The text has been modified to remove the reference to overcurrent protection since it is now covered in (B)(2).

8) The existing 695.4(B) (2), (3), (4) and (5) now become items a, b, c and d under new item (3). Since all of these rules deal with the disconnecting means in some manner, this relocation is appropriate. The text from the 2008 NEC remains in all of these sections. The title "Features and Location" was chosen for item "a" because the list of items apply to the features expected of the disconnect and the location of the disconnect.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on panel proposal 13-77a meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-87 Log #91 NEC-P13 **Final Action: Accept in Principle**
(695.4(B)(1))

Note: This Proposal appeared as Comment 13-129 on Proposal 13-90 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-90 was:
Revise as follows:
Overcurrent Device Selection. The overcurrent protective device shall be selected or set to carry indefinitely the sum of the locked rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The next standard overcurrent device shall be used in accordance with 240.6.
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.

Technical Correlating Committee understands that the Panel Action was to add a new second sentence in 695.4(B)(1) and the existing second sentence now becomes the third sentence.

This action will be considered by the panel as a public comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on panel proposal 13-77a meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-88 Log #1267 NEC-P13 **Final Action: Accept in Principle**
(695.4(B)(1))

Submitter: Stephen W. Drayton, Eastern Idaho Electrical JATC / Rep. IBEW
Recommendation: Revise text to read as follows:
695.4(B) **Supervised Connection.** A single disconnecting means and associated overcurrent protective devices(s) shall be permitted to be installed between a remote power source and one of the following:
~~(1)~~ a. A listed fire pump controller
~~(2)~~ b. A listed fire pump power transfer switch.
~~(3)~~ c. A listed combination fire pump controller and power transfer switch.
Substantiation: It was discovered in class that if you were to reference section 695.(4)(B)(1), a NEC user would have two places with the same section identifiers. If the list items under 695.4(B) are changed to small case letters as was done in 240.4(D)(1)(2)(a.-c.) it would eliminate this confusion.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on panel proposal 13-77a meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-89 Log #4473 NEC-P13 **Final Action: Reject**
(695.4(B)(1))

Submitter: Darrel Miller, LSW Engineers Arizona, Inc.
Recommendation: Revise text to read as follows:
695.4(B)(1) Overcurrent Device Selection. The overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The next standard overcurrent device shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall only ~~not~~ apply to ~~conductors or devices other than~~ overcurrent devices in the fire pump motor circuit(s). Where the alternate source is an on-site standby generator, the alternate source disconnecting means and the alternate source overcurrent protective device(s) for the electric-drive fire pump shall not be required to be sized for locked-rotor current of the fire pump motor(s).
Substantiation: NFPA 20 (2007 edition) handles the “normal” supply and the “alternate” supply differently than NFPA 70-article 695. NFPA 20-9.2 deals with the requirements for the “Normal Power”, while 9.3 deals with the “Alternate Power”. NFPA 70 article 695 has been updated to better align with the requirements listed in NFPA 695 over the last couple of code cycles and has generally accomplished that. However, NFPA 70 article 695 has overlooked the paragraph hierarchy in NFPA 20, 9.2 and 9.3 and lumped all the requirements for the “normal” and “alternate” power into a single set of requirements. This has effectively lost the intention set forth in NFPA 20, 9.2 & 9.3.
Specifically, NFPA 20, 9.2.3.4 indicates the normal source …”overcurrent protective device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full load current of the associated fire pump accessory equipment.” NFPA 20, 9.3 applying to the alternate source does not contain the locked-rotor sizing requirement.
The NEC 2008 Handbook supports the position of NFPA 20, refer to handbook page 1093, 695.3(B)(1) comment.
To align NFPA 70 with NFPA 20, NEC-695.4(B)(1) should be changed as proposed.
Panel Meeting Action: Reject
Panel Statement: The intent of the recommendation is met by the existing requirements in Section 695.4(B)(1).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-90 Log #4474 NEC-P13 **Final Action: Reject**
(695.4(B)(1))

Submitter: Darrel Miller, LSW Engineers Arizona, Inc.
Recommendation: Revise text to read as follows:
695.4(B)(1) Overcurrent Device Selection. The overcurrent protective device(s) shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The next standard overcurrent device shall be used in accordance with 240.6. The requirement to carry the locked-rotor currents indefinitely shall only ~~not~~ apply to ~~conductors or devices other than~~ overcurrent devices in the fire pump motor circuit(s). Where the alternate source is an on-site standby generator, the alternate source disconnecting means and the alternate source overcurrent protective device(s) for the electric-drive fire pump shall not be required to be sized for locked-rotor current of the fire pump motor(s).
Substantiation: This section has regionally been a challenge since there are conflicts between the applicable standards. NFPA 20 (2007 edition) handles the “normal” supply and the “alternate” supply differently than NFPA 70 article 695. NFPA 20-9.2 deals with the requirements for the “Normal Power”, while 9.3 deals with the “Alternate Power” which is further defined in 9.6 “On-Site Standby Generator Systems”. NFPA 70 article 695 has been updated to better align with the requirements listed in NFPA 695 over the last couple of code cycles and has generally accomplished that. However, NFPA 70 article 695 has overlooked the paragraph hierarchy in NFPA 20, 9.2 and 9.3 and lumped all the requirements for the “normal” and “alternate” power into a single set of requirements. This has effectively lost the intention set forth in NFPA 20, 9.2 & 9.3 which is further supported in 9.6.5.
Specifically, NFPA 20, 9.2.3.4 indicates the normal source …”overcurrent protective device shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full load current of the associated fire pump accessory equipment.” NFPA 20, 9.3 applying to the alternate source does not contain the locked-rotor sizing requirement.
NFPA 20, 9.6.5 states “where protective devices are installed in the on-site power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump room load.” This specific requirement makes no mention of sizing protective device(s) to handle continuously the lock-rotor current of the fire pump motor(s).
The NEC 2008 Handbook supports the position of NFPA 20, refer to handbook page 1093, 695.3(B)(1) comment.
The proposed text will better align NFPA 70 with NFPA 20.
Panel Meeting Action: Reject
Panel Statement: The intent of the recommendation is met by the existing requirements in Section 695.4(B)(1).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-91 Log #92 NEC-P13 **Final Action: Reject**
(695.4(B)(2)(3))

Note: This Proposal appeared as Comment 13-130 on Proposal 13-91 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-91 was:
Revise as follows:
Overcurrent Device Selection. The overcurrent protective device shall be selected or set to carry indefinitely the sum of the locked rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The next standard overcurrent device shall be used in accordance with 240.6.
Submitter: Michael P. Walls, American Chemistry Council
Recommendation: Add text to read as follows:
Exception: In industrial establishments, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, a metal clad disconnecting means may be located within equipment that feeds loads other than the fire pump if the other provisions of 695.4 (B)(2) are met.
Substantiation: The original comment was modified to include the requirement for metal clad equipment addressing the need for a secure enclosure. The addition of separate switchgear, cable/bus, six cable terminators and bus connections to meet the “not located within equipment that feeds other loads...” requirement added in 2005 actually lowers the installation’s reliability in these industrial installations since additional equipment must be connected to the bus.
Panel Meeting Action: Reject
Panel Statement: The purpose of the existing text in 695.4(B)(2)(3) is to provide separation for the fire pump disconnect from equipment supplying other loads. This requirement provides increased reliability for the fire pump circuit because an incident within a shared equipment enclosure could affect adversely impact the overcurrent protective device for the fire pump.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 12 Negative: 2
Explanation of Negative:
DEGNAN, J.: The term “metalclad” has limited industry understanding, a better term is “Metal Enclosed Switchgear”, as defined by UL 1558. The submitter(or others) is(are) encouraged to submit additional information during the comment stage documenting the following: 1) Provide supporting material clarifying the construction benefits of metal enclosed switchgear, with photographic information showing the construction standard for separation of vertical sections and isolation of devices within vertical sections. 2) Photographic or infrared information demonstrating the potential for error with field fabricated separation of devices, including taps, splices, etc versus the quality assurance that comes with factory assembled equipment. 3) Other

reliability or field performance data supporting metal enclosed switchgear. 4) Alternative proposals that are not restricted to industrial establishments. 5) Comparative information between the reliability of factory assembled equipment vs field fabrications.

MOUTON, C.: I'm voting against the panel action, the panel action should have been to accept in principle. The proposal intends to increase the reliability to fire pumps by eliminating components subject to failure that will reduce the overall reliability of the power supply to the fire pump. The panel action should have been accept in principle with an addition in wording to address the concern for common mode failure of two disconnect devices being in a common vertical section. To address this concern, the Exception should be reworded to include the words "located in a separate dedicated vertical section" so as to ensure that the fire pump disconnect is not adversely affected by an incident on another feeder in the equipment.

13-92 Log #1409 NEC-P13 **Final Action: Reject**
(695.4(B)(2)(3) and (4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

(3) Not be located within enclosures that contain equipment or conductors ~~that feeds loads other than~~ not associated with the fire pump.

Delete (B)(2)(4).

Substantiation: All equipment and conductors whether or not feeding other loads should be included in (3). The disconnecting means is required to be marked and lockable, and those provisions make inadvertent (accidental) operation very unlikely. "Sufficiently" is subjective and a term to be avoided per the Style Manual. "...at the same time does not necessarily mean simultaneously; one PM on Monday is the same time as one PM on Tuesday.
Panel Meeting Action: Reject
Panel Statement: Section 695.4(B)(2) applies to disconnecting means, not conductors or other equipment therefore the proposed changes are not appropriate for the text in this section.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-93 Log #3973 NEC-P13 **Final Action: Reject**
(695.4(B)(2)(4))

Submitter: Justin B. Biller, Roanoke County Office of Building Safety / Rep. NFPA Building Code Development Committee (BCDC)
Recommendation: Add new text as follows:

695.4 Continuity of Power.

Circuits that supply electric motor-driven fire pumps shall be supervised from inadvertent disconnection as covered in 695.4(A) or 695.4(B)....

...(2) Disconnecting Means. The disconnecting means shall comply with all of the following:

(1) Be identified as suitable for use as service equipment
(2) Be lockable in the closed position
(3) Not be located within equipment that feeds loads other than the fire pump
(4) Be located sufficiently remote by a minimum distance of 1.8 m (6 ft) from other building or other fire pump source disconnecting means such that inadvertent contemporaneous operation at the same time would be unlikely

Substantiation: The current language in these sections is vague and permits a large variation of interpretations from AHJs on what would be considered remote. By codifying a specific distance, the code user and enforcers can apply specific language to determine remoteness of disconnects to ensure that fire pumps, emergency systems, legally required or optional standby power systems are not inadvertently operated simultaneously. The use of 1.8 m or 6 ft is somewhat arbitrary, but would be considered an acceptable distance for an individual that would be servicing equipment or an emergency responder to be unable to physically operate both sets of disconnects. This proposal is also intended to establish dialogue for the code-making panel to consider alternative minimum dimensions based on other quantifiable data.

See also similar proposal to 230.72(B).

Panel Meeting Action: Reject
Panel Statement: There is insufficient technical substantiation to support the minimum 6-foot distance. Establishing a particular distance, noted in the substantiation as an arbitrary distance, would then require exceptions to take into consideration architectural appurtenances, landscaping, and other installation differences for the fire pump disconnecting means. The existing text here is consistent with the text in 230.72(B) for separation of the fire pump disconnect from other service disconnecting means.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-94 Log #93 NEC-P13 **Final Action: Reject**
(695.4(B)(2)(b))

Note: This Proposal appeared as Comment 13-131 on Proposal 13-89 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-89 was:

Revise 695.4(B) as shown below to read as follows:

(B) Supervised Connection.

(1) Number of Disconnecting Means.

a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between ~~a remote~~ the fire pump power source(s) and one of the following:

(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch

b. Feeder Sources. For systems installed under the provisions of 695.3(B)(2) only, ~~such~~ additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.

c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted to be located on or at the generator.

(2) Overcurrent Device Selection.

a. General. ~~The overcurrent~~ Overcurrent protective device(s), other than those installed between the on-site generator and the fire pump controller or fire pump transfer switch, that are unique to the fire pump loads shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).

b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with ~~according to~~ 430.62 to provide short-circuit protection only.

(3) Disconnecting Means. All disconnecting devices ~~and overcurrent protective devices~~ that are unique to the fire pump loads shall comply with items a through d. ~~695.4(B)(1) through (B)(5).~~

a. ~~(2)~~ Features and Location. [keep existing 2005 text]
b. ~~(3)~~ Disconnect Marking. [keep existing 2005 text]
c. ~~(4)~~ Controller Marking. [keep existing 2005 text]
d. ~~(5)~~ Supervision. [keep existing 2005 text]

Submitter: Lawrence A. Bey, Cummins Power Generation
Recommendation: Change "full pump room load" to "fire pump" so that the clause reads: "sized to allow for instantaneous pickup of the fire pump" (same wording to the end of the sentence).
Substantiation: Each fire pump is required to have a dedicated transfer switch and other loads are not allowed to be connected to it. Therefore, the generator feeder overcurrent device is sized based on the fire pump only. Where there are additional fire pump rooms loads (jockey pumps, lighting, etc.), they must be served by a separate feeder and transfer switch.
Panel Meeting Action: Reject
Panel Statement: In Section 695.4(B)(2), the overcurrent protection device unique to the fire pump loads include the fire pump motor or motors, the pressure maintenance pump motor, plus associated fire pump accessory equipment. Only the locked rotor size requirement applies to the fire pump, but the overcurrent device must be able to handle the fire pump and accessory loads.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-95 Log #94 NEC-P13 **Final Action: Reject**
(695.4(B)(3))

Note: This Proposal appeared as Comment 13-132 on Proposal 13-89 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-89 was:

Revise 695.4(B) as shown below to read as follows:

(B) Supervised Connection.

(1) Number of Disconnecting Means.

a. General. A single disconnecting means and associated overcurrent protective device(s) shall be permitted to be installed between ~~a remote~~ the fire pump power source(s) and one of the following:

(1) A listed fire pump controller
(2) A listed fire pump power transfer switch
(3) A listed combination fire pump controller and power transfer switch

b. Feeder Sources. For systems installed under the provisions of 695.3(B)

(2) only, ~~such~~ additional disconnecting means and associated overcurrent protective device(s) shall be permitted as required to comply with other provisions of this Code.
c. On-Site Standby Generator. Where an on-site generator is used to supply a fire pump, an additional disconnecting means and associated overcurrent protective device(s) shall be permitted to be located on or at the generator.
(2) Overcurrent Device Selection.
a. General. ~~The overcurrent~~ Overcurrent protective device(s), other than those installed between the on-site generator and the fire pump controller or fire pump transfer switch, that are unique to the fire pump loads shall be selected or set to carry indefinitely the sum of the locked-rotor current of the fire pump motor(s) and the pressure maintenance pump motor(s) and the full-load current of the associated fire pump accessory equipment when connected to this power supply. The requirement to carry the locked-rotor currents indefinitely shall not apply to conductors or devices other than overcurrent devices in the fire pump motor circuit(s).
b. On-Site Standby Generators. Overcurrent protective devices between an on-site standby generator and a fire pump controller shall be selected and sized to allow for instantaneous pickup of the full pump room load, but shall not be larger than the value selected to comply with ~~according to~~ 430.62 to provide short-circuit protection only.
(3) Disconnecting Means. All disconnecting devices ~~and overcurrent protective devices~~ that are unique to the fire pump loads shall comply with items a through d. ~~695.4(B)(1) through (B)(5).~~
a. ~~(2)~~ Features and Location. [keep existing 2005 text]
b. ~~(3)~~ Disconnect Marking. [keep existing 2005 text]
c. ~~(4)~~ Controller Marking. [keep existing 2005 text]
d. ~~(5)~~ Supervision. [keep existing 2005 text]
Submitter: Lawrence A. Bey, Cummins Power Generation
Recommendation: Change “All disconnecting devices” to “All disconnecting devices except standby generator disconnects” (same wording to the end of sentence).
Substantiation: Confusion exists between service supplied feeders and on-site generator set feeders. Use of the term “all disconnects” in this section is read by some to apply to both. The intent of Proposal 13-89 is to clear up the confusion, but it does not address this point.
Panel Meeting Action: Reject
Panel Statement: The proposal provided no substantiation to exclude the on-site generator disconnect from compliance with the four provisions to be suitable for use as service equipment, be lockable in the closed position, not be located within equipment supplying other loads, and be located sufficiently remote preventing inadvertent disconnection. See the panel action and statement on panel proposal 13-60a.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
DEGNAN, J.: See panel proposal 13-77a which addresses 695.4, “accept in part” may be a more accurate assessment of the panel’s action.

13-95a Log #CP1302 NEC-P13 **Final Action: Accept**
(695.6)

TCC Action: The Technical Correlating Committee directs that the panel clarify the location of the Fine Print Note from existing 695.6(B).
This action will be considered by the panel as a public comment.
Submitter: Code-Making Panel 13,
Recommendation: Revise Section 695.6(A) to read:
(A) Supply Conductors.
(1) Services and On-Site Power Production Facilities. Service conductors and conductors supplied by on-site power production facilities shall be physically routed outside a building(s) and shall be installed as service entrance conductors in accordance with 230.6, 230.9 and Parts III and IV of Article 230. Where supply conductors cannot be physically routed outside of buildings, the conductors shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
(2) Feeders. Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) or conductors that connect directly to an on-site standby generator shall comply with all of the following:
a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.
b. Associated Fire Pump Loads. The conductors shall supply only loads that are directly associated with the fire pump system.
c. Protection from Potential Damage. The conductors shall be protected from potential damage by fire, structural failure, or operational accident.
d. Inside a Building. When routed through a building, the conductors shall be installed using one of the following methods:
(1) Be encased in a minimum 50 mm (2 in.) of concrete
(2) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 2 hours and dedicated to the fire pump circuit(s).
(3) Be a listed electrical circuit protective system with a minimum 2-hour fire rating

Exception to (A)(2)(d): The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 2-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.
(3) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.3(B)(2), all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
Exception to (A)(3): Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement for routing outside of the building(s) shall apply only to those conductors on the load side of that point of automatic connection between sources.
Delete existing 695.6(B) and renumber the existing (C) through (H) to become (B) through (G).
Substantiation: This revision incorporates the concepts contained in the public proposals on which the panel accepted in whole, in part or in principle. The revision provides correlation and proper extract attribution between Article 695 and the recommendation for Chapter 9 in the 2010 edition of NFPA 20 based on the ROP and ROC actions of the NFPA 20 Technical Committee.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
CARON, D.: Although I agree with the Panel decision and statement, the language in 695.6 (A)(3) could be interpreted to require the normal feeder for the fire pump, under a multi-building campus style arrangement, to be encased in concrete all the way to the fire pump controller. In the case where a disconnecting means is provided under (the proposed) 695.4 (B) (see Proposal 13-77a), it should be clarified that the feeder from this disconnecting means to the fire pump can be installed in accordance with (the proposed) 695.6 (A)(2)d. (see proposal 13-60a).

13-96 Log #95 NEC-P13 **Final Action: Accept in Principle**
(695.6)

Note: This Proposal appeared as Comment 13-133 on Proposal 13-97 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-97 was:
Revise 695.6(A) as shown below:
~~(A) Service~~ Supply Conductors.
(1) Services and On-Site Power Production Facility. Service conductors and s~~upply~~ conductors supplied by an on-site power production facility shall be physically routed outside a building(s) and shall be installed as service entrance conductors in accordance with Article 230. Where supply conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
(2) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.3(B)(2), ~~this requirement shall apply to~~ all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
Exception to (A)(2): Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement for routing outside of the building(s) shall apply only to those conductors on the load side of that point of automatic connection between sources.
(3) Supervised or On-Site Standby Generator Connections. ~~(B) Circuit Conductors.~~ Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) or conductors that connect directly to an on-site generator shall comply with all of the following:
(1) a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.
(2) b. Associated Fire Pump Loads. ~~They~~ The conductors shall supply only loads that are directly associated with the fire pump system.
(3) c. Protection from Potential Damage. ~~, and they~~ The conductors shall be protected to resist potential damage by fire, structural failure, or operational accident.
(4) d. Inside a Building. When routed through a building, ~~they~~ the conductors shall be installed ~~be permitted to be routed through a building(s)~~ using one of the following methods:
(1) Be encased in a minimum 50 mm (2 in.) of concrete
(2) Be within an enclosed construction dedicated to the fire pump circuit(s) and having a minimum of a 1-hour fire resistive rating

(3) Be a listed electrical circuit protective system with a minimum 1-hour fire rating

Exception to (3)(d): The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 1-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.

In addition,

Delete 695.6(B)

Renumber the existing (C) through (H) to become (B) through (G).

Submitter: Jim Pauley, Square D Company

Recommendation: The panel should reconsider and Accept the Proposal.

Substantiation: The proposal provides a logical rearrangement of the existing material making it easier to use. Rather than attempt a complete rewrite at the comment stage, the better path would be to accept proposal the clean up the language and arrangement in the existing Article 695. This proposal would help to reduce a number of questions that arise from the present text.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel action on panel proposal 13-95a meets the intent of the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-97 Log #4392 NEC-P13 **Final Action: Accept in Principle**

(695.6)

Submitter: John R. Kovacik, Underwriters Laboratories Inc.

Recommendation: Add new paragraphs (I) and (J) to existing 695.6 as follows;

695.6 Power Wiring.

Power circuits and wiring methods shall comply with the requirements in 695.6(A) through (H) (K), and as permitted in 230.90(A), Exception No. 4; 230.94, Exception No. 4; 240.13; 230.208; 240.4(A); and 430.31. (Remainder unchanged)

(I) Listed Electrical Circuit Protective System to Controller Wiring. Where single conductors (individual conductors) are used, the following requirements shall be met:

(1) The conductors shall be terminated in a separate junction box. Single conductors (individual conductors) shall not enter the fire pump enclosure separately.

(2) Where required by the manufacturer of a listed electrical circuit protective system or by the listing, or as required elsewhere in this Code, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and in accordance with the instructions of the manufacturer.

(3) Standard wiring between the junction box and the controller shall be permitted.

(J) Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met:

(1) The junction box shall be securely mounted.

(2) Mounting and installing of a junction box shall not violate the enclosure type rating of the fire pump controller(s).

(3) Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the short circuit rating of the controller(s).

(4) As a minimum, a Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed to match the fire pump controller enclosure type rating.

(5) Terminals, junction blocks, and splices, when used, shall be listed.

(K) Raceway Terminations. Where raceways are terminated at a fire pump controller, the following requirements shall be met:

(1) Listed conduit hubs shall be used.

(2) The type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.

(3) The installation instructions of the manufacturer of the fire pump controller shall be followed.

(4) Alterations to the fire pump controller, other than conduit entry as allowed elsewhere in this Code, shall be approved by the authority having jurisdiction.

Substantiation: The added text represents electrical installation requirements from NFPA 20, Standard for the Installation of Stationary Pumps for Fire Protection. The text is essentially verbatim from NFPA 20, Sections 9.3.6, 9.3.7 and 9.3.8. These installation requirements are needed to supplement those already in Article 695.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

(I) Listed Electrical Circuit Protective System to Controller Wiring. Electrical circuit protective system installation shall comply with any restrictions provided in the listing of the electrical circuit protective system used and the following:

(1) A junction box shall be installed ahead of the fire pump controller a minimum of 12 in. beyond the fire-rated wall or floor bounding the fire zone.

(2) Where required by the manufacturer of a listed electrical circuit protective system or by the listing, or as required elsewhere in this *Code*, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and in accordance with the instructions of the manufacturer. [**20:**9.8.2]

(3) Standard wiring between the junction box and the controller shall be permitted. [**20:**9.8.3]

(J) Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met:

(1) The junction box shall be securely mounted. [**20:**9.7(1)]

(2) Mounting and installing of a junction box shall not violate the enclosure type rating of the fire pump controller(s). [**20:**9.7(2)]

(3) Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the short circuit rating of the controller(s). [**20:**9.7(3)]

(4) As a minimum, a Type 2, drip-proof enclosure (junction box) shall be used where installed in the fire pump room. The enclosure shall be listed to match the fire pump controller enclosure type rating. [**20:**9.7(4)]

(5) Terminals, junction blocks, wire connectors, and splices, where used, shall be listed. [**20:**9.7(5)]

(6) A fire pump controller or fire pump power transfer switch, where provided, shall not be used as a junction box to supply other equipment, including a pressure maintenance (jockey) pump(s).

(K) Raceway Terminations. Where raceways are terminated at a fire pump controller, the following requirements shall be met: [**20:**9.9]

(1) Listed conduit hubs shall be used. [**20:**9.9.1]

(2) The type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller. [**20:**9.9..2]

(3) The installation instructions of the manufacturer of the fire pump controller shall be followed. [**20:**9.9.3]

(4) Alterations to the fire pump controller, other than conduit entry as allowed elsewhere in this *Code*, shall be approved by the authority having jurisdiction. [**20:**9.9.4]

Revise existing 695.6(F) to read:

(F) Loads Supplied by Controllers and Transfer Switches. A fire pump controller and fire pump power transfer switch, where provided, shall not serve any load other than the fire pump for which it is intended.

Panel Statement: The panel action adds requirements from existing Section 695.6(F) to the recommendation for clarity. Revisions for compliance with the NEC Style Manual have been made. The panel action incorporates the parent text and item (1) as recommended in Proposal 13-105 into Section 695.6(I). The panel notes that the extract references are based on the recommended actions by the NFPA 20 Technical Committee in their ROP and ROC actions for the 2010 edition of that standard.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-98 Log #2675 NEC-P13 **Final Action: Accept in Part**

(695.6(A))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

~~SERVICE~~ SUPPLY CONDUCTORS. Where practicable, supply conductors shall be physically routed outside a building or structure and shall be installed as service conductors ~~in accordance with 230.6, 230.9 and Parts III and IV of article 230~~. (remainder unchanged).

Substantiation: Edit. The supply conductors may not be service conductors. “Where practical” removes a conflict between the first and second sentence. The provision should apply to structures not deemed “buildings” and not be limited to installation as service-entrance conductors but include other supply conductors such as service laterals. All applicable provisions of Article 230 should apply, as inferred by the requirement to be installed as service conductors. The heading should be “Supply” since that includes conductors supplied by other than services. (695.3(A)(2) and (B)(1)).

Panel Meeting Action: Accept in Part

Accept the change from “Service Conductors” to “Supply Conductors” in the title to (A) and reject the remainder of the proposal.

Panel Statement: There is not a conflict between the first sentence and the second sentence. The first sentence states the conductors must be routed outside the building. If that is not possible, then the conductors must be installed under 2 in. of concrete inside the building encased in 2 in. of concrete or brick. Adding “where practicable” to the first sentence could cause confusion to the user. The suggested deletion of the references to Sections 230.6 and 230.9 and Parts III and IV of Article 230 were not deleted since these references are necessary to provide installation requirements to treat these conductors, even though the conductors may be feeders, as service conductors. Structure was not accepted since there was no technical substantiation provided to include structures in these requirements. The intent is to protect the fire pump supply conductors to and through the building to ensure operation of the fire pump for people safety.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-99 Log #3746 NEC-P13 **Final Action: Accept in Principle**
(695.6(A))

Submitter: Jim Pauley, Square D Company/Schneider Electric
Recommendation: Revise 695.6(A) as shown below:
~~(A) Service~~ Supply Conductors.
(1) Services and On-Site Power Production Facility. Service conductors and s~~upply~~ conductors supplied by an on-site power production facility shall be physically routed outside a building(s) and shall be installed as service entrance conductors in accordance with 230.6, 230.9 and Parts III and IV of Article 230. Where supply conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
(2) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.3(B)(2), ~~this requirement shall apply to~~ all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
Exception to (A)(2): Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement for routing outside of the building(s) shall apply only to those conductors on the load side of that point of automatic connection between sources.
(3) Supervised or On-Site Standby Generator Connections. ~~(B) Circuit Conductors.~~ Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) or conductors that connect directly to an on-site generator shall comply with all of the following:
(1) a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.
(2) b. Associated Fire Pump Loads. ~~They~~ The conductors shall supply only loads that are directly associated with the fire pump system.
(3) c. Protection from Potential Damage. ~~, and they~~ The conductors shall be protected to resist potential damage by fire, structural failure, or operational accident.
(4) d. Inside a Building. When routed through a building, ~~they~~ the conductors shall be installed ~~be permitted to be routed through a building(s)~~ using one of the following methods:
(1) Be encased in a minimum 50 mm (2 in.) of concrete
(2) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 2 hours and dedicated to the fire pump circuit(s).
(3) Be a listed electrical circuit protective system with a minimum 2-hour fire rating
Exception to (3)d: The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 1-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.
In addition,
Delete existing 695.6(B) and renumber the existing (C) through (H) to become (B) through (G).
Substantiation: The objective of this proposal is intended to rearrange the material in 695.6(A) and (B) to make it clear to the user how the rules apply. The present text mixes rules for service conductors (the first two sentences of 695.5(A)) with feeder rules (last sentence of 695.6(A)) and then has "other conductors" in item (B). This creates confusion because the exception in (A) deals with feeders only (because it applies on the load side of the automatic connection), but is located in a manner that is being interpreted to apply to service conductors.
The rearrangement breaks the paragraph into services, multi-building campus applications and finally supervised connections. The following is a summary of the changes:
1) The wording has been revised to specifically apply (1) to both service conductors and the conductors from an on-site power production facility. This clears up the confusion in the present text where the title says "service conductors", but the text starts out with "supply conductors". It would appear that the conductors in question are either service conductors, supply conductors from an on-site supply (which are not service conductors by definition).
2) The campus distribution provision is broken out into its own section and given a title. Feeders which are covered in (A)(2) for the campus style distribution permission in 695.3(B)(2) or feeders covered by 695.6(B) which are on the load side of the supervised disconnect. In addition, since these are by definition feeder conductors so a reference has been added to Article 225 to ensure that the wiring methods and installation are covered. Finally, a sentence has been added to allow routing through the building in accordance with 230.6(1) or (2) to parallel the provision for services.
3) The exception is now placed under (A)(2) and is modified to specifically note what it applies to. The wording "for routing outside of the building" has been added to make it clear what is being "excepted" by the exception.
4) The old 695.6(B) now becomes 695.6(A)(3) so that all of the conductor routing rules appear in a single subsection. Text has been added to the main paragraph to make it clear that the provisions not only apply on the load side of the final disconnecting means, but also to the conductors that connect directly to a gen set that has no overcurrent protection. Article 445 would allow a direct connection to the generator if the conductors are sized at 115% of the full load current. Presently it is not clear what should be done with the conductors from a generator. In addition, the revision applies to "direct connection" since the assumption would be that a gen set that has OCP and a disconnect would already be covered by the language "on the load side of the final disconnecting means".
5) The main paragraph presently contains four separate provisions (independent routing, associated loads, protection from damage and routing inside a building) that are applicable to these conductors. The revision breaks these elements out into separately numbered items so that they are clearly identified.
6) The exception modified to make it clear that it applies to (3)(d) which covers the 1 hour fire rating issue.
7) 695.6(B) is deleted because it is now part of (A)(3) and the remaining sections are renumbered.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on panel proposal 13-95a meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-100 Log #96 NEC-P13 **Final Action: Accept**
(695.6(A) and (B))

Note: This Proposal appeared as Comment 13-135 on Proposal 13-97 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-97 was:
Revise 695.6(A) as shown below:
~~(A) Service~~ Supply Conductors.
(1) Services and On-Site Power Production Facility. Service conductors and s~~upply~~ conductors supplied by an on-site power production facility shall be physically routed outside a building(s) and shall be installed as service entrance conductors in accordance with Article 230. Where supply conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
(2) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.3(B)(2), ~~this requirement shall apply to~~ all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
Exception to (A)(2): Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement for routing outside of the building(s) shall apply only to those conductors on the load side of that point of automatic connection between sources.
(3) Supervised or On-Site Standby Generator Connections. ~~(B) Circuit Conductors.~~ Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) or conductors that connect directly to an on-site generator shall comply with all of the following:
(1) a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.
(2) b. Associated Fire Pump Loads. ~~They~~ The conductors shall supply only loads that are directly associated with the fire pump system.
(3) c. Protection from Potential Damage. ~~, and they~~ The conductors shall be protected to resist potential damage by fire, structural failure, or operational accident.
(4) d. Inside a Building. When routed through a building, ~~they~~ the conductors shall be installed ~~be permitted to be routed through a building(s)~~ using one of the following methods:
(1) Be encased in a minimum 50 mm (2 in.) of concrete
(2) Be within an enclosed construction dedicated to the fire pump circuit(s) and having a minimum of a 1-hour fire resistive rating
(3) Be a listed electrical circuit protective system with a minimum 1-hour fire rating
Exception to (3)(d): The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 1-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.
In addition,
Delete 695.6(B)
Renumber the existing (C) through (H) to become (B) through (G).
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.
This action will be considered by the Panel as a Public Comment.

Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
Accept Proposal 13-97 from the 2008 NEC ROP in principle.
Panel Statement: The panel accepts the direction of the NEC Technical Correlating Committee to reconsider. The panel action on panel proposal 13-95a meets the intent of the original recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-101 Log #97 NEC-P13 **Final Action: Accept in Principle**
(695.6(A) and (B))

Note: This Proposal appeared as Comment 13-136 on Proposal 13-97 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-97 was:
Revise 695.6(A) as shown below:
~~(A) Service~~ Supply Conductors.
(1) Services and On-Site Power Production Facility. Service conductors and s~~upply~~ conductors supplied by an on-site power production facility shall be physically routed outside a building(s) and shall be installed as service entrance conductors in accordance with Article 230. Where supply conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
(2) Multi-Building Campus Style Complexes. Where a fire pump is wired under the provisions of 695.3(B)(2), ~~this requirement shall apply to~~ all supply conductors on the load side of the service disconnecting means that constitute the normal source of supply to that fire pump shall be physically routed outside a building(s) and shall be installed as outside feeder conductors in accordance with Article 225. Where the feeder conductors cannot be physically routed outside of buildings, they shall be permitted to be routed through the building(s) where installed in accordance with 230.6(1) or 230.6(2).
Exception to (A)(2): Where there are multiple sources of supply with means for automatic connection from one source to the other, the requirement for routing outside of the building(s) shall apply only to those conductors on the load side of that point of automatic connection between sources.
(3) Supervised or On-Site Standby Generator Connections. ~~(B) Circuit Conductors.~~ Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) or conductors that connect directly to an on-site generator shall comply with all of the following:
(1) a. Independent Routing. The conductors shall be kept entirely independent of all other wiring.
(2) b. Associated Fire Pump Loads. ~~They~~ The conductors shall supply only loads that are directly associated with the fire pump system.
(3) c. Protection from Potential Damage. ~~, and they~~ The conductors shall be protected to resist potential damage by fire, structural failure, or operational accident.
(4) d. Inside a Building. When routed through a building, ~~they~~ the conductors shall be installed ~~be permitted to be routed through a building(s)~~ using one of the following methods:
(1) Be encased in a minimum 50 mm (2 in.) of concrete
(2) Be within an enclosed construction dedicated to the fire pump circuit(s) and having a minimum of a 1-hour fire resistive rating
(3) Be a listed electrical circuit protective system with a minimum 1-hour fire rating
Exception to (3)(d): The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 1-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.
In addition,
Delete 695.6(B)
Renumber the existing (C) through (H) to become (B) through (G).
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Revise text to read as follows:
Re-consider Accepting, or Accept in Principle or Accepting In Principle in Part Proposal 13-97. However, do not completely eliminate extant 695.6(B) “Conductor Size.”
Substantiation: This Proposal was considered by the panel to be part of the consolidation of Public Proposals on sections of Article 695 into the rewrite of Proposal 13-77 in error. This largely my oversight. In fact, these clauses are not extract text. Note that extant section 695.6 changes to 695.7 under the 13-77 re-write. This section is otherwise untouched by 13-77. The information in extant 695.6(B)(1) regarding other loads is vital. The Voltage Drop information in 695.6(B)(2) is also important since this is a very frequent problem with the Transformer Connection and also with the Alternate Supply.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on panel proposal 13-95a meets the intent of the original recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-102 Log #2910 NEC-P13 **Final Action: Reject**
(695.6(B))

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise text to read as follows:
695.6(B) Circuit Conductors. Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B) shall be kept entirely independent of all other wiring. They shall supply only loads that are directly associated with the fire pump system, and they shall be protected to resist potential damage by fire, structural failure, or operational accident. They shall be permitted to be routed through a building(s) using one of the following methods:
(1) Be encased in ~~a minimum 50 mm (2 in.) of~~ concrete **with a sufficient thickness to achieve a minimum 2 hour fire rating**.
(2) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 2 hours and dedicated to the fire pump circuit(s).
(3) Be a listed electrical circuit protective system with a minimum 2-hour fire rating
FPN: UL guide information for electrical circuit protective systems (FHIT) contains information on proper installation requirements to maintain the fire rating.
Exception: The supply conductors located in the electrical equipment room where they originate and in the fire pump room shall not be required to have the minimum 1-hour fire separation or fire resistance rating, unless otherwise required by 700.9(D) of this Code.
Substantiation: Methods (2) and (3) are 2 hour fire ratings. Method (1) should be changed to be consistent, hence the addition of the 2 hour rating. In various applications e.g. slabs versus columns or with different concrete, e.g. lightweight, siliceous, or carbonate; different concrete thickness may be required to meet the rating, hence the deletion of the 2 inches of concrete.
Panel Meeting Action: Reject
Panel Statement: The 2 in. of concrete has provided the industry with a prescriptive benchmark that has served the industry well. The substantiation does not demonstrate that use of 2 in. of concrete has compromised the integrity of the circuit. The recommendation does not provide an alternative prescriptive requirement that can be easily applied.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-103 Log #3986 NEC-P13 **Final Action: Reject**
(695.6(B))

Submitter: Michael Brennan, Draka Cableteq USA
Recommendation: Delete text as follows:
(B) Circuit Conductors... They shall be permitted to be routed through a building(s) using one of the following methods:
(1) ~~Be encased in a minimum of 50 mm (2 in.) of concrete~~
(2) Be….
Substantiation: 50 mm (2 in.) of concrete has not been proven to provide sufficient protection from fire for standard cables in conduit to survive a building fire for 2 hours as recognized in the other acceptable methods in this section.
Panel Meeting Action: Reject
Panel Statement: The 2 in. of concrete has provided the industry with a prescriptive benchmark that has served the industry well. The substantiation does not demonstrate that use of 2 in. of concrete has compromised the integrity of the circuit.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-104 Log #3987 NEC-P13 **Final Action: Reject**
(695.6(B))

Submitter: Michael Brennan, Draka Cableteq USA
Recommendation: Revise text as follows:
(B) Circuit Conductors... They shall be permitted to be routed through a building(s) using one of the following methods:
(1) Be encased in a minimum of ~~50 mm (2 in.)~~ 130 mm (5 in.) of concrete
(2) Be….
Substantiation: 50 mm (2 in.) of concrete has not been proven to provide sufficient protection from fire for standard cables in conduit to survive a building fire for 2 hours as recognized in the other acceptable methods in this section.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-102.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-105 Log #2905 NEC-P13 **Final Action: Accept in Principle**
(695.6(B)(3))

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Add new text as follows:
695.6(B)(3) Be a listed electrical circuit protective system with a minimum 2-hour fire rating.
Electrical circuit protective system installation shall comply with any restrictions provided in the listing of the electrical circuit protective system used and the following:
(1) A junction box shall be installed ahead of the fire pump controller a minimum of 12 in. beyond the fire-rated wall or floor bounding the fire zone.
(2) The raceway between the junction box and the fire pump controller shall be sealed at the junction box end with an identified compound in accordance with the instructions of the manufacturer of the electrical circuit protective system.
(3) Standard wiring between the junction box and the controller is acceptable.
Substantiation: The introductory wording is from 695.14(F) and notes that there are other restrictions to electrical circuit integrity systems. This is similar to wording presently in NFPA 20-2007 section 9.3.7 and section 9.3.7.2 modified to be like that proposed for the NFPA 20-2010. Single conductors may require cutting of slots per 300.20(B) and may violate the NEMA rating, which is what is noted in NFPA 20 section 9.7.3.1. Since a junction box is being required for a seal in NFPA 20 section 9.7.3.2, section NFPA 20 section 9.7.3.1 was modified to just require a junction box. The wording on 12 inches into the fire zone is from the UL system listings.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-106 Log #3854 NEC-P13 **Final Action: Accept in Part**
(695.6(B)(3) Exception)

Submitter: Bill McGovern, City of Plano
Recommendation: Revise text as follows:
Exception: The supply conductors located in the electrical equipment fire room where they originate and in the fire pump room shall not be required to have the minimum ~~1-hour~~ 2-hour for a separation or fire resistance ratings, unless otherwise required by 700.9(D) of this Code.
Substantiation: This is only an editorial change to correct the exception to the 2008 NEC from 1-hour to 2-hour.
Panel Meeting Action: Accept in Part
The panel accepts only the revision of "1-hour" to "2-hour" and rejects the remainder of the recommendation.
Panel Statement: There are recommended text changes that have not been substantiated. The accepted portion of the recommendation has been incorporated into the panel action on panel proposal 13-95a.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-107 Log #4822 NEC-P13 **Final Action: Reject**
(695.6(C))

Submitter: Robert Konnik, South Windsor, CT
Recommendation: Add text to read as follows:
695.6(C) Conductor Size.
(1) Fire Pump Motors and Other Equipment. Conductors supplying a fire pump motor(s), pressure maintenance pumps, and associated fire pump accessory equipment shall have a rating not less than 125 percent of the sum of the fire pump motor(s) and pressure maintenance motor(s) full-load current(s), and 100 percent of the associated fire pump accessory equipment. Table 310.16 shall be used to determine the conductor size.
Substantiation: NFPA 20 references NEMA standards publication ICS 14, 2.1.1c), suggests conductors to be sized per NEC 310.15 and Table 310.16. The 75C column is used, but 110.14(c) must be complied with as well. Breakers are qualified using a cable sized per table 310.16, and the conductor is a heat sink in this qualification. Grounding may be undersized if other means to size ampacity are used. The conductor may be undersized for short circuit considerations and may melt. Under emergency conditions, the cable may be hot enough to cause damage to other equipment or cause a fire to start (300% load).
Panel Meeting Action: Reject
Panel Statement: Based on Section 90.3 of the NEC, Chapters 1 through 4 apply except as supplemented or amended by Chapters 5, 6, or 7. Because there is no modification of the requirements, Section 110.14, 310.15 and the appropriate Tables in 310.15, such as Table 310.16, apply without adding the proposed text to 695.6(C). The concern expressed in the substantiation for undersized conductors and wire melting has not been supported with technical documentation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-108 Log #1283 NEC-P13 **Final Action: Reject**
(695.6(C)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Insert "ampacity" ahead of "rating."
Substantiation: Edit for clarity and specificity.
Panel Meeting Action: Reject
Panel Statement: The rating is determined based on the full-load current of the fire pump motor, pressure maintenance motor, and the accessory equipment, making the existing text very clear and concise so the change is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-109 Log #1426 NEC-P13 **Final Action: Reject**
(695.6(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise penultimate sentence: Where a tap is made to supply a fire pump in accordance with 695.3(A)(1) the wiring shall be treated as service conductors in accordance with 230.6.
Substantiation: Edit. Proposal clarifies where the tap is made.
Panel Meeting Action: Reject
Panel Statement: Because the conductors being referenced in 695.6(D) are power conductors, Section 695.6(A) already applies to these conductors, so the proposed reference is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-110 Log #3026 NEC-P13 **Final Action: Reject**
(695.6(D))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
(D) Overload Protection. Power circuits shall not have automatic protection against overloads. Except for protection of transformer primaries provided in 695.5(C)(2), branch-circuit and feeder conductors shall be protected against short circuits and ground-faults only. Where a tap is made to supply a fire pump, the wiring shall be treated as service conductors in accordance with 230.6. The applicable distance and size restrictions in 240.21 shall not apply.
Exception No. 1: Text to remain unchanged.
Exception No. 2: Text to remain unchanged.
Substantiation: Protection against short circuits but not ground-faults is extremely difficult, if not impossible.
Panel Meeting Action: Reject
Panel Statement: In the last sentence of Section 240.4(A), it is stated that conductor overload protection is not required but short circuit protection is required where interruption of the circuit would create a hazard. A ground fault may or may not be an issue since the first ground fault to an ungrounded system would not necessarily create a hazard, as noted in 250.4(B)(4), but a second ground fault would then create a phase- to phase-fault.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-111 Log #3417 NEC-P13 **Final Action: Reject**
(695.6(D))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
695.6(D) Overload Protection. Power circuits shall not have automatic protection against overloads. Except for protection of transformer primaries provided in 695.5(C)(2), branch-circuit and feeder conductors shall be protected against short circuit only. Where a tap is made to supply a fire pump, the wiring shall be treated as service-entrance conductors in accordance with 230.6. (The remaining text is unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject

Panel Statement: The recommendation is contingent on the acceptance of proposals to CMP-4, which intend to modify service-related definitions. The global implications of such a change would require task group action to correlate the use of these terms throughout the document. CMP-13 requests that the TCC direct CMP-4 to comment on this proposal and a task group be formed if necessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-112 Log #1282 NEC-P13 **Final Action: Reject**
(695.6(D) Exception No. 1)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise:

Conductors between storage batteries used for starting and control and the engine of an engine-driven fire pump shall not ~~require~~ be provided with overcurrent protection or disconnecting means other than the terminal connections.

Substantiation: Clarification of conductors and engine. Present wording does not prohibit overcurrent protection or disconnecting means.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided to revise the text from permissive to a mandatory requirement that no protection be provided. Section 240.21(H) is also non-mandatory (permissive) overcurrent protection for battery cables that permits overcurrent protection of the cables.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-113 Log #98 NEC-P13 **Final Action: Reject**
(695.6(E))

Note: This Proposal appeared as Comment 13-141 on Proposal 13-105 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-105 was:

Add "flexible metal conduit".

Submitter: Andre R. Cartal, Princeton Borough Building Dept. / Rep. Princeton Borough Building Dept.

Recommendation: Please reconsider and accept the proposal.

Substantiation: 348.12(1) permits flexible metal conduit in wet locations when the conductors are approved for the specific conditions and a "W" type conductor would be required. The Panel seems to feel that the installation of a sprinkler head creates a wet location. If that's the case, then we have a problem with all the electrical equipment in the fire pump room and throughout the building.

Panel Meeting Action: Reject

Panel Statement: Based on a change in 348.12(1) in the 2008 NEC, flexible metal conduit is no longer acceptable in a wet location. It is not the panel's position that the presence of a sprinkler head in the fire pump room necessitates the area be designated as a wet location.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-114 Log #99 NEC-P13 **Final Action: Accept**
(695.6(E))

Note: This Proposal appeared as Comment 13-142 on Proposal 13-106 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-106 was:

Add "electrical metallic tubing".

Submitter: Andre R. Cartal, Princeton Borough Building Dept. / Rep. Princeton Borough Building Dept.

Recommendation: Please review and reconsider the proposal.

Substantiation: The Panel expresses concern that the EMT from the controller to the pump should not be permitted as EMT does not have "sufficient mechanical strength to prevent damage to the conductors". However, 695.6(B) Exception, does not restrict the use of EMT to supply the controller so where is the logic that the inspector needs for enforcement?

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-115 Log #100 NEC-P13 **Final Action: Accept**
(695.6(E))

Note: This Proposal appeared as Comment 13-143 on Proposal 13-106 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-106 was:

Add "electrical metallic tubing".

Submitter: William A. Wolfe, Steel Tube Institute of North America

Recommendation: This Proposal should be Accepted.

Substantiation: The concern in 695.6(E) is for physical protection of the conductors between the controller and the pump. Article 358 allows the use of electrical metallic tubing in areas where it is not exposed to *severe* physical damage. MC cable, even with an impervious covering, is not allowed where subject to any physical damage. The impervious covering only protects the MC against corrosive conditions. The Panel should really remove the permission for MC cable but if they continue to allow that use, EMT should certainly be allowed.

The physical properties of EMT are more robust than those of MC cable. Chapter 3 allows the use of EMT where exposed to physical damage but does not allow the use of MC cable where so exposed. The 1999 NEC was very clear about the use of MC cable. Section 334-3 Uses Permitted stated: *ÒUnless specifically prohibited elsewhere in the Code and **where not subject to physical damage,** Type MC cables shall be permitted as follows:Ó* During the 2002 NEC cycle, the cable articles were reformatted, leading to current language that causes confusion about the use of MC cables where exposed to physical damage.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-116 Log #956 NEC-P13 **Final Action: Accept**
(695.6(E))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add: "electrical metallic tubing" after "intermediate metal conduit".

Substantiation: EMT is as suitable as LFMC and FNMC.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-117 Log #1425 NEC-P13 **Final Action: Reject**
(695.6(E))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise latter part: "...listed Type MC ~~with an impervious covering~~ cable complying with 330.10(A)(11) or Type MI cable." (See my proposal for 330.10(A))

Substantiation: Edit. "Impervious" is defined as not capable of damaged or harmed. Type MC cable is not impervious to damage with or without covering material. Section 330.12 indicates Type MC cable shall not be installed where subject to physical damage.

Panel Meeting Action: Reject

Panel Statement: The text in Section 330.10(A)(11) uses the term "impervious" with the intent to help protect the MC cable from corrosion and other deleterious effects. Deleting this term and simply referencing the section is not user-friendly and does not add anything useful to this section.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-135 Log #1281 NEC-P13 **Final Action: Reject**
(695.6(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
~~MECHANICAL~~ PHYSICAL PROTECTION. All wiring from engine controllers and batteries shall be protected against where likely to be subject to physical damage and shall be installed in accordance with any instructions of the controller and engine manufacturers ~~instructions~~.
Substantiation: Edit. Proposal clarifies uses of batteries. "Likely" is defined as such a nature or circumstance as to make something probable and it used in many sections.
Panel Meeting Action: Reject
Panel Statement: The panel understands this proposal to be on 695.6(G). The physical protection could be an NEC wiring method or the mechanical protection could be within the engine controllers or the fire pump itself. The proposed text does not have any technical substantiation for the change and is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-118 Log #3827 NEC-P13 **Final Action: Accept in Principle**
(695.6(I) (New))

Submitter: James S. Nasby, Skokie, IL
Recommendation: Add Text from NFPA-20-2007 Clause **9.3.6 Junction Boxes**, except for the two annex items, and renumber to the NEC Manual of Style.
A copy of the proposed text to be added from NFPA-20 is on sheet two of this submittal.
Substantiation: Although this text is in NFPA-20, it is installation related and proper material to be extracted to the NEC.
Problems occur in the field when junction boxes are installed in a manner not suitable for the environment or in a manner which is deleterious to fire pump controllers.
Note that there are two other companion Public Proposals related to this topic.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation. The submitter should be aware that Section 4.3.3 of the NFPA Rules and Regulations Governing Committee Projects requires recommendation to contain the actual text to be inserted into the NEC, in the proper format. It is not the panel's job to do the conversion.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-119 Log #3828 NEC-P13 **Final Action: Accept in Principle**
(695.6(J) (New))

Submitter: James S. Nasby, Skokie, IL
Recommendation: Add Text from NFPA-20-2007 Clause **9.3.7 Listed Electrical Circuit Protective System to Controller Wiring**, and renumber to the NEC Manual of Style.
A copy of the proposed text to be added from NFPA-20 is on sheets two and three of this submittal.
Substantiation: Although this text is in NFPA-20, it is installation related and proper material to be extracted to the NEC.
Problems and questions occur in the field when types MI and MC are installed in a manner not suitable for the environment or the application or in a manner which is deleterious to a fire pump controller. Also note that the splice between solid conductor MI type cable and stranded wire suitable for landing in a fire pump controller Isolating Switch (usually a Molded Case Switch) can also be made in the junction box. Molded Case Switch lugs are not rated for solid wire of the sizes used in fire pump circuits.
Note that there are two other companion Public Proposals related to this topic.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation. The submitter should be aware that Section 4.3.3 of the NFPA Rules and Regulations Governing Committee Projects requires recommendation to contain the actual text to be inserted into the NEC, in the proper format. It is not the panel's job to do the conversion.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-120 Log #3829 NEC-P13 **Final Action: Accept in Principle**
(695.6(K) (New))

Submitter: James S. Nasby, Skokie, IL
Recommendation: Add Text from NFPA-20-2007 Clause **9.3.8 Raceway Terminations**, and renumber to the NEC Manual of Style.
A copy of the proposed text to be added from NFPA-20 is on sheet two of this submittal.
Substantiation: Although this text is in NFPA-20, it is installation related and proper material to be extracted to the NEC.
Problems occur in the field when junction boxes are installed in a manner not suitable for the environment or in a manner which is deleterious to fire pump controllers.
Note that there are two other companion Public Proposals related to this topic.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation. The submitter should be aware that Section 4.3.3 of the NFPA Rules and Regulations Governing Committee Projects requires recommendation to contain the actual text to be inserted into the NEC, in the proper format. It is not the panel's job to do the conversion.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-121 Log #794 NEC-P13 **Final Action: Accept in Part**
(695.7)

Submitter: Carol Pafford, City and County of Denver
Recommendation: Revise text to read as follows:
The voltage drop at the fire pump controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor surge conditions.
Substantiation: The existing language is modified to eliminate confusion between the fire pump controller and any other controllers associated with the fire pump system, such as the foam pump controller and limited service controller. This particular section specifically refers to the fire pump controller.
Panel Meeting Action: Accept in Part
The panel accepts the inclusion of the term "fire pump" and rejects the remainder of the recommendation.
Panel Statement: The word "drop" was deleted as unnecessary within the context of the sentence.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-121a Log #2320 NEC-P13 **Final Action: Accept in Principle**
(695.7)

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add parts (A) and (B) as follows...(A) Starting, (existing text from first sentence) Exception: (existing text from exception) (B) Running, (existing text from second sentence).
Substantiation: This change will better reflect the requirements and exceptions included in NFPA 20. The exception should not apply to voltage drop requirements while a fire pump is running.
Panel Meeting Action: Accept in Principle
Revise Section 695.7 to read:
695.7 Voltage Drop.
(A) Starting. The voltage at the fire pump controller line terminals shall not drop more than 15 percent below normal (controller-rated voltage) under motor starting conditions.
Exception: This limitation shall not apply for emergency run mechanical starting. [**20:**9.4.2]
(B) Running. The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.
Exception: This limitation shall not apply for emergency run mechanical starting. [**20:**9.4.2]
Panel Statement: The panel action includes the recommendation of Proposal 13-121. In addition, the action reorganizes the recommendation to clearly demonstrate the text to which the exception applies.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-122 Log #101 NEC-P13 **Final Action: Accept**
(695.8 (New))

Note: This Proposal appeared as Comment 13-144 on Proposal 13-107 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-107 was:

Add text to read as follows:

695.8 Protective Devices. Where protective devices are installed in the onsite power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump room load.

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.

This action will be considered by the Panel as a Public Comment.

Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Accept

The panel accepts in principle the recommendation of Proposal 13-107 contained in the 2008 NEC ROP.

Panel Statement: The panel accepts the direction to reconsider the recommendation of Proposal 13-107 contained in the 2008 NEC ROP. The panel action on Panel Proposal 13-95a meets the intent of the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-123 Log #102 NEC-P13 **Final Action: Accept in Principle**
(695.8 (New))

Note: This Proposal appeared as Comment 13-145 on Proposal 13-107 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-107 was:

Add text to read as follows:

695.8 Protective Devices. Where protective devices are installed in the onsite power source circuits at the generator, such devices shall allow instantaneous pickup of the full pump room load.

Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle.
Substantiation: This was already correlated with 13.77. It is now clause 695.9(E). Note: This proposal originated with NEMA SC-10, Sub-committee on Fire Pump controllers. This requirement is not the same as the requirement to carry locked rotor current indefinitely. 1) Starting a single Design “B” Code “F” or “G” motor can incur first half cycle offset currents of over 12 times motor FLC (FLA). 2). The OCP in the Emergency (Alternate) power supply path must be able to start a fire pump motor in the Across-the-Line (Full Voltage Starting) mode regardless of whether or not the fire pump controller is of the reduced inrush starting type, due to the use of the Manual Mechanical Emergency Operator. 3) The same OCP must be able to start all such pumps plus any other connected loads. This is especially vital where fire pumps are connected either in series (high rise) or in parallel (large facilities such as aircraft hangers).

Panel Meeting Action: Accept in Principle

Panel Statement: The panel action on panel proposal 13-95a meets the intent of the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-124 Log #1280 NEC-P13 **Final Action: Reject**
(695.12(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

Storage batteries for starting and control for fire pump engines drives shall be supported above the floor, secured against displacement, and located where they are not likely to be subject to physical damage, flooding with water, ~~excessive~~ temperatures for which they are not suited, or ~~excessive~~ vibration likely to cause damage to the batteries.

Substantiation: Edit. “Likely” is defined as a nature or circumstance to make something probable and is used in many sections. Proposal clarifies use of batteries. “Excessive” is not defined.

Panel Meeting Action: Reject

Panel Statement: The recommended text does not provide additional clarity, and the substantiation contains absolutely no technical substantiation proved to support the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-125 Log #2674 NEC-P13 **Final Action: Reject**
(695.12(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text:

Fire pump controllers, power transfer switches, and other controls shall be located or enclosed or protected by identified means so they are not likely ~~damaged~~ to be subject to ~~damage by~~ water escaping from pumps or pump ~~connections~~ piping.

Substantiation: Edit. All controls should be included. The means of protection should be identified for the use. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.

Panel Meeting Action: Reject

Panel Statement: The recommended text does not provide additional clarity, and the substantiation contains absolutely no technical substantiation proved to support the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-126 Log #103 NEC-P13 **Final Action: Accept**
(695.13 (New))

Note: This Proposal appeared as Comment 13-146 on Proposal 13-109 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-109 was:

Revise text to read as follows:

~~9.3.2.2.6~~ 695.13 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.

~~9.3.2.2.6.1~~ 695.13(A) The junction box shall be securely mounted. [Note: This clause deleted by FIM-AAA]

~~9.3.2.2.6.2*~~ 695.13(B) Mounting and installing of a junction box shall not violate the enclosure Type ~~(NEMA~~) rating of the fire pump controller(s).

~~A.9.3.2.2.6.2 See also clause 10.3.3 (Enclosures for Electric Drive Controllers).~~

~~9.3.2.2.6.3*~~ 695.13(C) Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the Short Circuit Rating of the controller(s).

~~A.9.3.2.2.6.3 See 10.1.2.1, controller short circuit (withstand) rating.~~

~~9.3.2.2.6.4~~ 695.13(C) As a minimum, a ~~National Electrical Manufacturers Association (NEMA)~~ Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed ~~for the subject~~ to match the fire pump controller enclosure Type rating.

~~9.3.2.2.6.5~~ 695.13(D) Terminals, junction blocks, splices, ~~and the like~~, when used, shall be listed.

Or renumber as appropriate.

Note: Text Strikeouts (~~Text Strikeouts~~) and Text Underlines are FIM-AAA Committee ROP Actions.

Note: There was no Public Comments on this Proposal.

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.

This action will be considered by the Panel as a Public Comment.

Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.

Panel Meeting Action: Accept

Accept Proposal 13-109 from the 2008 NEC ROP in principle.

Panel Statement: The panel accepts the direction of the NEC TCC to reconsider the action from the 2008 NEC revsion cycle. The panel action on Proposal 13-97 meets the intent of the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-127 Log #104 NEC-P13 **Final Action: Accept in Principle**
(695.13 (New))

Note: This Proposal appeared as Comment 13-147 on Proposal 13-109 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-109 was:

Revise text to read as follows:

~~9.3.2.2.6~~ 695.13 Junction Boxes. Where fire pump wiring to or from a fire pump controller is routed through a junction box, the following requirements shall be met.

~~9.3.2.2.6.1~~ 695.13(A) The junction box shall be securely mounted. [Note: This clause deleted by FIM-AAA]

~~9.3.2.2.6.2*~~ 695.13(B) Mounting and installing of a junction box shall not violate the enclosure Type ~~(NEMA~~) rating of the fire pump controller(s).

~~A.9.3.2.2.6.2 See also clause 10.3.3 (Enclosures for Electric Drive Controllers).~~

~~9.3.2.2.6.3*~~ 695.13(C) Mounting and installing of a junction box shall not violate the integrity of the fire pump controller(s) and shall not affect the Short Circuit Rating of the controller(s).

~~A.9.3.2.2.6.3 See 10.1.2.1, controller short circuit (withstand) rating.~~

~~9.3.2.2.6.4~~ 695.13(C) As a minimum, a ~~National Electrical Manufacturers Association (NEMA)~~ Type 2, dripproof enclosure (junction box) shall be used. The enclosure shall be listed ~~for the subject~~ <u>to match the fire pump controller enclosure</u> Type rating.

~~9.3.2.2.6.5~~ 695.13(D) Terminals, junction blocks, splices, ~~and the like~~, when used, shall be listed.

Or renumber as appropriate.

Note: Text Strikeouts (~~Text Strikeouts~~) and <u>Text Underlines</u> are FIM-AAA Committee ROP Actions.

Note: There was <u>no</u> Public Comments on this Proposal.

Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle Proposal 13-109.
Substantiation: This proposal was/is correlated with Proposal 13-77 as clause 695.10.
This is extracted text. This text was added to NFPA-20 due to substantial numbers of compromised installations and confusion in the field over this topic. Junction boxes are frequently used due to the prohibition of using the fire pump controller as a junction box. Numerous controllers have been ruined or compromised regarding both reliability and personnel safety due to the high short circuit ratings -- usually 100,000 Arms Sym., but up to 200 Ka -- of typical controllers. Countless others are in the same condition; but, are unknown. This is to give both guidance and clout to inspection personnel.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-128 Log #105 NEC-P13 **Final Action: Accept**
(695.14 (New))

Note: This Proposal appeared as Comment 13-148 on Proposal 13-110 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-110 was:

Revise text to read as follows:

~~9.3.2.2.8*~~ 695.14 Raceway Terminations.

~~9.3.2.2.8.1~~ 695.14(A) Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.

~~9.3.2.2.8.2~~ 695.14(B) The ~~NEMA~~ Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.

~~9.3.2.2.8.3~~ 695.14(C) The installation instructions of the manufacturer of the fire pump controller shall be followed.

~~9.3.2.2.8.4~~ 695.14(D) ~~No alterations~~ <u>Alterations</u> to the fire pump controller <u>shall be approved by the authority having jurisdiction.</u> ~~without the express specific approval of the manufacturer of the controller.~~

~~A.9.3.2.2.8~~ FPN: All fire pump controllers are required to be rated as NEMA (UL) Type 2 as a minimum. Conduit hobs must be also. Controllers rated at higher levels, such as Type 12, Type 4, Type 4X and etc., require correspondingly rated hubs in order for the controller Type rating to be valid. Failing to do so ~~will void the controller's warranty and~~ may cause controller damage or destruction by entry of water into the controller.

Note: Text Strikeouts (~~Text Strikeouts~~) and <u>Text Underlines</u> are FIM-AAA Committee ROP Actions.

Note: There were Comments Logs #19 & #21 on this proposal, both APA, APR or APP. Wording above needs to be verified against to the ROC. The FPN wording was struck.

Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.

This action will be considered by the Panel as a Public Comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
Accept Proposal 13-110 from the 2008 NEC ROP in principle.
Panel Statement: The panel accepts the direction of the NEC TCC to reconsider the action from the 2008 NEC revision cycle. The panel action on Proposal 13-97 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-129 Log #106 NEC-P13 **Final Action: Accept in Principle**
(695.14 (New))

Note: This Proposal appeared as Comment 13-149 on Proposal 13-110 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-110 was:

Revise text to read as follows:

~~9.3.2.2.8*~~ 695.14 Raceway Terminations.

~~9.3.2.2.8.1~~ 695.14(A) Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.

~~9.3.2.2.8.2~~ 695.14(B) The ~~NEMA~~ Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.

~~9.3.2.2.8.3~~ 695.14(C) The installation instructions of the manufacturer of the fire pump controller shall be followed.

~~9.3.2.2.8.4~~ 695.14(D) ~~No alterations~~ <u>Alterations</u> to the fire pump controller <u>shall be approved by the authority having jurisdiction.</u> ~~without the express specific approval of the manufacturer of the controller.~~

~~A.9.3.2.2.8~~ FPN: All fire pump controllers are required to be rated as NEMA (UL) Type 2 as a minimum. Conduit hobs must be also. Controllers rated at higher levels, such as Type 12, Type 4, Type 4X and etc., require correspondingly rated hubs in order for the controller Type rating to be valid. Failing to do so ~~will void the controller's warranty and~~ may cause controller damage or destruction by entry of water into the controller.

Note: Text Strikeouts (~~Text Strikeouts~~) and <u>Text Underlines</u> are FIM-AAA Committee ROP Actions.

Note: There were Comments Logs #19 & #21 on this proposal, both APA, APR or APP. Wording above needs to be verified against to the ROC. The FPN wording was struck.

Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle Proposal 13-110.
Substantiation: This proposal was /is correlated with Proposal 13-77 as clause 695.12.

This is extracted text. This text was added to NFPA-20 due to substantial numbers of compromised installations and confusion in the field over this topic. Numerous controllers have been ruined or compromised due to flooding because of inadequate raceway (conduit) terminations. Numerous others are vulnerable to the same problem, especially the use of star nuts on 3" and larger top entry or exit conduit. One instance known which nearly required the evacuation of the top two thirds of a high rise hotel due to a flooded middle zone controller. This is a pervasive problem. Fire protection is often interrupted when a sole source controller needs extensive repair or replacement. This is exacerbated by the fact that many, if not most of these controllers are used as service entrance equipment.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-130 Log #107 NEC-P13 **Final Action: Reject**
(695.14)

Note: This Proposal appeared as Comment 13-150 on Proposal 13-110 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-110 was:
Revise text to read as follows:
~~9.3.2.2.8*~~ 695.14 Raceway Terminations.
~~9.3.2.2.8.1~~ 695.14(A) Listed conduit hubs shall be used to terminate raceway (conduit) to the fire pump controller.
~~9.3.2.2.8.2~~ 695.14(B) The ~~NEMA~~ Type rating of the conduit hub(s) shall be at least equal to that of the fire pump controller.
~~9.3.2.2.8.3~~ 695.14(C) The installation instructions of the manufacturer of the fire pump controller shall be followed.
~~9.3.2.2.8.4~~ 695.14(D) ~~No alterations~~ Alterations to the fire pump controller shall be approved by the authority having jurisdiction. ~~without the express specific approval of the manufacturer of the controller.~~
~~A.9.3.2.2.8~~ FPN: All fire pump controllers are required to be rated as NEMA (UL) Type 2 as a minimum. Conduit hobs must be also. Controllers rated at higher levels, such as Type 12, Type 4, Type 4X and etc., require correspondingly rated hubs in order for the controller Type rating to be valid. Failing to do so ~~will void the controller's warranty and~~ may cause controller damage or destruction by entry of water into the controller.
Note: Text Strikeouts (~~Text Strikeouts~~) and Text Underlines are FIM-AAA Committee ROP Actions.
Note: There were Comments Logs #19 & #21 on this proposal, both APA, APR or APP. Wording above needs to be verified against to the ROC. The FPN wording was struck.
Submitter: Elliot Rappaport, Electro Technology Consultants
Recommendation: Reject the proposal.
Substantiation: The proposed text gives the AHJ authority that neither the manufacturer or the testing agency would accept without appropriate testing. Alterations to the structure should void the listing.
Panel Meeting Action: Reject
Panel Statement: Sections 110.2, 90.4, and new 695.6(K)(4) of the NEC already provides the inspector with this authority so the substantiation is incorrect. See the panel action and statement on Proposal 13-97.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-131 Log #2911 NEC-P13 **Final Action: Accept in Part**
(695.14(F))

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise text to read as follows:
695.14(F) Generator Control Wiring Methods. Control conductors installed between the fire pump power transfer switch and the standby generator supplying the fire pump during normal power loss shall be kept entirely independent of all other wiring. They shall be protected to resist potential damage by fire or structural failure. They shall be permitted to be routed through a building(s) **using one of the following methods:**
(1) Be encased in ~~50 mm (2 in.) of~~ concrete **with a sufficient thickness to achieve a minimum 2 hour fire rating.**
(2) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 2 hours and ~~or within enclosed construction~~ dedicated to the fire pump circuits ~~and having a minimum 1-hour fire resistance rating~~,
(3) Be a listed electrical ~~or~~ circuit protective system~~s~~ with a minimum of **2**~~1~~-hour fire **rating** ~~resistance~~. The installation shall comply with any restrictions provided in the listing of the electrical circuit protective system used.
FPN: UL guide information for electrical circuit protective systems (FHIT) contains information on proper installation requirements to maintain the fire rating.
Substantiation: This will make the format and wording the same as what is proposed for 695.6(B) in a companion proposal. Note, this also corrects the control wiring to a 2 hour rating to be the same as 695.6(B).
Panel Meeting Action: Accept in Part
The panel rejects the recommendation for 695.14(F)(1). The panel accepts the remainder of the recommendation.
Panel Statement: See the panel action and statement on Proposal 13-102.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-132 Log #108 NEC-P13 **Final Action: Accept**
(695.15 (New))

Note: This Proposal appeared as Comment 13-151 on Proposal 13-111 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-111 was:
Revise text to read as follows:
~~9.3.2.2.7*~~ 695.15 Listed Electrical Circuit Protective System to Controller Wiring.
~~9.3.2.2.7.1*~~ 695.15(A) ~~When used, Type MI (Mineral Insulated) cable~~ Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with NFPA 70. Single (Individual) conductors shall not enter the fire pump enclosure separately.
~~A.9.3.2.2.7.1~~ FPN Cutting slots or rectangular cutouts in a fire pump controller will violate the ~~NEMA~~ Enclosure Type rating, and the controller's Short Circuit (Withstand) rating and will void the manufacturer's warrantee. See also NFPA 70 Articles 300.20 and 322, for example, for further information.
~~9.3.2.2.7.2*~~ 695.15(B) Where required by the manufacturer of a ~~Listed~~ listed Electrical Circuit Protective System or by NFPA 70 or by the Listing ~~agency~~, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer ~~or listing agency.~~
~~A.9.3.2.2.7.2~~ FPN When so required, this seal is to prevent flammable gases from entering into the fire pump controller.
Note: Text Strikeouts (~~Text Strikeouts~~) and Text Underlines are FIM-AAA Committee ROP or ROC Actions.
Note: There were Comments Logs #17, #18 & #20 on this proposal, both APA, APR, or APP. Wording above needs to be verified against to the ROC. The FPN wording was struck.
Submitter: Technical Correlating Committee on National Electrical Code®,
Recommendation: It was the action of the Technical Correlating Committee that this Proposal be reconsidered and correlated with the Technical Correlating Committee action on Proposal 13-77.
This action will be considered by the Panel as a Public Comment.
Substantiation: This is a direction from the National Electrical Code Technical Correlating Committee in accordance with 3.4.2 and 3.4.3 of the Regulations Governing Committee Projects.
Panel Meeting Action: Accept
Accept Proposal 13-111 from the 2008 NEC ROP in principle.
Panel Statement: The panel accepts the direction of the NEC TCC to reconsider the action from the 2008 NEC revision cycle. The panel action on Proposal 13-97 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-133 Log #109 NEC-P13 **Final Action: Accept in Principle**
(695.15 (New))

Note: This Proposal appeared as Comment 13-152 on Proposal 13-111 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-111 was:
Revise text to read as follows:
~~9.3.2.2.7*~~ 695.15 Listed Electrical Circuit Protective System to Controller Wiring.
~~9.3.2.2.7.1*~~ 695.15(A) ~~When used, Type MI (Mineral Insulated) cable~~ Where single conductors (individual conductors) are used, they shall be terminated in a separate junction box and in accordance with NFPA 70. Single (Individual) conductors shall not enter the fire pump enclosure separately.
~~A.9.3.2.2.7.1~~ FPN Cutting slots or rectangular cutouts in a fire pump controller will violate the ~~NEMA~~ Enclosure Type rating, and the controller's Short Circuit (Withstand) rating and will void the manufacturer's warrantee. See also NFPA 70 Articles 300.20 and 322, for example, for further information.
~~9.3.2.2.7.2*~~ 695.15(B) Where required by the manufacturer of a ~~Listed~~ listed Electrical Circuit Protective System or by NFPA 70 or by the Listing ~~agency~~, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer ~~or listing agency.~~
~~A.9.3.2.2.7.2~~ FPN When so required, this seal is to prevent flammable gases from entering into the fire pump controller.
Note: Text Strikeouts (~~Text Strikeouts~~) and Text Underlines are FIM-AAA Committee ROP or ROC Actions.
Note: There were Comments Logs #17, #18 & #20 on this proposal, both APA, APR, or APP. Wording above needs to be verified against to the ROC. The FPN wording was struck.
Submitter: James S. Nasby, Master Control Systems, Inc.
Recommendation: Continue to Accept in Principle Proposal 13-110.
Substantiation: This proposal was/is correlated with Proposal 13-77 as clause 695.11.
This is extracted text. This text was added to NFPA-20 due to substantial numbers of compromised installations and confusion in the field over this topic. Numerous controllers have been ruined or compromised due major hacking (modifications by way of large cut-outs to accommodate individual conductors. An unknown number of others exist. This is a poorly understood area. Use of individual conductors is increasing. This is partly due to the placement of fire pumps in the middle of high rise buildings. Both the Normal Source and the Emergency Source are so connected in many cases. Guidance is needed for both installers and inspection agencies. This is a matter of both

reliability of the equipment, protecting it from flooding, and personal safety due to the high short circuit ratings of typical fire pump controllers.
Panel Meeting Action: Accept in Principle
Panel Statement: The panel action on Proposal 13-97 meets the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-134 Log #110 NEC-P13 **Final Action: Reject**
(695.15)

Note: This Proposal appeared as Comment 13-153 on Proposal 13-111 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-111 was:

Revise text to read as follows:

~~9.3.2.2.7*~~ **695.15 Listed Electrical Circuit Protective System to Controller Wiring.**

~~9.3.2.2.7.1*~~ **695.15(A)** ~~**When used, Type MI (Mineral Insulated) cable**~~ <u>Where single conductors (individual conductors) are used, they</u> **shall be terminated in a separate junction box and in accordance with NFPA 70.** <u>**Single (Individual) conductors shall not enter the fire pump enclosure separately.**</u>

~~A.9.3.2.2.7.1~~ **FPN Cutting slots or rectangular cutouts in a fire pump controller will violate the** ~~**NEMA**~~ **Enclosure Type rating, and the controller's Short Circuit (Withstand) rating and will void the manufacturer's warrantee. See also NFPA 70 Articles 300.20 and 322, for example, for further information.**

~~9.3.2.2.7.2*~~ **695.15(B) Where required by the manufacturer of a** ~~Listed~~ <u>listed</u> **Electrical Circuit Protective System or by NFPA 70 or by the Listing** ~~agency~~**, the raceway between a junction box and the fire pump controller shall be sealed at the junction box end as required and per the instructions of the manufacturer** ~~or listing agency.~~

~~A.9.3.2.2.7.2~~ **FPN When so required, this seal is to prevent flammable gases from entering into the fire pump controller.**

Note: Text Strikeouts (~~Text Strikeouts~~) and <u>Text Underlines</u> are FIM-AAA Committee ROP or ROC Actions.

Note: There were Comments Logs #17, #18 & #20 on this proposal, both APA, APR, or APP. Wording above needs to be verified against to the ROC. The FPN wording was struck.

Submitter: Elliot Rappaport, Electro Technology Consultants
Recommendation: Reject the proposal.
Substantiation: The proposal would prohibit the use of conduit and wire to a controller and only permit cable. The substantiation does not address any problem with conduit and wire, but only discusses problems with terminating solid conductors.
Panel Meeting Action: Reject
Panel Statement: Sections 110.2, 90.4, and new 695.6(K)(4) of the NEC already provides the inspector with this authority so the substantiation is incorrect. See the panel action and statement on Proposal 13-97.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

(Note: Sequence 13-135 moved to follow 13-117 on page 930)

13-136 Log #484 NEC-P13 **Final Action: Reject**
(695.19 through 695.30 (New))

Submitter: Troy Meissner, Douglas County, Colorado
Recommendation: Add new text as follows:

II. Residential Fire Pumps

695.19 Scope. Part II covers the installation for one- and two-family dwellings.
695.20 Power Source(s). Electric motor-driven fire pumps shall have a reliable source of power.
(A) Electric Utility Service Connection. A fire pump shall be permitted to be supplied by a separate service, or from a connection location ahead of and not within the same cabinet, enclosure, or panelboard as the service disconnecting means. The connection shall be located and arranged so as to minimize the possibility of damage by fire from within the premises and from exposing hazards. A tap ahead of the service disconnecting means shall comply with 230.82(5). The service equipment shall comply with the labeling requirements in 230.72(B).
(B) On-Site Power Production Source. A fire pump shall be permitted to be supplied by an on-site power production source. Where this source is a generator, the generator shall comply with 695.3(B)(1).
695.21 Continuity of Power. Circuits that supply electric motor-driven fire pumps shall be installed to prevent inadvertent disconnection.
(A) Direct Connection. The supply conductors shall directly connect the power source to the fire pump disconnect. The supply conductors shall be continuous without a splice.
Where the power source is supplied by on-site generator(s), the supply conductors shall comply with 695.4(A).
(B) Overcurrent Device Selection. The overcurrent protective device(s) shall comply with 695.4(B)(1). If the overcurrent protective device is a breaker, it shall be provided with a lock on device.
(C) Disconnecting Means. The disconnecting means shall comply with all of the following:
(1) The disconnecting means shall comply with 695.4(B)(2)
(2) The disconnecting means shall be marked per 695.4(B)(3)
695.23 Power Wiring. Power circuits and wiring methods shall comply with the requirements in 695.23(A) and 695.23(B).
(A) Conductor Size. Conductors supplying a fire pump motor(s) shall comply with 695.6(C)(1) or 695.6(C)(2).
(B) Wiring Methods. Cable shall be installed within finished wall cavities. Conductors in accessible areas shall be installed in an approved raceway as per 695.6(E).
695.24 Voltage Drop. The voltage at the motor terminals shall not drop more than 5 percent below the voltage rating of the motor when the motor is operating at 115 percent of the full-load current rating of the motor.
695.27 Listed Equipment. All equipment used for the fire pump(s) system shall be listed.
695.29 Equipment Location.
(A) Feeder-Circuit Equipment. Equipment for feeder circuits shall be located in spaces fully protected by approved automatic fire suppression systems (sprinklers) or in spaces with one hour fire resistance rating required by 700.9(D)(2).
(B) Energized Equipment. All energized equipment parts shall be located at least 300 mm (12 in.) above the floor level. All energized equipment parts shall be located or protected so that they are not damaged by water escaping from pumps or pump connections.
(C) Mounting. All fire pump control equipment shall be mounted in a substantial manner on supporting structures.
695.31 Control Wiring. External control circuits that extend outside the fire pump room shall be arranged so that failure of any external circuit (open or short circuit) shall not prevent the operation of a pump(s) from all other internal or external means.
Substantiation: More and more single family dwellings are installing Fire Suppression systems that require pumps. This extraction language from Article 695 2008 NEC, is proposed to assist and clarify an important requirement necessary to the designer, user and enforcer of the NEC. It will further harmonize the NFPA family of codes and provide the information necessary to comply with the installation standard.
Panel Meeting Action: Reject
Panel Statement: Fire pumps covered within the scopes of NFPA 13 and NFPA 20 must comply with all of the requirements of Article 695. Requirements for water pumps and associated equipment used for fire protection, such as those that are covered in NFPA 13D, are not appropriate for inclusion in Article 695.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

ARTICLE 700 — EMERGENCY SYSTEMS

13-137 Log #2321 NEC-P13 **Final Action: Reject**
(700)

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add the words '(Life Safety)' after the word 'Emergency' in the title and throughout Article 700.
Substantiation: The words 'emergency system' are misused extensively by those who don't know it's specific meaning within the NEC and frequently by those who should. This change is intended to be the first step in a three cycle process (similar to the process used for Luminaires) which will rename Article 700 and more clearly identify the purpose for which the system is used. It will allow the term 'Emergency System' to encompass the combined 700, 701 and 702 system which is in line with the way the term is used in Article 517. The extended process will allow related standards to adapt their language.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided specific locations throughout the article where new text is to be added. This proposal does not meet the requirements of 4.3.3(b) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-138 Log #3028 NEC-P13 **Final Action: Reject**
(700)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Renumber Article 700 as follows:
I. General
700.1 Scope.
The provisions of this article apply to the electrical safety of the installation, operation, and maintenance of emergency systems consisting of circuits and equipment intended to supply, distribute, and control electricity for illumination, power, or both, to required facilities when the normal electrical supply or system is interrupted.
~~Emergency systems are those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life.~~
FPN No. 1: Text to remain unchanged.
FPN No. 2: Text to remain unchanged.
~~FPN No. 3: Emergency systems are generally installed in places of assembly where artificial illumination is required for safe exiting and for panic control in buildings subject to occupancy by large numbers of persons, such as hotels, theaters, sports arenas, health care facilities, and similar institutions. Emergency systems may also provide power for such functions as ventilation where essential to maintain life, fire detection and alarm systems, elevators, fire pumps, public safety communications systems, industrial processes where current interruption would produce serious life safety or health hazards, and similar functions.~~
FPN No. 3~~4~~: For specification of locations where emergency lighting is considered essential to life safety, see NFPA 101®-2006, Life Safety Code®.
FPN No. 4~~5~~: For further information regarding performance of emergency and standby power systems, see NFPA 110-2005, Standard for Emergency and Standby Power Systems.
700.2 Definition
Emergency System.
Emergency systems are those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life.
FPN: Emergency systems are generally installed in places of assembly where artificial illumination is required for safe exiting and for panic control in buildings subject to occupancy by large numbers of persons, such as hotels, theaters, sports arenas, health care facilities, and similar institutions. Emergency systems may also provide power for such functions as ventilation where essential to maintain life, fire detection and alarm systems, elevators, fire pumps, public safety communications systems, industrial processes where current interruption would produce serious life safety or health hazards, and similar functions.
~~700.2~~ 700.3 Application of Other Articles. Text to remain unchanged.
~~700.3~~ 700.4 Equipment Approval. Text to remain unchanged.
~~700.4~~ 700.5 Tests and Maintenance. Text to remain unchanged.
~~700.5~~ 700.6 Capacity.
(A) Capacity and Rating. Text to remain unchanged.
(B) Selective Load Pickup, Load Shedding, and Peak Load Shaving. The alternate power source shall be permitted to supply emergency, legally required standby, and optional standby system loads where the source has adequate capacity or where automatic selective load pickup and load shedding is provided as needed to ensure adequate power to (1) the emergency circuits, (2) the legally required standby circuits, and (3) the optional standby circuits, in that order of priority. The alternate power source shall be permitted to be used for peak load shaving, provided these conditions are met.
Peak load shaving operation shall be permitted for satisfying the test requirement of 700.5(B) ~~700.4(B)~~, provided all other conditions of 700.5 ~~700.4~~ are met.
A portable or temporary alternate source shall be available whenever the emergency generator is out of service for major maintenance or repair.
~~700.6~~ 700.7 Transfer Equipment. Text to remain unchanged.
~~700.7~~ 700.8 Signals. Text to remain unchanged.
~~700.8~~ 700.9 Signs. Text to remain unchanged.
II. Circuit Wiring
700.10 ~~700.9~~ Wiring, Emergency System.
(A) Identification. Text to remain unchanged.
(B) Wiring. Text to remain unchanged.
(C) Text to remain unchanged.
(D) Fire Protection. Emergency systems shall meet the additional requirements in ~~700.9~~(D)(1) and (D)(2) in assembly occupancies for not less than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile.
(1) Feeder-Circuit Wiring. Feeder-circuit wiring shall meet one of the following conditions:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
(4) Text to remain unchanged.
(5) Text to remain unchanged.
(6) Text to remain unchanged.
(2) Feeder-Circuit Equipment. Text to remain unchanged.
(3) Generator Control Wiring. Control conductors installed between the transfer equipment and the emergency generator shall be kept entirely independent of all other wiring and shall meet the conditions of 700.10(D)(1) ~~700.9(D)(1)~~.
III. Sources of Power
700.12 General Requirements. Text to remain unchanged.
(A) Storage Battery. Text to remain unchanged.
(B) Generator Set.
(1) Prime Mover-Driven. For a generator set driven by a prime mover acceptable to the authority having jurisdiction and sized in accordance with 700.6 ~~700.5~~, means shall be provided for automatically starting the prime mover on failure of the normal service and for automatic transfer and operation of all required electrical circuits. A time-delay feature permitting a 15-minute setting shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.
(2) Internal Combustion as Prime Movers. Text to remain unchanged.
(3) Dual Supplies. Text to remain unchanged.
(4) Battery Power and Dampers. Text to remain unchanged.
(5) Auxiliary Power Supply. Text to remain unchanged.
(6) Outdoor Generator Sets. Text to remain unchanged.
(C) Uninterruptible Power Supplies. Text to remain unchanged.
(D) Separate Service. Text to remain unchanged.
(E) Fuel Cell System. Text to remain unchanged.
(F) Unit Equipment. Text to remain unchanged.
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.
(4) A relaying device arranged to energize the lamps automatically upon failure of the supply to the unit equipment
The batteries shall be of suitable rating and capacity to supply and maintain at not less than 87½ percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 1½ hours, or the unit equipment shall supply and maintain not less than 60 percent of the initial emergency illumination for a period of at least 1½ hours. Storage batteries, whether of the acid or alkali type, shall be designed and constructed to meet the requirements of emergency service.
Unit equipment shall be permanently fixed in place (i.e., not portable) and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in Chapter 3. Flexible cord-and-plug connection shall be permitted, provided that the cord does not exceed 900 mm (3 ft) in length. The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. The branch circuit that feeds unit equipment shall be clearly identified at the distribution panel. Emergency luminaires that obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment as required by 700.10 ~~700.9~~ and by one of the wiring methods of Chapter 3.
Exception: Text to remain unchanged.
IV. Emergency System Circuits for Lighting and Power

700.15 Loads on Emergency Branch Circuits. Text to remain unchanged.
700.16 Emergency Illumination. Text to remain unchanged.
700.17 Circuits for Emergency Lighting. Text to remain unchanged.
700.18 Circuits for Emergency Power. Text to remain unchanged.
V. Control — Emergency Lighting Circuits
700.20 Switch Requirements. Text to remain unchanged.
700.21 Switch Location. Text to remain unchanged.
700.22 Exterior Lights. Text to remain unchanged.
700.23 Dimmer Systems. Text to remain unchanged.
VI. Overcurrent Protection
700.25 Accessibility. Text to remain unchanged.
700.26 Ground-Fault Protection of Equipment.

The alternate source for emergency systems shall not be required to have ground-fault protection of equipment with automatic disconnecting means. Ground-fault indication of the emergency source shall be provided per 700.8(D) ~~700.7(D)~~.

700.27 Coordination. Text to remain unchanged.

Substantiation: This proposal is part of a series of proposals intended to create a parallel numbering system for Articles 700, 701 and 702.
Panel Meeting Action: Reject
Panel Statement: Panel 13 recommends rejecting the proposed action since, even though the existing text in 700.1 appears to be a definition of emergency systems, there are too many "existing" definitions of emergency systems so adding another one that is different from the others is not productive. For example, there is a definition for emergency system in 517.2 as it applies to health care facilities and the origin is from NFPA 99, the health care standard. The proposed parallel numbering system for Articles 700, 701, and 702 is unnecessary since the articles are not large and complex articles. While there are some common titles and text, there are also titles and text that are different from one article to another.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-139 Log #2900 NEC-P13 **Final Action: Reject**
(700.1)

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Add new text to read as follows:

Relocate text to a 700.2 **Emergency systems** are those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction. These systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply or in the event of accident to elements of a system intended to supply, distribute, and control power and illumination essential for safety to human life.

Substantiation: Move definition of emergency system from 700.1 to 700.2 as the definitions should be in this section according to the style manual.
Panel Meeting Action: Reject
Panel Statement: Panel 13 recommends rejecting the proposed action because, even though the existing text in 700.1 appears to be a definition of emergency systems, there are too many "existing" definitions of emergency systems so adding another one that is different from the others is not productive. For example, there is a definition for emergency system in 517.2 as it applies to health care facilities and the origin is from NFPA 99, the health care standard.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:

CZARNECKI, N.: The definition of "emergency systems" belongs in Art 700.2, as per the Style Manual. Additionally, CMP 15 accepted proposal 15-7 which will remove the definition of emergency system from Article 517. There are no other definitions of "Emergency System" other than Article 700, so the panel statement is incorrect.

13-140 Log #4109 NEC-P13 **Final Action: Reject**
(700.1)

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Delete text to read as follows:

700.1 Scope The provisions... (retain existing text)... human life.

~~FPN No. 1: for further information regarding performance and maintenance of emergency systems in healthcare facilities, see Article 517.~~

~~FPN No. 2: for further information regarding performance and maintenance of emergency systems in healthcare facilities, see NFPA 99.205, Standard for Healthcare facilities.~~

FPN No. ~~3~~1: Emergency systems are generally installed in places of assembly where artificial illumination is required for sage exiting and of panic control in buildings subject to occupancy by large numbers of persons, such as hotels, theaters, sports arenas, ~~healthcare facilities~~ and similar institutions. Emergency...

Substantiation: The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings, and they are called on to perform differently than those in other kids of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, do not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctively so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the Electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on, and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and thus, reduce confusion.
Panel Meeting Action: Reject
Panel Statement: The panel rejects the recommendation because removing the references to Article 517 and NFPA 99 and not applying any of the requirements in Article 700 to Article 517 health care installations would leave Article 517 emergency systems (life safety and critical branches) and equipment systems without any requirements for emergency generators. The life safety system branch in Part III of Article 517 uses all of the requirements in Article 700, with the critical branch using much of the requirements in Article 700. This is a broader issue than what Panel 13 has jurisdiction over and should be cleared up at the NEC Technical Correlating Committee level and the NFPA Standards Council.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:

DEGNAN, J.: The scope noted in 700.1 should coordinate with the language of NFPA 99, and the proposals undertaken by CMP 15 for Article 517.

13-141 Log #4138 NEC-P13 **Final Action: Reject**
(700.1)

Submitter: Walter N. Vernon, IV, Mazzetti & Associates Inc.
Recommendation: Revise text to read as follows:

700.1 Scope The provisions...(retain existing text)...human life.

~~FPN No. 1: For further information regarding performance and maintenance of emergency systems in healthcare facilities, see Article 517.~~

~~FPN No. 2: For further information regarding performance and maintenance of emergency systems in healthcare facilities, see NFPA 99 205, Standard for healthcare facilities.~~

FPN No. ~~3~~1: Emergency systems are generally installed in places of assembly where artificial illumination is required for safe exiting and of panic control in buildings subject to occupancy by large numbers of persons, such as hotels, theaters, sports arenas, ~~healthcare facilities~~ and similar institutions. Emergency...

Substantiation: The electrical distribution systems in health care facilities are different from those in other kinds of buildings, and they are called on to perform differently than those in other kinds of buildings. Accordingly, the general requirements for emergency systems in 700, good as they are, do not, in many cases, work when applied to health care facilities. Indeed, as noted in other proposals, they can often compromise the performance of the very systems they seek to protect. Accordingly, it is vital to ensure the proper definition of performance of these systems clearly and distinctly so as to meet the many complicated demands on the systems. Exactly these issues are the subject of much debate on the Electrical Systems Technical Committee of NFPA 99, which I chair. That committee, composed of many electrical engineers with hundreds of years of experience designing and operating health care facilities between them, together with the medical expertise in the form of physicians on the committee allow that committee to focus on, and best define the peculiar needs of these buildings. This proposal will bring NFPA 70 into conformance with NFPA 99, and, thus, reduce confusion.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-140.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:

DEGNAN, J.: See My Explanation of Negative on 13-140.

13-142 Log #2811 NEC-P13 **Final Action: Accept**
(700.2)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text

~~700.2 Application of Other Articles.~~

~~Except as modified by this article, all applicable articles of this Code shall apply.~~

Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 700.2 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-143 Log #3625 NEC-P13 **Final Action: Reject**
(700.2)

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
700.2 Application of Other ~~Articles~~ Requirements.
Except as modified by this article, all applicable articles of this Code shall apply. Emergency systems shall be installed in accordance with this Code and NFPA 110 and NFPA 111.
Substantiation: The provisions of NFPA 110 and 111 are very important to the installations of emergency systems and these requirements should be referenced in the NEC. The International Building and Fire Codes have similar wording in Section 2702. Electrical installers need to be aware of these requirements.
Panel Meeting Action: Reject
Panel Statement: The proposed reference to NFPA 110 and NFPA 111 is not in compliance with Section 4.2 in the NEC Style Manual that states, "references to other standards shall not be in mandatory text. References to other standards shall be in the fine print notes."
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-144 Log #4676 NEC-P13 **Final Action: Reject**
(700.2)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following sentence: "The requirements in this article do not supersede specific requirements and allowances in Part III of Article 517 regarding emergency systems within the scope of that article."
Substantiation: Conflicts between articles in Chapters 5, 6, and 7 must be reciprocally correlated or the result is a stand-off. It is now abundantly clear, for example, that small hospitals are not going to give up the common transfer switch allowance in 517.30(B)(4) which directly conflicts with the dedicated transfer switch rule in 700.6(D). This proposal provides a vehicle to eliminate the conflict. As a matter of Code administration, articles covering specific occupancies must usually be allowed, subject to the review of the TCC, to write specialized rules that may modify general rules. Remember that the reach of an occupancy article will always be more limiting than the reach of a special condition article such as Article 700, which applies everywhere unless specific exception is taken.
Panel Meeting Action: Reject
Panel Statement: Section 517.26 addresses the concern expressed in the recommendation. This requirement that Article 700 applies except as amended by Article 517 already accomplishes the recommendation. In addition, the panel action on Proposal 13-142 deletes Section 700.2.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-145 Log #3231 NEC-P13 **Final Action: Accept in Principle**
(700.2.Relay, Automatic Load Control (New))

TCC Action: The Technical Correlating Committee understands that the panel's intent is to insert a new 700.2 to replace the one deleted by Proposal 13-142 with the title "700.2 Definitions" and has accepted the modified definition from this proposal.
Submitter: Steven R. Terry, Electronic Theatre Controls Inc.
Recommendation: Add new section to Article 700 and renumber the balance of sections to accommodate a new section as follows:
700.2(New) Definitions
Relay, Automatic Load Control. A device listed for use as Emergency Lighting and Power Equipment and used to energize switched or normally-off emergency equipment from an emergency supply in the event of loss of the normal supply, and to de-energize or return the equipment to normal status when the normal supply is restored.
Substantiation: Stand-alone Automatic Load Control Relays are a new class of device that has been introduced in the last few years. In my separate proposal for **700.24 (New) Emergency Lighting Automatic Control**, the Automatic Load Control Relay is introduced to the NEC. Therefore, a definition of the device is required. This definition should be in Article 700 and not Article 100 because these devices are only used for emergency applications. The proposed definition is in alignment with the definition of this device in UL924. In addition, the definition must make clear that the device is listed as Emergency Lighting and Power Equipment so that the reader can determine which standard in Annex A applies to these devices.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
Relay, Automatic Load Control. A device ~~listed for use as Emergency Lighting and Power Equipment and~~ used to energize switched or normally-off ~~emergency~~ lighting equipment from an emergency supply in the event of loss of the normal supply, and to de-energize or return the equipment to normal status when the normal supply is restored.
Panel Statement: The panel action to revise the definition meets the requirement of Section 2.2.2 of the NEC Style Manual regarding definitions containing requirements.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-146 Log #187 NEC-P13 **Final Action: Accept**
(700.3)

Submitter: Bryan P. Holland, City of North Port
Recommendation: Delete the following text:
~~700.3 Equipment Approval. All equipment shall be approved for use on emergency systems.~~
Substantiation: This section is redundant and unnecessary. Sections 90.7, 110.2, and 110.3 already contain this provision. There is no special listing, labeling, or marking which identifies equipment as suitable for this type of system, thus, no special evaluation beyond 90.7, 110.2, and 110.3 is needed.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-147 Log #3027 NEC-P13 **Final Action: Reject**
(700.4(A))

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
700.4 Tests and Maintenance.
(A) Conduct or Witness Test. The authority having jurisdiction shall conduct or witness a test of the complete system upon installation ~~and periodically afterward~~.
Substantiation: The requirement for periodic testing is already in 700.4(B), so the proposed deletion is simply removing redundant text.
Panel Meeting Action: Reject
Panel Statement: The existing text requires the AHJ to actually witness the initial and subsequent tests. The proposed revision simply requires the AHJ to approve the testing schedule for periodic testing. It is the intent of the panel to ensure that the AHJ conducts or witnesses both the initial and approved periodic testing.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-148 Log #3330 NEC-P13 **Final Action: Reject**
(700.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
~~CAPACITY and~~ RATINGS. An emergency system shall have ~~adequate capacity and~~ rating(s) not less than required for all loads to be operated simultaneously.
Substantiation: Edit. "Capacity" is not Code-defined. "Adequate" is subjective and a term to be avoided per the Style Manual. Proposal is specific and conforms to Code language.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to change the existing text. Adequate capacity for all loads to operate simultaneously is very clear so change is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-149 Log #2009 NEC-P13 **Final Action: Reject**
(700.5(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: An emergency system shall have ~~adequate capacity and~~ ratings not less than required for all loads to be operated simultaneously. The emergency system equipment shall be ~~suitable~~ identified for the maximum available fault current at its terminals.
Substantiation: Edit. "Adequate" and "suitable" are subjective and terms to be avoided per the Style Manual.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to change the existing text. Adequate capacity for all loads to operate simultaneously is very clear so change is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-150 Log #3329 NEC-P13 **Final Action: Reject**
(700.6(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise:
BYPASS ISOLATION DEVICES ~~SWITCHES.~~ Identified means shall be permitted to bypass and isolate the transfer equipment and ~~approved~~ identified means shall be provided to prevent parallel operation.
Substantiation: Edit. Circuit breakers can also be used for this function. The means for bypass, isolation, and parallel operation should be identified for the use. "Approved" is not necessarily the same as "identified".
Panel Meeting Action: Reject
Panel Statement: Section 110.3 provides general requirements for the use of the equipment for the function of a bypass isolation device, and the word "identified" may cause confusion and is unnecessary in this requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-151 Log #2920 NEC-P13 **Final Action: Reject**
(700.7)

Submitter: Merv Lapp, Hillsboro, OR
Recommendation: Revise text to read as follows:
700.7 Signals.
Audible and visual signal devices shall be provided, ~~where practicable~~, for the purpose described in 700.7(A) through (D).
Substantiation: This wording is not enforceable. All new installations can be purchased with the needed contacts to provide the signal.
NOTE: Related section NEC 701.8.
Panel Meeting Action: Reject
Panel Statement: "Where practicable" leaves the decision up to the authority having jurisdiction and the circumstances of being able to see and hear the signaling devices. Many of the new systems are linked to computers systems and can be transferred through these systems to security, the building engineer's office, and other similar locations, so the word "practicable" provides the ability to signal these alternative locations.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
DEGNAN, J.: The intent of the panel's statement would be met by accepting the submitter's proposal. Deletion of the word's "where practicable" would leave the requirement for the alarms, but not specify where they are to be seen and heard. Rhetorically, if an audible and visual signal isn't in an area where it can be acted upon, is it practicable? Perhaps the submitter's and the panel's intent can be met by: "...provided, and located where practicable, for...".

13-152 Log #2922 NEC-P13 **Final Action: Reject**
(700.7)

Submitter: Merv Lapp, Hillsboro, OR
Recommendation: Revise text to read as follows:
700.7 Signals.
Audible and visual signal devices shall be provided, where practicable, for the purpose described in 700.7(A) through ~~(D)~~ (E).
(E) Generator Trouble. To provide a generator trouble signal to the Fire Alarm Panel.
Substantiation: This addition will permit the generator to be supervised 24/7 the same as the rest of the Fire Alarm Life Safety equipment. The existing generator remote annunciator is normally located in the Fire Command Room that is not manned 24/7. A problem may exist for several days, stopping the generator from functioning, which could jeopardize the lives of the building occupants.
NOTE: Related section NEC 701.8.
Panel Meeting Action: Reject
Panel Statement: Many of the new systems are linked to computers systems and can be transferred through these systems to security, the building engineer's office, and other similar locations, so monitoring by the fire alarm system is not required but certainly can be done. It is permissible by the existing NEC, and there was no technical substantiation provided to justify requiring monitoring by the fire alarm panel.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-153 Log #2921 NEC-P13 **Final Action: Reject**
(700.7(A))

Submitter: Merv Lapp, Hillsboro, OR
Recommendation: Revise text to read as follows:
700.7 Signals.
Audible and visual signal devices shall be provided, where practicable, for the purpose described in 700.7(A) through (D).
(A) Derangement. To indicate derangement of the emergency source.
(1) Generator main circuit breaker to be alarmed in the off position (Not-in-Auto).
Substantiation: Clarification of the derangement signal: The generator engine control can be in the auto position, indicating it is in the ready state, when the main circuit breaker is in the open, or off, position. In this mode, you do not have an emergency generator available to power the Life Safety Systems; Egress Lighting, Fire Pumps, Pressurization fans.
NOTE: Related section NEC 701.8(A).
Panel Meeting Action: Reject
Panel Statement: A signal is already required to indicate the disruption of the generator, so the proposed new text is unnecessary. In addition, emergency systems must be tested periodically and must be maintained on a regular basis.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-154 Log #3984 NEC-P13 **Final Action: Reject**
(700.8)

Submitter: Michael A. Anthony, University of Michigan Business Operations
Recommendation: Add text to read as follows:
700.8 Illumination of Emergency Source Switchgear. The area around the service equipment and emergency switchgear in non-dwelling unit occupancies 200 amperes and above shall be automatically illuminated upon loss of power. For a period of 90 minutes illumination levels shall be 1-footcandle on the egress path from the switchgear and 3-footcandles on the vertical surfaces of the service equipment.
Substantiation: The need for illumination during power outages should be intuitive. It provides illumination for a) the electrician who is working in the service equipment area without a flashlight, b) for the maintenance mechanic who may neither be an electrician nor familiar with the electric service equipment to work on it in the dark.
Electric service panels are not always installed along either the primary or secondary egress path required by the Life Safety Code and CMP-1 should not leave it to other standards to assert this requirement.
Other NFPA documents have been examined and a short summary of this examination appears below. [Underline emphasis has been added]
NFPA 101
There is no provision for any emergency illumination other than egress illumination for occupant safety in Section 7.8 of NFPA 101-2009. Egress safety for the occupants of an electrical room is not specifically addressed. In some cases, the cause of a building outage originates in the electrical service switchgear area. In any case, it is likely that there will be activity to and from the electrical service equipment area during a power outage.
NFPA 110
An excerpt from this standard is copied below for your convenience:
7.3 Lighting.
7.3.1 The Level 1 or Level 2 EPS equipment location(s) shall be provided with battery-powered emergency lighting. This requirement shall not apply to units located outdoors in enclosures that do not include walk-in access.
7.3.2 The emergency lighting charging system and the normal service room lighting shall be supplied from the load side of the transfer switch.
7.3.3* The intensity of illumination in the separate building or room housing the EPS equipment for Level 1 shall be 32.3 lux (3.0 ft-candles), unless otherwise specified by a requirement recognized by the authority having jurisdiction.
Although this standard is seen four times in the NEC, all appearances are Fine Print Notes, and may be unenforceable at the local level, even if it is known to be applicable.
NFPA 70E
An excerpt is copied below for your convenience:
130.6 Other Precautions for Personnel Activities.
(B) Blind Reaching. Employees shall be instructed not to reach blindly into areas that might contain exposed energized electrical conductors or circuit parts where an electrical hazard exists.
(C) Illumination.
(1) General. Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely.
(2) Obstructed View of Work Area. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists…
Without this specific provision, emergency illumination "falls between the cracks" and remains a design option.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided justifying the foot-candle level for all electrical service equipment and emergency switchgear. There was no indication of whether these requirements applied to indoor or outdoor locations. There was no technical explanation for the required illumination for the service switchgear. Service switchgear is covered in Article 230, not in Article 700.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-155 Log #2008 NEC-P13 **Final Action: Reject**
(700.8(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part: ....that shall identify all emergency and ~~normal~~ other sources and their location ~~connected~~ grounded at that location.
Substantiation: "Normal" is not defined; does it include photovoltaic systems, optional standby systems, legally required standby systems, fire pump services, electric welder services? Location of sources should be provided.
Panel Meeting Action: Reject
Panel Statement: There are emergency sources, and all other sources are considered normal sources. Normal sources could include photovoltaic sources, utility supplied sources, or any other normal source of power that is not emergency. The suggested change in text is unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-156 Log #4677 NEC-P13 **Final Action: Reject**
(700.8(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows: "Where the removal of a main or system bonding jumper interrupts the continuity of the grounding connection to an alternate source grounded conductor, a permanent sign shall be installed on or at the equipment in which the bonding jumper is installed identifying all alternate sources having grounded conductors connected to ground through the main or system bonding jumper."
Substantiation: With changes in grounding terminology, the intent of this section is being lost. Some think this is about a connection between a grounding electrode and a grounding electrode conductor, for example. This requirement resulted from an actual case where the emergency source was supplying power, and during that period maintenance personnel disconnected the normal source grounded conductor for testing purposes. The personnel did not realize that they were also disconnecting the grounding connection for the emergency source at the same time, since the grounded system conductor was only connected to the grounding electrode conductor in the main switchboard. This rewrite makes the intent very clear.
Panel Meeting Action: Reject
Panel Statement: The suggested text is much more complex than is necessary in applying this requirement. The recommended text does not identify at which electrical equipment the sign is to be installed. The recommended text is not user friendly and the change is unnecessary since the existing text is clear and concise in the requirements for signage.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LITTLE, L.: This proposed revision clarifies the intent of this requirement and enhances usability. The proposed text is not more complex than the existing requirement. This revision provides clear, prescriptive text on where the required sign is to be located. It is the removal of a main or system bonding jumper that would interrupt the continuity of the grounding connection to an alternate source grounded conductor that this first level subdivision seeks to prevent.
The submitter is correct. The proposed revision makes the intent of this requirement very clear.

13-157 Log #3977 NEC-P13 **Final Action: Reject**
(700.9 (New))

Submitter: Michael A. Anthony, University of Michigan Business Operations
Recommendation: Add text to read as follows:
700.9 Illumination of Emergency Source Switchgear. The area around the service equipment and emergency switchgear in non-dwelling unit occupancies 200 amperes and above shall be automatically illuminated upon loss of power. For a period of 90 minutes illumination levels shall be 1-footcandle on the egress path from the switchgear and 3-footcandles on the vertical surfaces of the service equipment.
Substantiation: The need for illumination during power outages should be intuitive. It provides illumination for a) the electrician who is working in the service equipment area without a flashlight, b) for the maintenance mechanic who may neither be an electrician nor familiar with the electric service equipment to work on it in the dark.
Electric service panels are not always installed along either the primary or secondary egress path required by the Life Safety Code and CMP-1 should not leave it to other standards to assert this requirement.
Other NFPA documents have been examined and a short summary of this examination appears below. [Underline emphasis has been added]
NFPA 101
There is no provision for any emergency illumination other than egress illumination for occupant safety in Section 7.8 of NFPA 101-2009. Egress safety for the occupants of an electrical room is not specifically addressed. In some cases, the cause of a building outage originates in the electrical service switchgear area. In any case, it is likely that there will be activity in the electrical service equipment area during a power outage.
NFPA 110
An excerpt from this standard is copied below for your convenience:
7.3.1 The Level 1 or Level 2 EPS equipment location(s) shall be provided with battery-powered emergency lighting. This requirement shall not apply to units located outdoors in enclosures that do not include walk-in access.
7.3.2 The emergency lighting charging system and the normal service room lighting shall be supplied from the load side of the transfer switch.
7.3.3* The intensity of illumination in the separate building or room housing the EPS equipment for Level 1 shall be 32.3 lux (3.0 ft-candles), unless otherwise specified by a requirement recognized by the authority having jurisdiction.
Although this standard is seen four times in the NEC, all appearances are Fine Print Notes, and may be unenforceable at the local level, even if it is known to be applicable.
NFPA 70E
An excerpt is copied below for your convenience:
130.6 Other Precautions for Personnel Activities.
… (B) Blind Reaching. Employees shall be instructed not to reach blindly into areas that might contain exposed energized electrical conductors or circuit parts where an electrical hazard exists.
(C) Illumination.
(1) General. *Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely.*
(2) Obstructed View of Work Area. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists…
Without this specific provision, emergency illumination "falls between the cracks" and remains a design option.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-154.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-158 Log #734 NEC-P13 **Final Action: Reject**
(700.9(A))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
700.9 Wiring, Emergency System.
(A) Identification. All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system. The identification marking shall not be permitted to include the word "Standby", unless otherwise permitted in (B)(1) through (B)(5).
Substantiation: Manufacturers of surface raceways, both metal (*NEC*® Article 386) and nonmetallic (*NEC*® Article 388), and of multi-outlet assemblies (*NEC*® Article 380) derived from surface raceways have had numerous inquiries from specifiers and installers for applications of surface raceways where used for Emergency Systems (*NEC*® Article 700) AND for either Legally Required Standby Systems (*NEC*® Article 701) or Optional Standby Systems (*NEC*® Article 702) AND for other general wiring (power, lighting, signaling) in the same installation. Despite the requirement of 900.9(B), these specifiers and installers are believed to be marking raceways with "EMERGENCY STANDBY", without distinction between "EMERGENCY" (*NEC*® Article 700 circuits) and "STANDBY" (*NEC*® Article 701 or Article 702 circuits), leading to confusion as to the identity of the circuit (*NEC*® Article 700 or Article 701 or Article 702) within the single-channel or multiple-channel surface raceway (or multi-outlet assembly) overall or within a specific channel of a multiple-channel surface raceway.
Panel Meeting Action: Reject
Panel Statement: The substantiation is based on applying identification to raceways. The requirement in 700.9(A) applies to boxes and equipment enclosures. Article 700 does not require raceways to be marked. The AHJ is responsible for approval of the required marking on boxes and equipment enclosures.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-159 Log #735 NEC-P13 **Final Action: Reject**
(700.9(B))

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text to read as follows:
700.9 Wiring, Emergency System.
(B) Wiring. Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet. Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment, unless otherwise permitted in (1) through (5):
(1) Wiring from the normal power source located in transfer equipment enclosures
(2) Wiring supplied from two sources in exit or emergency luminaires
(3) Wiring from two sources in a common junction box, attached to exit or emergency luminaires
(4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment
(5) Wiring from an emergency source to supply any combination of emergency, legally required, or optional loads in accordance with (a), (b), and (c):
a. From separate vertical switchboard sections, with or without a common bus, or from individual disconnects mounted in separate enclosures.
b. The common bus or separate sections of the switchboard or the individual enclosures shall be permitted to be supplied by single or multiple feeders without overcurrent protection at the source.
Exception to (5)(b): Overcurrent protection shall be permitted at the source or for the equipment, provided the overcurrent protection is selectively coordinated with the downstream overcurrent protection.
c. Legally required and optional standby circuits shall not originate from the same vertical switchboard section, panelboard enclosure, or individual disconnect enclosure as emergency circuits.
For the purpose of keeping emergency system wiring entirely independent of all other wiring and equipment, the separate channels, whether adjacent or not, of multiple-channel raceway sharing any common enclosure components (raceway enclosure base, raceway enclosure cover, or contiguous barrier) other than supporting means and containing other wiring other than emergency system wiring shall not be considered as entirely independent equipment.
Substantiation: Manufacturers of surface raceways, both metal (*NEC*® Article 386) and nonmetallic (*NEC*® Article 388), and of multi-outlet assemblies (*NEC*® Article 380) derived from surface raceways have received numerous inquiries from specifiers and installers for applications of surface raceways where used for Emergency Systems (*NEC*® Article 700) AND for either Legally Required Standby Systems (*NEC*® Article 701) or Optional Standby Systems (*NEC*® Article 702) AND for other general wiring (power, lighting, signaling) in the same installation. Despite the requirement of 900.9(B), some of these specifiers and installers not versed in "*Code*-speak" chose to focus on keeping the emergency system wiring "independent of all other wiring" (ignoring "equipment" as encompassing the multiple-channel raceway shared in common as being a violation) and are believed to be installing *NEC*® Article 700 circuits in raceway channel separate from channels of the SAME raceway used for *NEC*® Article 701 or Article 702 circuits or for circuits of other general wiring (power, lighting, signaling). A Formal Interpretation Request was submitted to get an answer in black-and-white (see attached), but definitive clarification in the *Code* would resolve these misinterpretations in a more visible and uniformly enforceable manner.
Note: Supporting Material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The term "entirely independent" precludes the use of a compartmentalized raceway sharing a common base and/or cover. The recommended text does not provide additional clarity in the application of the requirement of Section 700.9(B).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-160 Log #3958 NEC-P13 **Final Action: Reject**
(700.9(B))

Submitter: James E. Degnan, Sparling
Recommendation: Revise text to read as follows:
(B) Wiring. Emergency system wiring includes any wiring between the emergency source and any transfer switch. Emergency system wiring includes one or more emergency transfer switches dedicated to emergency loads, and the wiring from the emergency transfer switch(es) to the emergency load(s). ~~Wiring of two or more emergency circuits supplied form the same source shall be permitted in the same raceway, cable, box or cabinet.~~ Wiring from an emergency source or emergency source distribution overcurrent protection device to emergency loads shall be kept entirely independent of all other wiring and equipment, unless otherwise permitted in (1) through(5):
(1) Wiring from…(retain text to end of (4))…the unit equipment.
(5) Wiring of two or more emergency circuits supplied from the same source in the same raceway, cable, box or cabinet.
(5) ~~Wiring from and emergency source to supply any combination of emergency, legally required, or optional loads. in accordance with (a), (b), and (c).~~
~~a. From…~~ (Delete the rest of the text in a, b, and c)….~~emergency circuits.~~
Substantiation: The first two sentences help to define the emergency wiring system, something that is not explicitly done in 700.1 through 700.9.
The third sentence (previously the first sentence) is simply relocated from the opening down to where it should be, given the structure of the sentence that follows it.
Paragraph 700.9(B)(5) should be deleted. Some of the reliability and intent of this paragraph is met by insertion of the first two sentences in (B) Wiring noted above. The intent to require separation of emergency distribution systems ahead of the transfer switches should not be required because if these systems are all considered part of the emergency system they will retain the reliability offered by separating them from the normal power system. The emergency source has to be split apart at some point, this point should be at the transfer switches, and not as currently required in the NEC, for the following reasons:
1. It would be an extremely rare event that a fault on one emergency system feeder would propagate and affect multiple emergency feeders. No record of these events was included in the substantiation that added this requirement to the 2008 NEC.
2. Even if the separation in the switchboard is constructed it may not achieve what it is intended to. Most faults result in some consumption of material with associated vaporization, hazardous gasses, etc. The materials often leave deposits throughout a switchboard, compromising components in adjacent sections and often throughout the room.
3. The proposed language notes that group mounted switches comply with the code. Considering the expense and space requirements of switchboards, using a wireway to serve individual overcurrent devices is a cost effective alternative to switchboard vertical sections.. However, a wireway with field made taps to switches, has a much better chance of erroneous assembly than a regulated product like a panelboard or even a single switchboard section. The attempt to improve reliability may result in a less reliable system.
4. The code language requires separate vertical sections but is not really clear on the degree of isolation that the vertical sections are suppose to offer. Switchboards can be constructed with separate vertical sections that are not barriered between the sections. If barriers are the intent, then do they extend all the way to the rear and across the horizontal bus or is it adequate to just isolate the feeders? At some point there still must be a separate definition of emergency system vs legally required, where does this occur?
This section of the 2008 NEC forces an increase in building size and electrical cost against no historical record of performance problems.
Panel Meeting Action: Reject
Panel Statement: The referenced change in the 2008 NEC was the result of a task group comprised of NEC Panel 13 members, NFPA 99 health care members, and NFPA 110, Standard for Emergency and Standby Power committee members. The submitter did not provide any technical substantiation for deleting the text that was developed as a result of the task group. There was substantiation provided that indicated there was a safety issue with feeders from the generator source supplying a switchboard with common busing and separate vertical sections. The action on this proposal in the 2008 NEC revision cycle clarified that the required separation of emergency system wiring from wiring of other systems in switchboards is accomplished through the use of barriers to separate the vertical sections.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
DEGNAN, J.: Defining the emergency system as I've noted in this proposal will increase the reliability of emergency and legally required standby power systems, and provide a clear point of separation between the emergency, legally required standby, and optional standby power systems.

13-161 Log #4397 NEC-P13 **Final Action: Accept in Principle in Part**
(700.9(B))

Submitter: Michael S. Shulman, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
700.9 Wiring, Emergency System.
(A) Identification. (no change)
(B) Wiring. Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet. Wiring from an emergency source or emergency source distribution overcurrent protection device to emergency loads shall be kept entirely independent of all other wiring and equipment, unless otherwise permitted in (1) through (5):
(1) Wiring from the normal power source located in transfer equipment enclosures
(2) Wiring supplied from two sources in exit or emergency luminaires
(3) Wiring from two sources in a common junction box, attached to or supplying only exit or emergency luminaires
(4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment
(5) (no change)
(C) Wiring Design and Location. (no change)
(D) Fire Protection. (no change)

Substantiation: 700.9(B) 3 currently only allows junction boxes physically attached to emergency luminaires to include both normal and emergency wiring. But the physical attachment of the junction box to the luminaire is not a very relevant factor. The likelihood of emergency lighting system disruption due to a fault on the normal power system is based on proximity of the two systems' wires within the common junction box and not on the physical location of the junction box itself.

It has become a desirable building feature to use (UL 924) Listed load control relays within wall mounted switch boxes, to control ceiling mounted emergency luminaires. This promotes energy conservation by allowing luminaires for sections of buildings that are frequently unoccupied for extended periods of time to be de-energized. It also allows (emergency) luminaires within rooms used for presentations to be dimmed. In both situations, the Listed load control relay will automatically restore full emergency lighting levels upon loss of normal power or activation of a fire alarm. The UL 924 requirements provide for electrical and physical separation between normal and emergency power circuitry of the load control relay and of its wiring terminals.

These wall mounted lighting control boxes are not physically "attached to" the luminaires they control but do not present any more risk of emergency lighting disruption than boxes mounted directly to the luminaire. The proposed revision would make installation of these physically 'remote' but electrically connected common junction boxes permissible by the Code.

As an editorial-only matter, the word "device" seems needed in the base paragraph of 700.9(B).

Panel Meeting Action: Accept in Principle in Part

Revise text for (3) to read:

(3) Wiring from two sources <u>in a listed load control relay supplying exit or emergency luminaires</u> or in a common junction box attached to exit or emergency luminaires.

Reject the addition of "device" in the first paragraph.

Panel Statement: Wiring installations utilizing a listed load control relay must have both normal and emergency circuit conductors enter into the relay enclosure, but only the emergency circuit conductors exit from the enclosure to supply the exit lights or emergency lights. Addition of this text correlates with the panel action on Proposal 13-188. The panel has rejected the recommendation to add "device" because it does not improve clarity.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

DEGNAN, J.: The submitter has not substantiated the omission of the requirement for limiting selective coordination to downstream devices, which is what is noted in the 2008 NEC. The submitter's substantiation statement makes reference to the exceptions of 700.27, but that is not the key impact of this proposed change.

13-162 Log #4475 NEC-P13 **Final Action: Reject**
(700.9(B))

Submitter: Gordon Pierret, Ring & DuChateau, Inc. / Rep. WHEA Code and Advocacy Committee, Tim O'Rorke

Recommendation: Revise text to read as follows:

(B) Wiring. Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet. Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment, unless otherwise permitted in (1) through (5):

(1) Wiring from the normal power source located in transfer equipment enclosures

(2) Wiring supplied from two sources in exit or emergency luminaires

(3) Wiring from two sources in a common junction box, attached to exit or emergency luminaires

(4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment

(5) Wiring from an emergency source to supply any combination of emergency, legally required, or optional loads in accordance with (a), (b), (c) and (d):

(a) From separate vertical switchboard sections, with or without a common bus, or from individual disconnects mounted in separate enclosures.

(b) The common bus or separate sections of the switchboard or the individual enclosures shall be permitted to be supplied by single or multiple feeders without overcurrent protection at the source.

Exception to (5)(b): Overcurrent protection shall be permitted at the source or for the equipment, provided the overcurrent protection is selectively coordinated with the downstream overcurrent protection.

(c) Legally required and optional standby circuits shall not originate from the same vertical switchboard section, panelboard enclosure, or individual disconnect enclosure as emergency circuits.

(d) <u>For large facilities with large alternate power system (greater than 500 kW), an additional generator distribution point(s) shall be permitted if the distribution point is supplied by redundant feeders. The redundant feeders shall follow two separate routes and not supported from the same building structural member. The additional generator distribution point shall comply with the requirements of (a), (b) and (c) above. If the generator system voltage is greater than the utilization voltage, redundant step-down transformers shall be provided. See Exhibit 700.5a and 700.5b.</u>

Substantiation: The above proposal would allow the alternate power distribution system to either easily expand as the building expands.

Example: An office building is originally built with a small generator just to provide the minimum code required emergency and legally required power. The building is expanded and new larger alternate power system is required to supply the building and its emergency, legally required and optional standby loads. This proposal also allows for large campus style installations where there is a central generating plant serving either a very large single building or multiple buildings in a campus style installation.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: Based on the recommended text and the drawings, the NEC does not prohibit this type of installation, especially where installed in accordance with 700.9(B)(5); therefore the recommendation is unnecessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-163 Log #1163 NEC-P13 **Final Action: Accept**
(700.9(B)(5))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Revise the Exception to read as follows:

Exception to (5)(b): Overcurrent protection shall be permitted at the source or for the equipment, provided ~~the overcurrent protection is selectively coordinated with the downstream overcurrent protection~~ <u>the overcurrent protection complies with the requirements of 700.27.</u>

Substantiation: In the CMP-13 Panel Statements to Comment 13-157 in the 2007 ROC, the CMP stated that: "Item (5)(b) gives permission to omit the overcurrent protection in the supply feeders, with the subsequent Exception to (5)(b) allowing overcurrent protection as long as the protective devices are selectively coordinated." It continued, "Selective coordination has nothing to do with the objectives of 700.9, and furthermore, selectivity is not a substitute for circuit separation." Certainly, if selective coordination is not a substitute for circuit separation, it is also certain that selective coordination should not be included in 700.9 unless all the exceptions of **700.27 Coordination** are included. 700.9 is improved by linking the Exception to (5)(b) to 700.27 where the concept of selective coordination is fully outlined.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-164 Log #4476 NEC-P13 **Final Action: Reject**
(700.9(B)(5)(a), 700.9(B)(5)(b), and 700.9(B)(5)(c))

Submitter: Gordon Pierret, Ring & DuChateau, Inc. / Rep. WHEA Code and Advocacy Committee, Tim O'Rorke

Recommendation: Revise text to read as follows:

(B) Wiring. Wiring of two or more emergency circuits supplied from the same source shall be permitted in the same raceway, cable, box, or cabinet. Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment, unless otherwise permitted in (1) through (5):

(1) Wiring from the normal power source located in transfer equipment enclosures

(2) Wiring supplied from two sources in exit or emergency luminaires

(3) Wiring from two sources in a common junction box, attached to exit or emergency luminaires

(4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment

(5) Wiring from an emergency source to supply any combination of emergency, legally required, or optional loads in accordance with (a), (b), and (c) and (d):

(a) From ~~separate vertical switchboard sections,~~ <u>overcurrent device in individually barriered compartments of distribution equipment,</u> with or without a common bus, or from individual disconnects mounted in separate enclosures.

(b) The common bus or separate sections of the ~~switchboard~~ <u>distribution equipment</u> or the individual enclosures shall be permitted to be supplied by single or multiple feeders without overcurrent protection at the source.

Exception to (5((b): Overcurrent protection shall be permitted at the source or for the equipment, provided the overcurrent protection is selectively coordinated with the downstream overcurrent protection.

(c) Legally required and optional standby circuits shall not originate from the same ~~vertical switchboard section, panelboard enclosure,~~ <u>unbarriered distribution equipment</u> or individual disconnect enclosure as emergency circuits.

Substantiation: The above proposal revises the language "separate vertical switchboard sections" to "overcurrent device in individually barriered compartment of distribution equipment". The purpose of this proposed revision is to:

1. Provide flexibility by allowing the overcurrent devices serving multiple branches (emergency, legally required, or optional loads) to be located in common vertical sections but requiring compartmentalization for each overcurrent device.

2. Requiring that all overcurrent devices serving common branches (emergency, legally required, or optional loads) to be compartmentalized, therefore enhancing the level of protection between these devices.

3. The present code language does not reflect current industry design and equipment manufacturing methods. Emergency distribution additions at many current facilities would in many cases impracticable.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided to permit emergency overcurrent protective devices to be installed in the same vertical section as legally required standby or optional standby devices. The substantiation did not address the availability of switchgear to be manufactured with individual barriers for separation of these devices within the same vertical section. In addition, there is no reason to require individual barriers where only legally required and optional standby are in the same vertical section.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

DEGNAN, J.: This proposal would permit the use of highly reliable Metal Enclosed Switchgear per UL 1558 to serve combinations of emergency, legally required standby, and optional standby power systems without vertical separation. The reliability of this equipment will exceed field fabricated assemblies of splices serving individually mounted overcurrent protective devices, and therefore offers an increase in safety beyond what is in the 2008 NEC.

13-165 Log #789 NEC-P13 **Final Action: Reject**
(700.9(B)(5)c. Exception)

Submitter: Lawrence W. Forshner, Town of Natick

Recommendation: Add exception after 700.9(B)(5)c. to read as follows:

Exception: Individual disconnect enclosures, shall not be required when a single enclosure, factory or field installed, on gen-sets, containing two or more circuit breakers supplying feeders, are equipped with barriers, that provide separation for the load side conductors.

Substantiation: It is common practice to have multiple feeder breakers mounted on the side of Gen-Set alternators. There are space limitations making it difficult to comply with the requirement for separate enclosures. The line side of the multiple feeder disconnects are fed with short feeder tap conductors from a common bus on the generator alternator. They are common in the alternator housing which is the common voltage source. I am in agreement with the addition of 700.9(B)(5)c. to the 2008 Code, however, how far back to the source is it practical to require separation? Partitioning on the load side of the breakers, separating the load side feeder conductors, satisfies the intent of this section.

Panel Meeting Action: Reject

Panel Statement: The proposed exception does not provide any information on the types of barriers to be installed within the single enclosure and the installation requirements of these barriers.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-166 Log #2912 NEC-P13 **Final Action: Reject**
(700.9(C)(1) (New))

Submitter: Thomas Guida, TJG Services, Inc.

Recommendation: Add new paragraph below:

700.9(C) Wiring Design and Location. Emergency wiring circuits shall be designed and located so as to minimize the hazards that might cause failure due to flooding, fire, icing, vandalism, and other adverse conditions.

<u>**(1) Floodplain Protection.** Where emergency wiring circuits are installed below the level of the 100-year floodplain, the circuit conductors shall be listed for use in a wet location in accordance with 310.8(C) and be installed in a wiring method that is permitted for use in wet locations.</u>

Substantiation: This is equivalent to wording in 708.10(C)(3) to protect cables and wiring methods for cables to be functional in a wet location.

Panel Meeting Action: Reject

Panel Statement: The panel concludes that the level of protection contained in the recommendation is not necessary for emergency system wiring installed in locations that are not wet, but are included in the 100 year flood plain. For all indoor and outdoor installations that are in wet locations, the present requirements of Article 300 apply.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-167 Log #29 NEC-P13 **Final Action: Reject**
(700.9(D))

NOTE: This proposal appeared as Comment 13-162 on Proposal 13-123 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-123 was:

Revise Feeder-Circuit Wiring to Emergency Circuit Wiring. Emergency circuit wiring shall meet one of the following conditions.

Submitter: Edward Walton, Draka Cableteq

Recommendation: Add new text to 700.9(D) as follows:

<u>(3) Branch Circuit Wiring. Branch circuits that originate in a location remote from the area being served shall meet one of the following conditions:</u>

<u>(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system</u>

<u>(2) Be a listed electrical circuit protective system with a minimum 1-hr fire rating</u>

<u>(3) Be protected by a listed thermal barrier system for electrical system components</u>

<u>(4) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 1 hr</u>

<u>(5) Be embedded in not less than 50 mm (2 in.) of concrete</u>

<u>(6) Be a cable listed to maintain circuit integrity for not less than 1 hr when installed in accordance with the listing requirements.</u>

Revise reference in 700.9(D) to read:

<u>700.9(D)(1), (D)(2), and (D)(3)</u>

Optional. Add FPN as follows:

<u>FPN: A remote location is defined as an area separate from the Emergency System Circuit load such as a different floor in a multistory building or a different fire zone in a place of assembly or stadium.</u>

Substantiation: This proposal has been modified to resolve the panel's concern that this "level of protection" is not warranted for all branch circuits. The branch circuit for which this protection is required is now defined as a remotely located branch circuit.

5-a. Even though a fire caused circuit failure would be more catastrophic for the feeder cable, the remotely located branch circuit is far more vulnerable if it is run through the protected premises before connected to the load.

5-b. Presently the emergency branch circuit panel could be located in the basement of a multistory building (7 stories or higher) or on the opposite side of an assembly hall or stadium far from the emergency circuit load and without the required fire protection of 700.9(D).

5-c. One code user misinterpretation is that the feeder-circuit wiring terminates at the transfer switch and anything beyond that does not require fire protection. Adopting this proposal would help clarify this misinterpretation.

I have included an optional FPN if the panel feels it needs to define remote location.

This proposal could be located in Section IV if the panel believes this is a more proper location.

Panel Meeting Action: Reject

Panel Statement: The submitter has not provided sufficient technical substantiation to require all emergency branch circuits in assembly occupancies for not less than 1000 persons or in buildings above 75 ft in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile. The stipulation that this only applies to branch circuits that originate in a location remote from the area being served by the branch circuit would result in confusion in application. The suggested definition of remote location is not clear, as "an area separate from the emergency system circuit load" is not definitive.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-168 Log #1523 NEC-P13 **Final Action: Accept**
(700.9(D))

TCC Action: The Technical Correlating Committee understands that the panel action on this proposal modifies the panel action on Proposal 13-170.

Submitter: L. Keith Lofland, IAEI

Recommendation: Revise text to read as follows:

700.9(D) Fire Protection. Emergency systems shall meet the additional requirements in 700.9(D)(1) <u>through (D)(3)</u> in assembly occupancies for not less than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile.

Substantiation: 700.9(D)(3) dealing with generator control wiring was added for the 2008 NEC. This is an additional requirement that emergency system feeder-circuit wiring is required to meet. Previous language only required these emergency system feeders to meet 700.9(D)(1) and (D)(2).

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-169 Log #3913 NEC-P13 **Final Action: Reject**
(700.9(D))

Submitter: Edward Walton, Draka Cableteq, USA
Recommendation: Add the following new text:
(3) Branch Circuit Wiring. Branch circuits that originate in a location remote from the area being served shall meet one of the following conditions:
(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system
(2) Be a listed electrical circuit protective system with a minimum 1-hour fire rating
(3) Be protected by a listed thermal barrier system for electrical system components
(4) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 1 hour
(5) Be embedded in not less than 50 mm (2 in.) of concrete
(6) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirements
Revise reference in 700.9(D) to read: 700.9(D)(1), (D)(2) and (D)(3)
Add FPN as follows:
FPN: A remote location is defined as an area separate from the Emergency System Circuit load such as a different floor in a multistory building or a different fire zone in a place of assembly or stadium.
Substantiation: This proposal has been modified to resolve the panel's concern that this "level of protection" is not warranted for all branch circuits. The branch circuit for which this protection is required is now defined as a remotely located branch circuit.
a. Even though a fire caused circuit failure would be more catastrophic for the feeder cable, the remotely located branch circuit is far more vulnerable if it is run through the protected premises before connected to the load.
b. Presently, the emergency branch circuit panel could be located in the basement of a multistory building (7 stories or higher) or on the opposite side of an assembly hall or stadium far from the emergency circuit load and without the required fire protection of 700.9(D).
c. One code user misinterpretation is that the feeder-circuit wiring terminates at the transfer switch and anything beyond that does not require fire protection. Adopting this proposal would help clarify this misinterpretation.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-167.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-170 Log #3938 NEC-P13 **Final Action: Accept**
(700.9(D))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read:
(D) Fire Protection. Emergency systems shall meet the additional requirements in 700.9(D)(1) and (D)(2) in assembly occupancies for not less than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and
mercantile.
FPN For the definition of *0ccupancv Classification*, see Section 6.1 of NFPA *101-2006, Life Safety Code.*
(1) Feeder-Circuit Wiring. Feeder-circuit wiring shall meet one of the following conditions:
(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system
(2) Be a listed electrical circuit protective system with a minimum 1-hour fire rating
FPN: UL guide information for electrical circuit protection systems (FHIT) contains information on proper installation requirements to maintain the fire rating.
(3) Be protected by a listed thermal barrier system for electrical system components
(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 1 hour and contains only emergency wiring circuits.
(5) Be embedded in not less than 50 mm (2 in.) of concrete
(6) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirements
(2) Feeder-Circuit Equipment. Equipment for feeder circuits (including transfer switches, transformers, and panelboards) shall be located either in spaces fully protected by approved automatic fire suppression systems (including sprinklers, carbon dioxide systems) or in spaces with a 1-hour fire resistance rating.
~~*FPN: For the definition of Occupancy Classification, see Section 6.1 of NFPA 101 2006, Life Safety Code.*~~
Substantiation: Editorial change for the placement of the Fine Point Note (FPN) that follows 700.9(D)(2) to be relocated to follow 700.9(D). Though the 2003 National Electrical Code Style Manual amended January 15, 2003 does not address the placement of FPNs, their placement should, like those of "Exceptions" (Ref. Style Manual in 2.6.1), "immediately follow the main rule to which they apply." In the case of the subject FPN, which provided additional information about Occupancy Classification, it would be better served following 700.9(D) because of its mention of "occupancy classes".
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-171 Log #2913 NEC-P13 **Final Action: Accept**
(700.9(D)(1))

TCC Action: The Technical Correlating Committee understands that the panel actions on proposals 13-172, 13-173, and 13-174 modified the panel action on this proposal.
Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Delete method 6 as shown below.
700.9(D) Fire Protection. Emergency systems shall meet the additional requirements in 700.9(D)(1) and (D)(2) in assembly occupancies for not less than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile.
(1) Feeder-Circuit Wiring. Feeder-circuit wiring shall meet one of the following conditions:
(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system
(2) Be a listed electrical circuit protective system with a minimum 1-hour fire rating
FPN: UL guide information for electrical circuit protection systems (FHIT) contains information on proper installation requirements to maintain the fire rating.
(3) Be protected by a listed thermal barrier system for electrical system components
(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 1-hour and contains only emergency wiring circuits.
(5) Be embedded in not less than 50 mm (2 in.) of concrete
~~(6) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirements.~~
Substantiation: Item (6) is encompassed by item (2). A "listed cable to maintain circuit integrity" is covered as a listed electrical circuit protective system for power. All UL FHJR fire resistive cables are listed as an electrical circuit protective system (FHIT).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-172 Log #2914 NEC-P13 **Final Action: Accept in Principle in Part**
(700.9(D)(1))

TCC Action: The Technical Correlating Committee understands that the panel action on this proposal modifies the panel action on Proposal 13-171.
Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise text as follows:
700.9(D) Fire Protection. Emergency systems shall meet the additional requirements in 700.9(D)(1) and (D)(2) in assembly occupancies for not less than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes: assembly, educational, residential, detention and correctional, business, and mercantile.
(1) Feeder-Circuit Wiring. Feeder-circuit wiring shall meet one of the following conditions:
(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system
(2) Be a listed electrical circuit protective system with a minimum 2~~1~~-hour fire rating
FPN: UL guide information for electrical circuit protection systems (FHIT) contains information on proper installation requirements to maintain the fire rating.
(3) Be protected by a listed thermal barrier system for electrical system components **that has a minimum fire rating of 2 hours and contains only emergency wiring circuits.**
(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 2~~1~~-hour and contains only emergency wiring circuits.
(5) Be embedded in ~~not less than 50 mm (2 in.) of~~ concrete **with a sufficient thickness to achieve a minimum 2 hour fire rating**.
~~(6) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirements.~~
Substantiation: This proposal increases the time from 1 hour to 2 hours as was done last code cycle in 695.6(B). The extended time is to allow occupants to exit the building as well as give fire fighters additional time to operate the fire fighting equipment once people exit the building by extending the time the emergency circuits operate.
Method (3) adds the duration of the fire rating and the same wording as method 4.
Method (5) has deleted the 2 inches because in various applications e.g. slabs versus columns or with different concrete, e.g. lightweight, siliceous, or carbonate; different concrete thickness may be required to meet the rating.
Method (6) is encompassed by method (2). A "cable listed to maintain circuit integrity" is covered as a listed electrical circuit protective system for power.

All UL FHJR fire resistive cables are listed as an electrical circuit protective system (FHIT).

Panel Meeting Action: Accept in Principle in Part

The panel accepts the recommended revisions to 700.9(D)(1)(2), (4), and (6) and accepts in principle the recommended revision to 700.9(D)(1)(3). The panel rejects the remainder of recommended revisions.

Panel Statement: See the panel action on Proposal 13-173 relative to the panel action on 700.9(D)(1)(3). In regard to the rejected portion of the recommendation on 700.9(D)(1)(5), the 2 in. of concrete has provided the industry with a prescriptive benchmark that has served the industry well. The substantiation does not demonstrate that use of 2 in. of concrete has compromised the integrity of the circuit. The recommendation does not provide an alternative prescriptive requirement that can be easily applied.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-173 Log #3988 NEC-P13 **Final Action: Accept in Part**
(700.9(D)(1))

TCC Action: The Technical Correlating Committee understands that the panel action on this proposal modifies the panel action on Proposal 13-171.

Submitter: Michael Brennan, Draka Cableteq USA

Recommendation: Revise text as follows:

(1) Feeder- Circuit Wiring. Feeder -circuit wiring shall meet one of the following conditions:

(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system.

(2) Be a listed electrical circuit protective system with a minimum 2-hour fire rating.

(3) Be protected by a listed thermal barrier system for electrical system components with a minimum 2-hour fire rating

(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 2-hour and contains only emergency wiring circuits.

(5) Be embedded in not less than 50 mm (2 in.) of concrete

(6) Be a cable listed to maintain circuit integrity for not less than 2 hours when installed in accordance with the listing requirements.

Substantiation: This will provide occupants necessary time for safe egress from the occupancy classes where this is required. 1 hour is not sufficient time for high rise buildings or large assemblies of people to safely evacuate.

Panel Meeting Action: Accept in Part

The panel accepts the recommended action except for that proposed for 700.9(D)(1)(6).

Panel Statement: The panel notes that the panel action on Proposal 13-171 deletes 700.9(D)(1)(6).

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-174 Log #3989 NEC-P13 **Final Action: Accept in Part**
(700.9(D)(1))

TCC Action: The Technical Correlating Committee understands that the panel action on this proposal modifies the panel action on Proposal 13-171.

Submitter: Michael Brennan, Draka Cableteq USA

Recommendation: Revise text as follows:

(1) Feeder- Circuit Wiring. Feeder -circuit wiring shall meet one of the following conditions:

(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system.

(2) Be a listed electrical circuit protective system with a minimum 2-hour fire rating.

(3) Be protected by a listed thermal barrier system for electrical system components with a minimum 2-hour fire rating

(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 2-hour and contains only emergency wiring circuits.

(5) Be embedded in not less than 130 mm (5 in.) of concrete

(6) Be a cable listed to maintain circuit integrity for not less than 2 hours when installed in accordance with the listing requirements.

Substantiation: This will provide occupants necessary time for safe egress from the occupancy classes where this is required. 1 hour is not sufficient time for high rise buildings or large assemblies of people to safely evacuate.

Panel Meeting Action: Accept in Part

The panel rejects the recommendation for 700.9(D)(1)(5). The panel accepts the remainder of the recommendation.

Panel Statement: The panel action on Proposal 13-171 deletes 700.9(D)(1)(6). In regard to the recommendation for 700.9(D)(1)(5), the 2 in. of concrete has provided the industry with a prescriptive benchmark that has served the industry well. The substantiation does not demonstrate that use of 2 in. of concrete has compromised the integrity of the circuit. The recommendation does not provide an alternative prescriptive requirement that can be easily applied.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-175 Log #3990 NEC-P13 **Final Action: Reject**
(700.9(D)(1))

Submitter: Michael Brennan, Draka Cableteq USA

Recommendation: Revise text as follows:

(1) Feeder- Circuit Wiring. Feeder -circuit wiring shall meet one of the following conditions:

(1) Be installed in spaces or areas that are fully protected by an approved automatic fire suppression system.

(2) Be a listed electrical circuit protective system with a minimum 1-hour fire rating.

(3) Be protected by a listed thermal barrier system for electrical system components.

(4) Be protected by a listed fire-rated assembly that has a minimum fire rating of 1-hour and contains only emergency wiring circuits.

~~(5) Be embedded in not less than 50 mm (2 in.) of concrete~~

(6) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirements.

Substantiation: 50 mm (2 in.) of concrete has not been proven to provide sufficient protection from fire for standard cables in conduit to survive a building fire for 2 hours as recognized in the other acceptable methods in 695.6 (B).

Panel Meeting Action: Reject

Panel Statement: The 2 in. of concrete has provided the industry with a prescriptive benchmark that has served the industry well. The substantiation does not demonstrate that use of 2 in. of concrete has compromised the integrity of the circuit. The recommendation does not provide an alternative prescriptive requirement that can be easily applied.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-175a Log #CP1303 NEC-P13 **Final Action: Accept**
(700.9(D)(2))

Submitter: Code-Making Panel 13,

Recommendation: Revise Section 700.9(D)(2) to read:

(2) Feeder-Circuit Equipment. Equipment for feeder circuits (including transfer switches, transformers, and panelboards) shall be located either in spaces fully protected by approved automatic fire suppression systems (including sprinklers, carbon dioxide systems) or in spaces with a ~~1~~ 2-hour fire resistance rating.

FPN: For the definition of Occupancy Classification, see Section 6.1 of NFPA 101-2006, Life Safety Code.

Substantiation: The recommendation to revise 1-hour to 2-hour correlates the equipment space protection requirement with the revisions to the wiring method/system protection requirements resulting from the panel's actions on Proposals 13-172, 13-173, and 13-174.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-176 Log #493 NEC-P13 **Final Action: Reject**
(700.10 (New))

Submitter: Daniel J. Wheeler, Wheeler's Electric

Recommendation: Add new text as follows:

Electrical rooms, telephone rooms, elevator machinery rooms and mechanical rooms: These rooms should have a requirement that at least one light source and one convenience outlet be available on emergency power if the building has an emergency source of power.

Substantiation: In the event of a total power failure in a building, the electrical rooms, mechanical rooms, telephone rooms and elevator machinery rooms, should have lighting in that room and at least one convenience outlet wired to an emergency source of power provided that the building has such a source. If the building does not have a/an emergency source of power, then a battery powered emergency light(s) should be installed so as to provide a source of lighting in the event of a total power failure and maintain a source of light for 1 ½ hours as per NFPA 101 7.9.2.1.

Panel Meeting Action: Reject

Panel Statement: The emergency circuits are designated for systems intended to supply, distribute, and control power and illumination essential for safety to human life. The illumination and receptacles proposed in the recommendation is more suited for legally required standby power than for emergency since these lights and receptacles are for maintenance purposes. The requirements for the areas to be supplied with emergency power are outside the scope of the NEC.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-177 Log #4879 NEC-P13 **Final Action: Reject**
(700.12, FPN (New))

Submitter: Michael A. Anthony, University of Michigan Business Operations / Rep. Association of Education Facilities Executives
Recommendation: Add FPN 3 to the list as shown below:

700.12 General Requirements.

Current supply shall be such that, in the event of fauilure of the normal supply to, or within, the building or group of buildings concerned, emergency lighting, emergency power, or both shall be available within the time required for the application but not to exceed 10 seconds. The supply system for emergency purposes, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 700.12(A) through (E). Unit equipment in accordance with 700.12(E) shall satisfy the applicable requirements of this article.

In selecting an emergency source of power, consideration shall be given to the occupancy and the type of service to be rendered, whether of minimum duration, as for evacuation of a theater, or longer duration, as for supplying emergency power and lighting due to an indefinite period of current failure from trouble either inside or outside the building.

Equipment shall be designed and located so as to minimize the hazards that might cause complete failure due to flooding, fires, icing, and vandalism.

Equipment for sources of power as described in 700.12(A) through (E) where located within assembly occupancies for greater than 1000 persons or in buildings above 23 m (75 ft) in height with any of the following occupancy classes — assembly, educational, residential, detention and correctional, business, and mercantile — shall be installed either in spaces fully protected by approved automatic fir suppression systems (sprinklers, carbon dioxide systems, and so forth) or in spaces with a 1-hour rating.

FPN No. 1: For the definition of Occupancy Classification, see Section 6.1 of NFPA 101-2006, Life Safety Code.

FPN No. 2: Assignment of degree of reliability of the recognized emergency supply system depends on the careful evaluation of the variables at each particular installation.

FPN No. 3: Quantitative methods provide more consistent results in reliability studies. For further information see ANSI/IEE Standard 493: Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems.

Substantiation: The IEEE "Gold Book" is the most comprehensive document on quantitative methods for reliability in the world. Since reliable power systems are as important to life safety as fire safety, all NFPA committees and NEC users should become more familiar with the terms and art of reliability engineering.
Panel Meeting Action: Reject
Panel Statement: Fine Print Note No. 2 already provides the assignment of the degree of reliability for the evaluation of the variables making the addition of this new FPN No. 3 unnecessary.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-178 Log #3939 NEC-P13 **Final Action: Accept**
(700.12(B)(2))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:

(2) Internal Combustion Engines as Prime Movers. Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided with an on-premises fuel supply sufficient for not less than 2 hours' full-demand operation of the system. Where power is needed for the operation of the fuel transfer pumps to deliver fuel to a generator set day tank, this pump shall be connected to the emergency power system.

Substantiation: Editorial change for the insertion of "Engines" in the title of 700.12(B)(2) because it is the subject and this would be consistent with the title of a parallel topic in 701.11(B)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-179 Log #3950 NEC-P13 **Final Action: Reject**
(700.12(B)(3))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:

(3) Dual Fuel Supplies. Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or municipal water supply for their cooling systems. Means shall be provided for automatically transferring from one fuel supply to another where dual fuel supplies are used.

Substantiation: Editorial change for the insertion of "Fuel" in the title of 700.12(B)(3) because it is the adjective of the subject and this would be consistent with the title of a parallel topic in 701.11(B)(3).
Panel Meeting Action: Reject
Panel Statement: The requirement covers other than fuel supplies.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-180 Log #3454 NEC-P13 **Final Action: Reject**
(700.12(B)(6))

Submitter: Joseph A. Ross, Haverhill, MA
Recommendation: Revise 700.12(B)(6) and add a new *Exception* as follows:

Where an outdoor housed generator set, equipped with a readily accessible disconnecting means, is located within sight of the building or structure supplied, an additional disconnecting means shall not be required where ungrounded conductors serve or pass through the building or structure. The disconnecting means shall ~~meet the requirements of 225.36~~ be marked to identify it as being suitable for use as service equipment.

Exception: For installations under single management, where conditions of maintenance and supervision ensure that only qualified persons will monitor and service the installation and where documented safe switching procedures are established and maintained for disconnection, the generator set shall not be required to be located within sight of the building or structure served.

Substantiation: We are aware of the concerns that CMPs 10 and 13 have had with this issue. The concept of this proposal is to address confusion in the field. The first sentence clarifies that it's the generator set (housed or not housed) that is to be "within sight" of the building and not the disconnecting means. Over zealous AHJs have had generator sets lifted and rotated so the disconnecting means faced the building. The second sentence clarifies that conductors from the generator may be "outside feeders" (225.36) or could be "service conductors" (230.66), therefore, the revision. The Exception gives practical relief to some establishments that may desire to locate the generator at the edge of their parking lots and not in the middle of it (premium space, snow plowing, noise pollution, etc.). Also, the generator may serve more than one building (alarm systems, etc.).
Panel Meeting Action: Reject
Panel Statement: The intent is for the generator disconnecting means to be in line of sight of the building, not the generator. The recommendation changes the intent of the existing requirement. The output conductors of the generator do not involve service conductors, as alluded to in the substantiation. The output conductors of a generator are feeder conductors and, if the generator is located outside the building and assuming the generator is a structure, the feeders and their disconnecting means are covered by Part II of Article 225. Where the generator is located in a parking lot not in close proximity to the building, an additional disconnecting means must be installed at the building to comply with Part II of Article 225. No technical substantiation was provided to permit the disconnecting means to not be located at the point where the feeder enters into the building in accordance with 225.32 with the accompanying four exceptions that would permit alternatives to this requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:

MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept in principle. The proposal intends to provide the same exception for installations under single management to outdoor housed generator sets, as provided by Exception 1 of Article 225.32 for other types of outside feeders. The proposed changes in the main paragraph related to the reference to Article 225.36 should be eliminated. And the proposed exception should have been accepted in principle and modified to replace the wording "generator set" in the Exception with "generator disconnecting means". This will correctly identify the exception as applying to the disconnecting means and not the generator set. As indicated in the panel statement, the intent of the referenced Article 700.12(B)(6) is for the disconnecting means to be in line of sight of the building. As allowed by Exception 1 of Article 225.32, the additional disconnecting means should not be required to be within site of the building or structure served, and can be located "elsewhere on the premises". The application of this exception to an outdoor housed generator set is technically no different than any other type of outside feeder to the building. The exception provides the conditions upon which the installation can be operated and maintained safely, i.e. the use of qualified persons for the maintenance and supervision and documented safe switching procedures are established and maintained. Similar installations of outdoor feeders serving a building or structure, without the installation of a disconnect device installed either inside or outside of the building or structure and not within site of the building or structure, are operated and maintained safely when the conditions stated in the exception are present.

13-181 Log #4707 NEC-P13 **Final Action: Reject**
(700.12(B)(6))

Submitter: Clyde V. Carl, North Carolina Dept. of Administration/State Construction Office
Recommendation: Delete text as follows:
~~The disconnecting means shall meet the requirements of 225.36.~~
Substantiation: The sentence that was added to 700.12(B)(6) is superfluous with consideration to the requirements of UL 869A and UL 2200. The physical requirements that determine a disconnecting means to be "suitable for use as service equipment" are not found in NEC®. Consequently, the mandate that equipment must be suitable for use a service equipment, without clear definition of how equipment may be suitable, may foster misunderstandings about how the requirement may be satisfied. This is the thesis by which the proposed fine print note should be added to 225.36 to mitigate a misapplication for the "suitable for service equipment" requirement of 700.12(B)(6) that was revised for the 2008 edition of the NEC®.

In UL 869A, *Reference Standard for Service Equipment,* fourth edition, one learns in Section 14.2, Insulated neutral, Paragraph 14.2.1, that, "Equipment having a neutral insulated from the enclosure, intended for use as service equipment, and that can accommodate not more than six main disconnecting means shall be marked "Suitable for use as service equipment." The NEC® definition for service equipment expands on UL 869A by stating, "The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply." The problem is that generator sets are, by the NEC® definition, separately derived systems. A separately derived system is, "A premises wiring system whose power is derived from a source of electrical energy or equipment other than a service. Such systems have no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system." A generator set is a separately derived system, therefore, there is no justification for 700.12(B)(6) to require the disconnecting means of a generator set to be suitable for service equipment. 700.12(B)(6) is ambiguous in another way.

In UL 2200, *Stationary Engine Generator Assemblies,* Section 25 discusses overcurrent protection, a requirement of equipment suitable for service equipment, and output circuit grounding. UL 2200 does not specifically call out a requirement for a neutral that is insulated from the generator set enclosure, but Section 14, Output Circuit Grounding, in paragraph 14.1.2 requires that "an output alternating current power circuit shall be grounded" when in sub-paragraph (a) "the circuit has no electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another wiring system." Conversely, the alternating current output power circuit must be insulated from ground at the generator if the circuit shares a neutral conductor ground reference with another system, or a service. If the grounded conductor is not to be shared with another system, or service, UL 2200 goes on in paragraph 14.1.4 to describe the application and sizing of a bonding jumper to ground conductors of output circuit configurations listed in paragraph 14.1.3. A bonding jumper would not be required if a generator output circuit was bonded to ground at the factory. If this were the case, the generator set output, though a separately derived system, could only be utilized in the manner of service entrance equipment, and if UL 2200 was similar to UL 869A, it would require the generator set to be labeled, "Suitable only for use as service equipment", unless its output enclosure can accommodate more than six disconnecting means, and then it would be required to be labeled. "Suitable only for use as service equipment. Install not more than six main disconnecting means."
Panel Meeting Action: Reject
Panel Statement: In the substantiation the submitter states that as far as the NEC is concerned, generators are separately derived systems and that is incorrect. To determine whether the generator is a separately derived system, both the transfer switch and the bonding and grounding within the generator must be determined. If the generator is manufactured with the neutral isolated from the frame, then the transfer switch can either switch all of the conductors, including the neutral, if there is one, or switches only the phase conductors and not the neutral. Where the neutral is not tied down and not switched by the transfer switch, the system is not separately derived so Section 250.30 is not followed. Where the neutral is tied internal to the generator and not accessible to the installer to isolate, the generator must be installed as a separately derived system and must comply with 250.30 with the neutral switched by the transfer switch, if there is a neutral. These issues are key to the generator feeder (generators are not considered by the NEC to be services) disconnecting means, and critical to that issue is whether the neutral, where provided, is able to be isolated from the frame of the disconnecting means at the building. Compliance with 225.36 is essential to the disconnecting means to be able to have the neutral isolated from the disconnect enclosure or not, depending upon whether the generator is a separately derived system, so deleting the last sentence is not acceptable.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-182 Log #1496 NEC-P13 **Final Action: Accept in Principle**
(700.12(F), Exceptions No. 1 and No. 2)

Submitter: Robert G. Fahey, City of Janesville
Recommendation: Add new text as follows:
700.12(F)
Exception No. 1: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is provided with a lock-on feature.
Exception No. 2: Unit equipment located on the exterior of buildings, outside of exit doors shall be permitted to be on the same emergency lighting circuit as is the unit equipment illuminating the area immediately inside the same exit door.
Substantiation: The addition of the 2nd Exception will allow a practice which is commonly done in the State where I inspect electrical wiring, this practice also appears to take place in other areas of the United States, as Electrical Engineers from other areas of the United States designs include this concept. The present wording in 700.12(F) requires the outside unit equipment to be supplied off of the outside lighting circuit, the common practice is to use the unit equipment inside the exit door, typically an exit/emergency light with the capability of supplying remote heads, thus the electrician will install 2 remote lights outside the exit door, utilizing the emergency lighting circuit inside the building and not the lighting circuit which supplies the outside lights, normally wall packs. This exception would, in my mind, not reduce safety, as when the interior normal lighting circuit is compromised, the interior emergency lights will activate both the emergency lights inside and outside the exit door(s), giving the occupants a safe passage to the exit and away from the building.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Exception No. 2: Remote heads providing lighting for the exterior of an exit door shall be permitted to be supplied by the unit equipment serving the area immediately inside the exit door.
Panel Statement: The panel action clarifies the intent of the recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-183 Log #2244 NEC-P13 **Final Action: Reject**
(700.12(F)(4))

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text to read as follows:
The branch circuit feeding the unit equipment shall be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches without energizing unit equipment in other lit areas.
Substantiation: In a large new building, the emergency battery units where not wired on the normal lighting branch circuit. The problem was resolved by adding many relays, wired that when any circuit tripped or was shut off all the emergency battery units would energize in that area, room or corridor when the normal lighting was on draining the other battery units that were not needed.
Panel Meeting Action: Reject
Panel Statement: The third sentence in the second paragraph of 700.12(F), clearly requires the branch circuit feeding the unit equipment to be the same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. The other unit equipment in those other areas must be connected to the lighting branch circuit in that area so the proposed additional is unnecessary and misleading.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MOUTON, C.: The panel statement should be modified to reflect that the correct reference is 700.12(F)(4).

13-184 Log #1585 NEC-P13 **Final Action: Reject**
(700.12(F)(4) Exception)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is ***lockable in the closed position*** *~~provided with a lock-on feature.~~*
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: The substantiation does not support the recommended change. The current text is clear as to the intended function of this device.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-185 Log #111 NEC-P13 **Final Action: Reject**
(700.16)

Note: This Proposal appeared as Comment 13-173 on Proposal 13-133 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 13-133 was:
Revise text to read as follows:
"...failure of any individual lighting element such as ~~the burning out of a light bulb~~ a lamp, cannot...".
Submitter: Samuel Goble, Department of General Services / Rep. Commonwealth of Virginia
Recommendation: Revise text to read:
"...failure of any individual lighting ~~element~~ component such as the burning out of a ~~light bulb~~ lamp or ballast, cannot...".
Substantiation: The term "element" is often confused for a "filament". Using an example can often confuse the intent of the code section, such as in this example. Replacing the word "element" with "component" does not change the intent or meaning of this code section and replaces a layman's term such as the "element" often misused as the filament of a lamp. Using the term "component" covers all parts of all types of luminaries.
Panel Meeting Action: Reject
Panel Statement: The phrase "light bulb" was replaced with the word "lamp" in the 2008 NEC. The proposed change from "element" to "component" can be misleading and confusing. There was no technical substantiation for adding "ballast" to the requirement for the failure of any one element. A ballast is not an element of individual lighting. Acceptance of this proposed text would require redundant ballast for no reason.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-186 Log #656 NEC-P13 **Final Action: Reject**
(700.16)

Submitter: Samuel J. Goble, Just Good Electrical Code Training
Recommendation: Revise text to read as follows:
"...failure of any individual lighting ~~element~~ component such as the burning out of a lamp or ballast cannot...".
Substantiation: The term "element" is often confused for a "filament". Using an example can often confuse the intent of the code section, such as in this example. Replacing the word "element" with "component" does not change the intent or meaning of this code section and replaces a layman's term such as the word "element" often misused as the "filament" of a lamp. Using the term "component", covers all parts of all types of luminaries.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-185.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-187 Log #3512 NEC-P13 **Final Action: Accept in Principle**
(700.17)

Submitter: Mark R. Hilbert, Wolfeboro, NH
Recommendation: Revise 700.17 as follows:
700.17 Branch Circuits for Emergency Lighting.
Branch circuits that supply emergency lighting shall be installed to provide service from a source complying with 700.12 when the normal supply for lighting is interrupted. Such installations shall provide either of the following:
(1) An emergency lighting supply, independent of the ~~general~~ normal lighting supply, with provisions for automatically transferring the emergency lights upon the event of failure of the ~~general~~ normal lighting ~~system~~ branch circuit, ~~supply~~
(2) Two or more branch circuits supplied from separate and complete systems with independent power ~~supply~~ sources. One of the two power sources and systems shall be part of the emergency system and the other shall be permitted to be part of the normal power source and system. ~~each~~ Each system shall provide ~~providing~~ sufficient current for emergency lighting purposes.
Unless both systems are used for regular lighting purposes and are both kept lighted, means shall be provided for automatically energizing either system upon failure of the other. Either or both systems shall be permitted to be a part of the general lighting ~~system~~ of the protected occupancy if circuits supplying lights for emergency illumination are installed in accordance with other sections of this article.
Substantiation: Revising this section as proposed will clarify that the requirements of the section are branch circuit level requirements and how these branch circuits are installed. Although the term "branch circuit" is used in the opening sentence, including it in the title of the section will heighten the awareness that this section provides information for branch circuits supplying emergency lighting.
Section 700.17 is often misunderstood and the proposed revisions to (1) and (2) should provide a clearer understanding of how branch circuits for emergency lighting purposes should be installed and operate.
By replacing the words "general" with "normal" and adding the term "branch circuit" as indicated in 700.17(1) will make it clear that the emergency lighting supply must be independent of the normal lighting supply and that it must automatically operate when there is a failure of the branch circuit supplying the normal lighting. The fact that the emergency lighting must operate upon a failure of the normal lighting branch circuit is often overlooked.
Revising 700.17(2) as recommended will clarify that the requirement of this section is for the area requiring the emergency lighting to be supplied by a minimum of two branch circuits that originate from separate systems with different power sources. These facts and the fact this section is also addressing times when the normal power is present are often overlooked. Unlike 700.17(1) where a failure of the normal lighting branch circuit will activate the emergency lighting supply, an area supplied by only one emergency lighting branch circuit will be in total darkness if there is a failure of that branch circuit. For example; it is not uncommon to find installations where a single branch circuit from an emergency lighting branch circuit panelboard, which is being used as part of the general lighting, has been run to a stairwell (means of egress). In this example, any time there is a failure of the branch circuit supplying the stairwell, the stairwell would be in total darkness. If two branch circuits from separate systems had been run to the stairwell as required by 700.17(2) and there is a failure of one branch circuit, the other would still provide the necessary lighting.
The word "systems" has been removed from the last paragraph as indicated to provide a clearer understanding that both systems are actually permitted to provide general lighting for the protected occupancy.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
700.17 Branch Circuits for Emergency Lighting.
Branch circuits that supply emergency lighting shall be installed to provide service from a source complying with 700.12 when the normal supply for lighting is interrupted. Such installations shall provide either of the following:
(1) An emergency lighting supply, independent of the ~~general~~ normal lighting supply, with provisions for automatically transferring the emergency lights upon the event of failure of the ~~general~~ normal lighting ~~system~~ branch circuit, ~~supply~~
(2) Two or more branch circuits supplied from separate and complete systems with independent power ~~supply~~ sources. One of the two power sources and systems shall be part of the emergency system and the other shall be permitted to be part of the normal power source and system. ~~each~~ Each system shall provide ~~providing~~ sufficient power ~~current~~ for emergency lighting purposes.
Unless both systems are used for regular lighting purposes and are both kept lighted, means shall be provided for automatically energizing either system upon failure of the other. Either or both systems shall be permitted to be a part of the general lighting ~~system~~ of the protected occupancy if circuits supplying lights for emergency illumination are installed in accordance with other sections of this article."
The remainder of the proposed text accepted as is.
Panel Statement: The panel has replaced the term "current" with "power" to ensure that proper voltage is maintained at the equipment being supplied.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-188 Log #3232 NEC-P13 **Final Action: Accept in Principle**
(700.24 (New))

Submitter: Steven R. Terry, Electronic Theatre Controls Inc.
Recommendation: Add new section as follows:

700.24 (new) Emergency Lighting Automatic Control. Where an emergency lighting load is automatically energized upon loss of the normal supply, an automatic load control relay shall be permitted to energize the load. Where an emergency lighting load is automatically energized, upon loss of the normal supply, by transferring the load from a normal supply branch circuit to a different, unswitched, emergency supply branch circuit, an automatic transfer switch shall be used for such energization.

Substantiation: Two new classes of device have emerged in the last few years:

1. Listed stand-alone Automatic Load Control Relays. This device was traditionally part of emergency unit equipment but UL now lists stand-alone devices under UL924.

2. UL 1008-listed Automatic Transfer switches of one to 48 circuits specifically designed for transferring emergency loads between a normal branch circuit and a different, emergency branch circuit. Previously, listed ATSs were used primarily in feeder applications, not on branch circuit loads.

There is ongoing confusion in the specification and installation community concerning the proper application of these two devices on branch circuits. The UL924 Load Control Relay is often misapplied as an Automatic Transfer Switch in a branch circuit application. UL has publicly asserted that UL924 Load Control Relays are not to be used to transfer a load between two non-synchronous power sources, and that only a UL1008 device is suitable for this application. In the Spring 2005 issue of “The Code Authority” (UL’s newsletter on Code issues), the article “Focus on Emergency Lighting Equipment “ appears on page 3 (see Exhibit A provided with this proposal). In the second paragraph, that article states:

“An important issue to recognize is that an LCR does not switch the load between the normal and emergency supplies. Load switching of this type should only be performed by a transfer switch listed in accordance with UL1008, Standard for Safety for Transfer Switch Equipment. An LCR has only one power input source, and that is connected to the emergency power supply.”

In addition the UL white book clearly differentiates Automatic Transfer Switches (product category WPWR) and Automatic Load Control Relays (product cateory FTBR).

Nevertheless, misapplication of these devices continues, perhaps because it is so easy to misunderstand the limitations of Load Control relays. This is not helped by the fact that at least 3 manufacturers of stand-alone UL924 Load Control Relays describe these products as “Transfer” devices in their literature (see Exhibit B provided with this proposal). Such literature also encourages misapplication of these devices as transfer switches through installation diagrams that show transfer of the load between normal and emergency sources, in direct contravention to UL’s statement above.

Load Control Relays are not suitable for transfer between two non-synchronous power sources because:

A. They do not have mechanisms required by UL1008 to prevent inadvertent connection of the normal and emergency sources, and

B. They do not undergo fault-current evaluation that is required of UL1008 transfer switches.

Because it is so easy for engineers and installers to misapply Load Control Relays as transfer devices on branch circuits, Article 700 should clarify the correct application of these two devices. Efforts by UL alone have been unsuccessful in preventing field misapplication of Load Control Relays as transfer switches.

I have made a separate proposal in this cycle to add a definition of Automatic Load Control Relays in 700.2(new).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

700.24 Automatic Load Control Relay. If an emergency lighting load is automatically energized upon loss of the normal supply, a listed automatic load control relay shall be permitted to energize the load. The load control relay shall not be used as transfer equipment.

Panel Statement: The panel action clarifies the permitted use of this equipment and that this type of equipment cannot be used as transfer equipment. The action also imposes a requirement for this type of equipment to be listed.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-189 Log #399 NEC-P13 **Final Action: Accept**
(700.26)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Change “per” to “in accordance with”.

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.

Panel Meeting Action: Accept

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-190 Log #3690 NEC-P13 **Final Action: Reject**
(700.26)

Submitter: Christopher G. Walker, Eaton Corp.
Recommendation: Add new text to read as follows:

<u>(A) Feeders</u>

<u>Where ground-fault protection has been provided for the operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load.</u>

<u>Such protection shall consist of overcurrent devices, current transformers, or other equivalent protective equipment that shall cause the feeder disconnecting devices to open.</u>

<u>The additional levels of ground-fault protection shall NOT be installed as follows:</u>

<u>1. On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground, but not more than 600 volts phase-to-phase.</u>

<u>2. On electrical systems where a non-orderly shutdown of power will introduce additional or increased hazards.</u>

<u>Where ground-fault protection has been provided for the operation of service level or feeder level disconnecting means, these means shall be selectively coordinated such that the feeder level device, but not the service level device, shall open on ground faults on the load side of the feeder level device.</u>

<u>A 6-cycle minimum separation time between the service and feeder ground fault trip response bands shall be provided.</u>

Substantiation: Ground faults are typically believed to be the most common type of fault experienced in operating energized electrical systems, per ANSI/IEEE Std 242-1986 Buff book, chapter 7. Professional design engineers tell stories of ballast or small motor failures that have caused main or feeder devices to open. Why is this so? In some instances, a ground fault condition existed that went undetected and precipitated the protective device to open. In other cases, ground fault protective devices were improperly set, or not set at all. In others, a selective coordination study may not have been done, or may have been done improperly.

Therefore, with the goal of using selective coordination as the process by which electrical systems may achieve maximum uptime, it is important that all he key areas of impact are addressed in the design of these electrical systems.

The NEC has for many years required ground fault protection of equipment, but only at the service disconnect level (with noted special exceptions), per Article 230.95. The relatively recent 2005 and 2008 NEC versions, requires selective coordination in applications related to life safety, public safety, and/or national security applications where reliable electrical power systems are required.

These relatively new requirements for selective coordination in these types of applications are needed throughout the entire service level, feeder and branch levels of the electrical system.

With the goal in mind of maximizing the reliability and uptime of electrical systems, and giving consideration that the most common types of faults are ground fault related, it becomes a reasonable approach that whenever selective coordination is required by the Code, that the requirements for ground fault protection of equipment be extended to all appropriate areas in the electrical system beyond just the service level.

This proposal mirrors a similar requirement for ground fault protection of equipment that currently exists in NEC Article 708.52 for Critical Operations Power Systems (COPS). This proposal therefore recommends enhancing the reliability of the electrical system by requiring ground fault protection of equipment in all appropriate levels of the system whenever there are also requirements for selective coordination in that system.

Panel Meeting Action: Reject

Panel Statement: Section 700.26 permits the alternate source for emergency systems to not have ground-fault protection of equipment with automatic disconnecting means. Where it alarms, the ground-fault indication of the emergency source must be provided in accordance with 700.7(D). This means that the GFP would alarm and notify the facility-engineering department or other designated entity so there is no reason to require an additional level of GFP as is required for health care facilities in 517.17.

It seems to be the intent of this proposal to make sure that the emergency system remains selectively coordinated for all fault conditions, including ground faults. The selective coordination required by 700.27 already includes all types of overcurrent, including, but not limited to, phase-to-phase and three phase faults, and phase-to-ground, double phase-to-ground, and three phase-to-ground faults. As such, the intent of this proposal is already met in the existing text, since total selective coordination is already required for all types of overcurrent, including ground faults in 700.27.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-191 Log #3933 NEC-P13 **Final Action: Reject**
(700.26)

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Add a second paragraph.
<u>Ground fault relays on the normal source side (line side of the transfer switch) that supply emergency systems are permitted to be restrained from operating for ground faults on the loadside of the transfer switch if the system complies with both of the following:</u>
<u>(A) Ground fault protection relays on the normal source side (line side of the transfer switch) are not restrained from operation for ground faults on the normal source side (line side of the transfer switch)</u>
<u>(B) Audible and visual signal devices indicate whenever a ground fault relay has been restrained. Instructions on the course of action to be taken in the event of an indicated ground fault shall be located at or near the sensor location.</u>
Substantiation: For life-safety purposes and system reliability for the prevention of blackouts, it is desirable that a ground-fault on the load side of a transfer switch in an emergency system not take out the ground fault protection on the normal source. This proposal allows the ground fault protection on the normal source to be restrained from operating and taking down all or large portions of the normal system because of a ground fault on the load side of the transfer switch. For these critical life-safety-related applications, it requires both audible and visual signaling that a ground fault has occurred and that it is being restrained. Restraining the normal system ground fault protection relays for faults on the load side of the transfer switch is consistent with the concept of continuity of service for emergency systems (700.26 & 700.7(D)), legally required standby systems (701.17), and healthcare essential electrical systems (517.17(B).
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided for installing ground fault protection relays on the normal source side of the transfer switch. Determining the fault on the emergency (load) side of the transfer switch requires specialized sensors and ground fault protection relays with a design system and additional equipment not provided as part of the substantiation. This technical information must be provided to the panel with operational design information, safety features, and other technical information to ensure the proper operation of this sensing system.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-192 Log #3934 NEC-P13 **Final Action: Reject**
(700.26)

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Revise 700.26.
700.26 Ground-Fault Protection of Equipment.
<u>(A) Alternate Source</u>. The alternate source for emergency systems shall not be required to have ground-fault protection of equipment with automatic disconnecting means. Ground-fault indication in the emergency <u>(alternate)</u> source shall be provided per 700.7(D).
<u>(B) Normal Source. Ground-fault protection shall not be required for a disconnecting means in the normal source supplying an emergency system where the disconnecting means supplies only fire pumps, emergency systems, or legally required standby systems. Ground-fault indication in the emergency (normal) source shall be provided per 700.7(D).</u>
Substantiation: Where a disconnecting means supplies only fire pumps, emergency loads, and legally required standby loads, that disconnecting means should be allowed to operate as long as possible during a ground-fault, without opening the life-safety-related loads. Keep the loads on as long as possible. Because ground-fault operation of the disconnecting means would not be required, signaling would be necessary. This proposal provides the same ‘’safety logic” for the normal source as the Code already provides for the alternate source.
700.7(D) does not need to change if this proposal is accepted, since 700.7(D) now requires the sensor to be located ahead of the disconnecting means for the “emergency source”, and the source for the emergency system can be either the ‘normal” or the ‘alternate” source.
Panel Meeting Action: Reject
Panel Statement: The requirements of Section 695.6(H) already addresses ground-fault protection of equipment in the normal and alternate supplies to a fire pump. However, short circuit and ground fault protection still must be provided for the normal circuit supplying other critical loads. A ground fault or a short circuit anywhere in the feeder or on a branch circuit could cause loss of the entire power source, such as a generator, a UPS system, a fuel cell system, or similar power source, resulting in the loss of more than just the one feeder.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-193 Log #4908 NEC-P13 **Final Action: Reject**
(700.26)

Submitter: James Brozek, Acton, MA
Recommendation: Delete 700.26 entirely. This is a companion proposal in association with a proposal covering new 240.27 and 240.28, which consolidates requirements from 240.13, 230.95, 700.26, 215.10, 517.17, and 708.52.
Substantiation: If the proposal for new 240.27 and 240.28 is accepted, 700.26 will no longer be necessary.
Panel Meeting Action: Reject
Panel Statement: Sections 240.27 and 240.28 are not under the jurisdiction of Panel 13; therefore, there is no information on what is covered by the “companion” proposals or what action Panel 10 will have taken on these proposals. In addition, the submitter has not provided any technical substantiation to support his recommendation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-194 Log #3692 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: Christopher G. Walker, Eaton Corp.
Recommendation: Add new text to read as follows:
Overcurrent devices shall be selected by a qualified person to optimize selective coordination and arc flash protection (NFPA 70E).
Substantiation: Designing electrical systems with overcurrent protective devices that are to be selectively coordinated involves using data from the device manufacturers, and conducting analyses of the various conditions that the electrical system may experience. The choice of overcurrent protective devices involves the study and analysis of both phase and ground fault currents, and cover currents that ranges from low level overloads up to high short circuit fault current levels.
In addition, there are applications that are justified per NFPA 70E-2004 that allow installation and maintenance personnel to perform work close to energized conductors. For these applications where personnel are working in close contact with energized conductors, design studies are to be conducted to determine the possible levels of arc flash energy that personnel may be exposed to, and the subsequent levels of protective equipment that should be in place.
It should be evident that the correct selection of protective devices is very important to minimize damage to equipment, minimize the loss of power in key electrical systems, and minimize the arc flash energy exposure to personnel whenever electrical fault conditions occur. The correct selection of the protective devices that will satisfy these conditions must be done by persons that are qualified to perform the appropriate types of analysis and studies. A thorough analysis is needed to ensure optimal selection of protective devices, otherwise, it may result in excessive equipment damage and/or personnel injury.
The current National Electric Code specifies the types of systems that require selective coordination. The Code does not identify who is responsible for ensuring that the electrical systems meet the selective coordination requirements.
Therefore, this proposal simply adds verbiage to clarify who is responsible for ensuring that the electrical systems meet the current selective coordination requirements, while also addressing equipment protection and personnel safety.
Panel Meeting Action: Reject
Panel Statement: In Section 215.5, an authority having jurisdiction (AHJ) can require a diagram showing feeder details prior to the installation of the feeders and then can require a certain level of expertise for the design of these feeders. Section 240.12 already permits selective coordination for orderly shutdown of the system as a permissive rule.
Section 110.16 requires a sign be posted at the distribution equipment, panelboards, switchboards, and similar equipment warning qualified personnel of the potential electric arc flash hazard. The NEC covers the installation of the electrical system, and NFPA 70E provides coverage once the system has been energized. There may be many reasons a designer provides a particular type of overcurrent protective device for a certain system, with arc flash as one of the many considerations and selective coordination as another.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
CARON, D.: See my comments to Proposal 13-195.
DEGNAN, J.: The panel’s statement notes that arc flash and selective coordination are considerations, as if they have equal stature, if this is true the vote should be to accept the proposal. Design engineers that utilize circuit breakers to comply with 700.27 are limited in their ability to set limits on the level of arc flash explosions that will injure or kill electricians who work on live systems. The 2008 NEC mandates selective coordination at the expense of arc flash management and the well being of electricians. See my statement on proposal 13-195.

MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept in principle in part. The proposal should not have been rejected since it properly indicates that selective device coordination should be an optimization. To make the correction, the recommended rewording of the submitter's proposal is as follows;

"Overcurrent devices shall be selected by a qualified person to optimize selective coordination using the best possible compromise between maximum equipment protection, maximum service continuity, and arc flash protection".

The recommended wording for the balance of the first two criteria is taken from Chapter 15 of IEEE 242 (the Buff Book), the IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems. As stated in IEEE 242 on page 607 in Section 15.7.1, "complete selective coordination may not be achieved in all systems". The current language of 700.27, 701.18, and 708.54 does not allow the flexibility for a qualified person to make the compromise between these two criteria, which has been the common practice in selective protective device coordination for decades. Additional substantiation for this rewording of the proposal comes from NFPA 110 which says in Article 6.5.1 that "The overcurrent protective devices in the EPSS shall be coordinated to optimize selective tripping of the circuit overcurrent protective devices when a short circuit occurs". The current language in these NEC Articles for 100% coordination has had the affect of inappropriately restricting the options available for a qualified person, and has led to the use of a limited set of options to achieve 100% coordination, giving a windfall advantage to a certain specific class of equipment. The recommended change would make the necessary adjustment in the language to allow more flexible coordination in accordance with the methodology recommended in IEEE 242. In addition, the addition of the wording "a qualified person" will incorporate the panel judgement from Proposal 13-203 which was to accepted in principle in part, additional language to indicated the qualifications of persons performing the coordination.

13-195 Log #3953 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: James E. Degnan, Sparling
Recommendation: Revise text to read as follows:

700.27 Coordination Emergency system(s) overcurrent devices shall be selectively coordinated with all <u>emergency system</u> supply side overcurrrent protective devices <u>for faults with a duration of 0.1 seconds and longer.</u>
Substantiation: The text used in the comment is preferred over the original text for the following reasons:

1. Language similar to this language is being utilized by some states, for example Oregon & Florida, as a means to apply the intent of selective coordination.

2. Article700.1 states that the scope of Article 700 is: "The provisions of this article apply to the electrical safety of the installation, operation and maintenance of emergency systems ….to required facilities when the normal electrical supply or system in interrupted." If the normal system has been interrupted there is no need for the emergency system to selectively coordinate with it. Changing "all supply side" to "all emergency system supply side" will make this intent clear.
This clarification also prevents mandating the complete use of fuses on facilities that have over 100,000 amperes of fault current available on the normal side. If normal side fault current exceeds 100,000 amperes automatic transfer switches must have fuses on the supply side. Almost always, once a current limiting fuse is used in a selectively coordinated system, every overcurrent protective device downstream must also be a fuse.

3. The addition of the 0.1 second criteria will permit the use of interchangeable data to determine selective coordination that is not dependent on a single manufacturer. When analysis is done for fault currents in excess of 0.1 seconds, graphic time current curves can be used to determine selective coordination. When time periods are shorter than 0.1 seconds, and especially when they are shorter than a quarter cycle, manufacturers must be consulted to determine if devices selectively coordinate. These manufacturers will only provide proprietary selective coordination data, limiting competition.

4. The addition of the 0.1 second criteria will make energized electrical systems safer to work on than what is obtained with the present language. If circuit breakers are used for selective coordination the upstream circuit breakers must rely on delayed tripping to give downstream circuit breakers the opportunity to trip first. Delaying the tripping of circuit breakers increases the amount of arc flash energy that is delivered to a fault. Calculations comparing the arc fault current and associated requirements for personal protective equipment worn by electricians on a selectively coordinated system and a partial selectively coordinated system are shown in the following Table. The partial selectively coordinated system does not delay the instantaneous tripping of circuit breakers, but is selectively coordinated for fault conditions lasting longer than 0.1 seconds.

See Table 1 on page 951

<u>Table 1. Personal Protective Equipment Requirements for Two Systems at Various Fault Current Intervals.</u>
Table Notes:

1. On this model system there is 100 feet of wire between each of the circuit breaker sizes indicated in the first column. Calculations were made per IEEE 1584 using software furnished by SKM. Similar results are obtained using NFPA 70E for faults rated below 50,000 amperes.
2. Fault current levels are indicated by 10kA=10,000 amperes, 100kA=100,000 amperes, etc.
3. The goal of Personal Protective Equipment (PPE) is to limit injury to *second degree burns or less* if the wearer experiences an arc flash. PPE Category 0 clothing approaches everyday construction clothing in appearance, PPE Category 4 is a completely enclosing jumpsuit. There is no protective clothing available above Category 4, hence these situations are designated as dangerous.
4. This table is a single example, but gives an appropriate indication of overall trends. There will be various alternatives and exceptions that comprise a minority of applications.
5. Worker safety distance increases with the rating of the protective device.

The Table clearly shows that PPE hazard Cat 3 and Cat 4 conditions are far more prevalent on a fully coordinated system.

Emergency systems are always required in larger facilities and many of these facilities operate 24 hours a day. Although working on live systems is to be avoided wherever possible, maintenance and modification of energized switchboards and panelboards in large facilities is often risked to avoid interrupting usage. Some maintenance and inspection activities such as voltage checks and infrared scans can only be done while the equipment is energized. Electricians working on energized equipment and any others that are within the arc flash boundary may be subject to injury if a fault occurs.
Although selective coordination of the emergency system was added to NFPA 70 in 2005, it is still too early to track and directly attribute an increase of electrician injuries on selectively coordinated systems. Large projects that were designed to the 2005 NEC are just now completing construction and it will be some years before these systems require significant maintenance or will undergo modifications. However some selectively coordinated systems are starting to appear and the potential for injury to electricians is increasing. Arc flash hazards affect the lives of electricians (and others that work in the vicinity of electricians) everyday, the following information was taken from various NFPA publications:

● *Every day in the United States, at least one person dies from electrocution on the job. Each year, thousands of workers are treated in emergency rooms and burn centers.* (NFPA Catalog Website, July 2008)

● *On January 1, 2007, this person was working on energized equipment using all the required PPE for his 480-volt job, including FR coveralls, arc shield, electrical-rated hard hat, Class 0 rubber gloves, and insulated tools. Behind him, another electrician who was also working on energized 480-volt equipment had no protective equipment but cotton clothing. When confronted about his lack of PPE, the man said that he had been doing this work for more than 20 years and knew what he was doing. Shortly after the protected worker left area, a loud arc flash took place, and the man began to scream. When the protected worker went to help, he smelled the man's flesh burning. His clothes had been burned and blown completely off his body.*("Hey Electricians" NFPA Electrical Section Website October, 2008.)

● *In 2003, municipal fire departments responded to an estimated 40 institutional electrical rescues.* (NON- FIRE ELECTRICAL RESCUE INCIDENTS REPORTED TO FIRE DEPARTMENTS IN 2003, Jennifer D. Flynn, NFPA, August 2007)

● *The IBEW will support any effort which helps to identify and acknowledge the increasing problem of electrical arc blasts and flashes.* (IBEW statement in NFPA 70 2002 ROC 1-152, regarding an accepted proposal to add Section 110-116 Flash Protection to NFPA 70)

Additional information on electrical injuries and deaths can be found by searching "electrician" on OSHA's website. It's clear from historical records that electrical systems are hazardous, that people become exposed to live electrical systems even though they are not suppose to be, and that injuries and deaths occur. It is also evident from the above calculations that selective coordination will increase the amount of energy available to injure or kill, and accordingly we will eventually see additional deaths and more severe injuries in the work place.
Circuit breakers are used for the examples in this substantiation statement, which the author finds to be the predominant choice of those that own and operate facilities. If a facility owner prefers to have fuses throughout their system, the issues identified in this substantiation are still present, but to a lesser extent.

5. When selective coordination was added to NFPA 70 in 2005 there was no documentation citing historical injuries or loss of life as a result of electrical systems that were not selectively coordinated, hence the consequences of reducing the selective coordination requirements of 700.27 to what is stated herein are minimal.

Note that the proposed comment also applies to NEC 701.18.
Panel Meeting Action: Reject
Panel Statement: The 0.1 second limit in this proposal could reduce the level of safety by limiting the types of overcurrents that would need to be isolated to the nearest upstream device. Requiring selective coordination down to only 0.1 seconds will cover only overloads and a few minor phase-to-phase and minor ground faults.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3

Table 1. Personal Protective Equipment Requirements for Two Systems at Various Fault Current Intervals.
(13-195 Log #3953)

Low Voltage Power and Molded Case Circuit Breakers – Fully Coordinated

	Incident Energy (J/cm2)				Arc Flash Boundaries (mm)				PPE			
	10kA	40kA	70kA	100kA	10kA	40kA	70kA	100kA	10kA	40kA	70kA	100kA
2000A LVPCB	107	373	617	850	4876	11380	16021	19924	Cat 4	Dangerous	Dangerous	Dangerous
1600A LVPCB	105	53	83	110	4824	3010	4112	4969	Cat 4	Cat 3	Cat 3	Cat 4
800A LVPCB	103	35	54	68	4761	2306	3054	3590	Cat 3	Cat 3	Cat 3	Cat 4
225A MCCB	121	28	38	44	3179	1313	1576	1729	Cat 4	Cat 2	Cat 3	Cat 3
20A MCCB	1.2	2	2.3	2.4	194	264	283	292	Cat 0	Cat 0	Cat 0	Cat 3
Fault	0.53	0.77	0.01	0.02	117	146	150	152	Cat 0	Cat 0	Cat 0	Cat 0

Molded Case Circuit Breakers – Partial Coordination

	Incident Energy (J/cm2)				Arc Flash Boundaries (mm)				PPE			
	10kA	40kA	70kA	100kA	10kA	40kA	70kA	100kA	10kA	40kA	70kA	100kA
2000A	107	373	617	850	4876	11380	16021	19924	Cat 4	Dangerous	Dangerous	Dangerous
1600A	105	3.4	5.1	6.5	4824	470	616	725	Cat 4	Cat 0	Cat 1	Cat 1
800A	103	4.2	5.8	6	4761	540	671	693	Cat 3	Cat 0	Cat 1	Cat 1
225A	2.8	4.3	5.6	6.3	322	418	487	527	Cat 0	Cat 0	Cat 1	Cat 1
20A	1.2	2	2.3	2.4	194	264	283	292	Cat 0	Cat 0	Cat 0	Cat 0
Fault	0.53	0.77	0.81	0.82	117	146	150	152	Cat 0	Cat 0	Cat 0	Cat 0

Explanation of Negative:

CARON, D.: With respect to the panel actions that leave the present wording of Article 700.27, 701.18 and 708.54 to require coordination above all other factors (such as arc flash concerns), I disagree with the panel action for the following reasons:

1. According to Article 90.1 (C) "This Code is not intended as a design specification…". It is intended to be installation guide. Coordination is an engineering design issue. IEEE has an extensive document on the subject of coordination (IEEE Buff Book) that is a design guide to assist engineers in balancing the desire to coordinate a system vs. maintaining a safe system.

2. When coordination takes precedence over all else (including safety), arc flash hazards increase. This is a fact. When devices are completely selectively coordinated, certain overcurrent protective devices in the distribution system are either inherently designed, or physically manipulated thru trip settings to "wait" to open in order to give downstream devices the opportunity to open first, whether or not the fault is downstream of another device. In all cases, as you move upstream of the first device, the devices that "wait" the longest are the largest devices. When any overcurrent protective devices wait to open during a fault, arc flash energy is increased. When it's the largest device in the circuit waiting the longest, arc flash energy increases proportionally.

3. Engineers are not opposed to coordinated power systems. Engineers are opposed to the strict interpretation that system coordination takes precedence over all other issues within a power system design. The engineering community has been balancing coordination and safety in electrical distribution systems quite effectively for decades. There is little justification to defend this strict requirement for selective coordination.

4. I am not aware of, nor am I aware of anyone who has offered, any documented accounts of individuals hurt or killed as a result of an electrical distribution system being improperly coordinated. There are endless accounts of people hurt and killed as a result of arc flash.

5. The requirement does not specify the value of the fault, so it has to be assumed to be the worst case condition, which is a bolted 3 phase fault at the circuit breaker terminals. This is unrealistic for countless reasons. One of note; manufacturers I have talked to have tried to simulate bolted faults in laboratory settings. It's nearly impossible. The way it is simulated is to prepare the fault in advance and close the overcurrent protective devices into it. This scenario could be possible in reality if inadvertently wired this way during construction, but would have been corrected prior to building occupancy. However, this does not reflect a realistic short circuit when it occurs. Most faults begin with two energized sources or one energized source and ground (or the neutral). In this scenario, there is high impedance arcing prior to the fault that reduces the available short circuit current for the first few cycles. The first device upstream of the fault generally sees the lower amperage fault first and opens, thus showing that a system that is not selectively coordinated on paper, is actually coordinated very well. We achieve a balance between coordination and arc flash energy, which is the designers goal.

6. How does one add to an existing emergency system as part of a renovation or expansion and meet the requirement as written?

7. The NEC seeks to provide a nationally recognized standard. Relief to this strict requirement has already been granted, in varying forms, from many jurisdictions.

DEGNAN, J.: The submitted proposal contains clear substantiation linking selective coordination requirements to decreasing safety for electricians that work on energized systems. The panel statement does not address this issue and there is no substantiation offered to refute the analysis presented in the proposal. The panel statement notes that the proposal "could reduce the level of safety" however none of the following have ever substantiated that anyone has been injured or killed as a result of non-selectively coordinated emergency systems: the panel's statement, the original selective coordination proposal 13-135 to the 2005 NEC, and those who opposed removing selective coordination in the 2008 NEC through comments. On the other hand there is clear evidence that electricians who work on live systems get injured, and that selective coordination will likely increase the severity and number of injuries. The panel is encouraged to accept this proposal, it will reduce future injuries to electricians while retaining the aspect of selective coordination where it is most needed, outside of the instantaneous range. Also see my response to proposal 13-199.

MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept in principle in part. The proposal should not have been rejected since it properly indicates that selective device coordination should be an optimization, with the 0.1 seconds limitation one of many methods to achieve the optimization. See my comments to Panel Action for Proposal 13-194 for additional comments about optimization and why it is needed. The panel should have accepted the proposal in principle in part, eliminating the additional wording for "Emergency system". Additionally, the panel statement is incorrect in stating that the 0.1 second limit "could reduce the level of safety by limiting the types of overcurrent that would need to be isolated to the nearest upstream device". The 0.1 second limit will not provide coordination for only "overloads and few minor phase-to-phase and minor ground faults". These were incorrect statements taken from the substantiation for another Proposal 13-198, that are technically unsubstantiated (see my comments to Proposal 13-198). Faults that are not overloads, minor phase-to-phase faults, and minor ground faults will be cleared by protective devices, but 100% coordination may not be achievable when balancing equipment protection and maximum service continuity in this small percentage of the operating range of protective devices. This optimization has been the practice for decades where qualified persons made practical judgements about protective device coordination design.

13-196 Log #3954 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: James E. Degnan, Sparling
Recommendation: Revise text to read as follows:

700.27 Coordination ~~Emergency system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrrent protective devices.~~ <u>The first emergency system branch circuit overcurrent protective device upstream of outlets or utilization equipment shall selectively coordinate with all upstream overcurrent protective devices. Additional selective coordination is not required between overcurrent protective devices that are upstream of the first overcurrent protective device that serves outlets and utilization equipment.</u>

Substantiation: 1. Real world overcurrent conditions most commonly occur near the load, for example too many items of equipment plugged into electrical outlets or a short circuit occurring during a light fixture change out.. This proposal focuses selective coordination language where it is needed most.

2. This proposal also reduces arc flash hazards. It does not do so as completely as the "0.1 second criteria" does, but there is some benefit. There is only one layer of delay, not multiple cascading layers. By limiting the selective coordination to the first node, subsequent supply side overcurrent protective devices don't need cascaded operational delays, with an associated increase of the arc flash hazard

3. By limiting the extent of selective coordination this proposal permits facility power system designers some flexibility in how distribution panels are configured and placed. System maintenance, arc flash hazards and economics can be considered with selective coordination.

4. This proposal offers benefits to circuit breaker manufacturers who won't have to resort to ANSI rated switchgear to achieve selectively coordinated systems. One fuse manufacturer recently introduced a combination circuit breaker and fuse branch circuit panelboard that can be used to an advantage under this proposal, because applying fuses to the first overcurrent protective device will make coordination with all upstream overcurrent protective devices easier to achieve.

If this proposal is accepted a similar proposal should be made for Section 701.18.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-195.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 2

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

DEGNAN, J.: See my statement on 13-195. This is an alternative proposal that places a different focus on selective coordination, however it should only be considered if the panel wants to address where selective coordination can offer the best economic return for the investment.

13-197 Log #4326 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: Malcolm Allison, Ferraz Shawmut
Recommendation: Amend 700.27 as follows.

700.27 Coordination.

<u>**(A) Normal System.** Normal system overcurrent protective devices on the supply side of the emergency system overcurrent protective devices shall not be required to be selectively coordinated with other supply side, normal system overcurrent protective devices.</u>

<u>**(B) Emergency System.**</u> Emergency system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices <u>unless one of the following conditions in (1) through (5) are met.</u>

(1) <u>Transformer Overcurrent Protective Devices.</u> Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.

<u>(2) Overcurrent Protective Devices of the Same Size.</u> Between overcurrent protective devices of the same size (ampere rating) installed in series.

<u>(3) Expansion of an Existing Emergency System - Existing Overcurrent Protective Devices. Between existing emergency system overcurrent protective devices and any existing supply side overcurrent protective devices, where the emergency system is expanded.</u>

<u>(4) Expansion of an Existing Emergency System - New Overcurrent Protective Devices. Between new emergency system overcurrent protective devices and any existing supply side overcurrent protective devices, where the emergency system is expanded.</u>

<u>(5) Designed Under Engineering Supervision. Where a licensed professional engineer, engaged primarily in the design of electrical installations, provides stamped documentation showing the specific circuit that cannot be selectively coordinated, and substantiation of the design alternatives that were analyzed in the failed attempt to achieve selective coordination. This documentation shall be available to those authorized to design, install, inspect, maintain, and operate the system.</u>

FPN: These are several techniques that help to selectively coordinate an electrical distribution
system
(a) Where transfer switches are utilized, utilizing several smaller transfer switches rather than one larger transfer switch, and moving the transfer switches down in the system, closer to the loads.
(b) Utilizing short-time delay
(c) Utilizing devices with an adjustable instantaneous trip
(d) Utilizing smaller downstream devices
(e) Utilizing several smaller downstream devices rather than one larger downstream device
(f) Utilizing upstream devices with larger frame sizes
(g) Utilizing fuse manufacturers' ratio charts
(h) Utilizing circuit breaker manufacturers' selective coordination charts
(i) Utilizing differential relays
(j) Utilizing isolation transformers
(k) Minimizing the number of levels in a distribution system
(l) Utilizing a greater number of smaller feeders, rather than a smaller number of larger feeders
(m) Utilizing impedance grounded systems
(n) Utilizing high-instantaneous trip circuit breakers

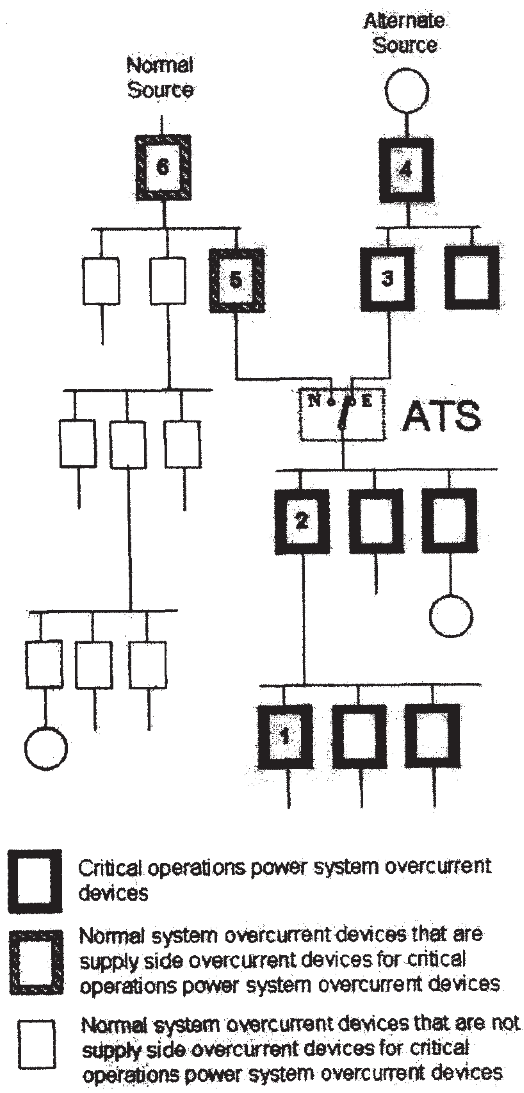

Figure 700.27 Clarification of Selective Coordination Requirements

Substantiation: This proposal is an attempt to clarify the confusion concerning selective coordination requirements.

(1) Figure 700.27 has been added to clarify which devices are emergency side devices, and which are normal side devices. This figure should be included in the NEC® text. Figure 700.27 was based upon a figure from an necdigest® article, Keep The Power On For Vital Loads, by Evangelos Stoyas, December 2007
Copyright© 2007, National Fire Protection Association, Quincy, MA.

(2)"(A) Normal System" was added because there have been questions about the need for selective coordination of the overcurrent devices on the normal side, on the line side of the transfer switch. Since Devices 5 and 6 are not really part of the emergency system, 700.27 does not apply, and therefore 5 and 6 dc not need to selectively coordinate with each other.

(3)"(B) (1)" and "(B)(2)" are taken from existing text. No changes made

(4) "(B)(3)" was added because there have been questions about the need for existing devices to selectively coordinate when an emergency system is expanded or modified. This proposal clarifies that existing devices do not have to be replaced if they do not already selectively coordinate.

(5) "(B)(4)" was added because there have been questions about the need for new devices to selectively coordinate with existing devices when an emergency system is expanded or remodeled. This clearly states that new devices do not have to selectively coordinate with the existing devices.

(6) "(B)(5)" was added for those few cases where selective coordination is simply not possible. It is not meant to be a "blank check" to allow designers to avoid their responsibility to provide a selectively coordinated system. The requirements are very similar to those found in 240.86 and are meant to ensure that all reasonable attempts have been made to achieve the objective. Once all attempts have been exhausted, the engineer simply documents the circuit in question and shows the techniques that were attempted.

(7) The FPN was added to provide some of the common methods that experienced engineers utilize to obtain selective coordination. It is not all-inclusive, and has been carefully worded so as not to include any requirements.

Panel Meeting Action: Reject

Panel Statement: The proposal for "(A) Normal System" covers devices in the normal source that are outside the scope of Article 700. While the concept is correct, the additional text is unnecessary. The proposed figure is also unnecessary.

While the concepts in (B), (B)(1), and (B)(2) are basically unchanged from the 2008 NEC, the change is not needed because all other portions of this proposal are also rejected.

(B)(3) is rejected because 700.27 is not retroactive for existing systems.

(B)(4) is rejected because no technical substantiation was provided to justify the reduced continuity of service that would result from the elimination of the requirement of new devices to selectively coordinate with upstream existing devices.

(B)(5) is rejected because no technical justification was provided as to why selective coordination cannot be achieved in all situations. In addition, no information was provided as to which or how many design alternatives the consulting engineer needs to analyze and submit in the required documentation.

The FPN is rejected because technical substantiation was not provided for any of the 14 listed techniques.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

Comment on Affirmative:

DEGNAN, J.: I agree with rejection of this proposal, however the panel's statements regarding (B)(3) and (B)(4) are contradictory, with (B)(3) being the correct response. When it comes to existing systems the best available NEC reference is Annex G 80.9 (B).

13-198 Log #4342 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: Dan Giblin, National Electric Fuse Assn. (NEFA)

Recommendation: Revise text as follows:

700.27 Coordination.

(Keep present text and add the following at the end)

Selective coordination is required for the full range of overcurrents up to the highest available short-circuit current available at the lineside of each overcurrent protective device. The consideration shall include evaluation for the available short-circuit current from the normal supply and alternate supply as well as the transfer switch type.

Substantiation: The purpose of this addition is to clarify that selective coordination is for the full range of available overcurrents. Some people in the industry have contended that the present requirement is not clear on the range of overcurrent that must be considered. When 700.27 was voted as a requirement during the 2005 NEC cycle and then reaffirmed during the 2008 cycle, Code Making Panel 13 substantiated that this requirement is for the full range of overcurrents. For instance, Comment 20-13 in part "…*Selective coordination increases the reliability of the emergency system. The current wording of the NEC® is adequate.* ***The instantaneous portion of the time-current curve is no less important than the long time portion.***"
The available short-circuit current must be considered for the worst case from the normal source, alternate source, or both for a closed transition transfer switch. If a fault occurs on an emergency load being supplied by the normal source and both the emergency branch circuit overcurrent protective device and emergency feeder overcurrent protective device open, then when the power is transferred to the alternate source, loads supplied by the affected feeder will unnecessarily be interrupted.

There is no simple alternative to use other than for the full range of available short-circuit currents. Some in the industry are advocating changing the selective coordination requirement to only times greater than 0.1 second. The paragraphs below illustrate why this is not viable.

Permitting the selective coordination requirement to be for times only greater than 0.1 second will allow non-coordinated operation of multiple levels of overcurrent protective devices (cascading) under short-circuit current (fault) conditions, which reduces the reliability of the system to deliver power to vital loads. Requiring selective coordination for times only greater than 0.1 second provides coordination for only overloads and does not provide assurance that typical ground faults and arcing faults will not cascade multiple levels of overcurrent protective devices, thereby unnecessarily losing power to critical loads. While both overloads and short-circuits occur on branch circuits, the predominance of overcurrent interruptions on feeder and service circuits are short-circuits (of all types). Graphs A and B depict the time-current curves of the same 30A, 200A, and 800A system. Graph A shows the portion of the circuit breaker time-current curves that would be analyzed for selective coordination for times only down to 0.1 seconds. Graph B depicts the circuit breaker curves showing the crossover of the circuit breakers in their instantaneous trip region. The cross over is a lack of selective coordination for overcurrents at that level and greater. Graph B shows a lack of coordination between the 30A and 200A circuit breakers for ground, arcing, and any combination of phase faults as low as 800A. Any type of fault as low as 2200A can take out the 800A circuit breaker as well. These are low available fault currents, easily achieved in almost every essential electrical system via a line-ground fault, line-line fault or three phase fault.

All circuit breakers with an instantaneous trip will open in less than 0.1 seconds when fault current is above the instantaneous trip setting. Requiring selective coordination for times only greater than 0.1 second will permit the design of vital electrical systems without regard to proper engineering attention being given to the instantaneous trip region.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The existing text of 700.27 already requires selective coordination for the full range of overcurrents, from overloads through the available short-circuit current, with all upstream devices. Specific additional text is not necessary. Substantiation was not provided for the reference to the transfer switch type.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

DEGNAN, J.: I agree with rejection of the proposal, however with regard to the panel's statement, the present text of 700.27 only requires what is says and no more. The proposal ignores the increasing arc flash hazard created by cascaded delays of selectively coordinated overcurrent protective devices and the associated potential of injuring electricians that work on energized systems.

MOUTON, C.: I'm voting in the affirmative for the panel action, but would like to make the following comments regarding the proposal, which need to be added into the panel statement in whole or in part, to correctly address incorrect statements made in the proposal substantiation by the submitter. These incorrect statements have been used by the panel in another panel statement that improperly distributes this misinformation to the public. The 0.1 second limit discussed by some in the industry will not as indicated provide coordination for only "overloads". The 0.1 second portion of some protective device curves constitute a very small percentage of the operating range of these devices and typically includes operation at currents approximately 10x the normal overload trip setting for most devices. Faults that are not overloads, minor phase-to-phase faults, and minor ground faults will be cleared by protective devices and will typically coordinate for large current values in the time zone greater than 0.1 second. Coordination at operating times less than 0.1 second may not be achievable always when balancing equipment protection and maximum service continuity, as indicated in IEEE 242 (See my comments for Proposal 13-194). Optimization of protective device coordination has been the practice for decades where qualified persons made practical judgements about protective device coordination design. For example, in the Graph B, provided as a supporting document for the proposal, an 800A breaker is shown to have a portion of its operating range that does not coordinate with the downstream devices. This is an exaggeration since this device would typically have a definite time delay on the short time (instantaneous) portion of the curve, to allow it to coordinate with the downstream devices. Of course, this coordination technique will come at the price of a longer operating time for the larger upstream breaker, which will increase the arc flash energy to a fault cleared by this breaker. It is important to note that these incorrect statements come from the same segment of the protective device industry that has seen a windfall in the preference for their products by the 100% coordination currently required in the NEC language that has been selected for Articles 700.27, 701.18, and 708.54.

13-199 Log #4379 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: Alan Manche, Square D Company/Schneider Electric

Recommendation: Add a new sentence to the end of the main paragraph of 700.27:

Emergency system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices. <u>A means to intentionally defeat selectivity shall not be permitted.</u>

Substantiation: Although no data was presented during the 2005 or the 2008 NEC to support the requirement for selective coordination, the panel clearly acted to include the requirement for life safety reasons. Establishing selectively coordinated systems can increase the arc-flash hazard when maintenance is performed on the system depending upon the design of the system. The concern of increased arc-flash hazard was presented to the panel in past cycles and the panel accepted those risks in favor of the benefit of selectivity on these systems. Some system designers are now including a means to defeat selectivity by installing systems that can turn the selectivity off by temporarily changing breaker settings via a switch or sensor in order to protect the electrical worker. There is no prohibition established in the NEC to restrict defeating selectivity, or the life safety aspect for which it was installed, in order to protect the electrical worker.

Unfortunately the enhanced protection for the electrical worker can be a trade-off by defeating the life safety function of the selectively coordinated system in the emergency system. The most likely time for an incident to happen that would require the system to be selective is when a working is doing maintenance on the system. If the selectivity is defeated, an arc event small or large could initiate a fire hazard or take down lighting, ventilation, or emergency circuits in a hospital leaving a system inoperable which places the life safety of others in a dangerous position.

There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety.

Panel Meeting Action: Reject

Panel Statement: The panel supports the use of energy reduction means for the protection of personnel during periods of maintenance of energized equipment. Use of these types of devices should be left to the discretion of the facility operator. The panel recognizes that the selective coordination is not available in the system at the time the energy reduction means is operational.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Abstain: 1

Explanation of Abstention:

DEGNAN, J.: I abstain because the preferred approach is to minimize the arc flash hazard as part of the design, and not as a halfway developed afterthought. By supporting the means for an energy reduction switch the panel acknowledges that selective coordination increases the arc flash hazard. The panel is encouraged to extend its attention to the arc flash hazard in developing a more complete statement in its response to proposal 13-195.

The panel should direct additional attention to the safety implications of their statement in this proposal prior to continuing endorsement of the means to limit energy. There are well documented industry standards for locking out and tagging out electrical systems to assure electrician safety during maintenance. Nothing in the panel's statement identifies if their endorsement includes requirements for lockout and tag out of this device. To endorse an energy limiting device without requiring it to have lock-out tag-out provisions will compromise electrician safety. There is no discussion as to what level of arc flash labeling is necessary per 110.16, is it with the device on or off? Use of this devices requires an integrated system protection concept and should have labeling similar to what is in use on series rated systems, although there really should be code requirements for labeling to address and maintain the integrity of all components in a selectively coordinated system.

There is also several question of logic and the need for substantiating varying degrees of protection. If selective coordination is important enough to mandate(which field experience indicates that it is not) why would it be okay to turn it off in a facility that operates 24/7? Why does it make sense to turn the integrity of a selectively coordinated system over to a building operator for an undefined period of time and use, but not to an engineer during design? Should the panel note that "The instantaneous portion of the time current curve is no less important than the long time portion, unless a facility operator chooses to turn it off."?

This proposal raises significant questions and issues regarding the application of selective coordination, all of which can be answered by accepting proposal 13-195. and then rejecting this proposal because of the lack of answers to the identified safety issues. Trying to add a number of safety provisions in the code to address the shortcomings of selective coordination would add additional cost and expense on top of a code provision that can already require a substantial investment with no record of a reasonable expectation that the investment is needed to protect life and safety. See my proposal 13-195, which provides a much more reasonable approach to selective coordination and protecting the welfare of electricians, while at the same time setting an appropriate level of protection for emergency systems.

13-200 Log #4479 NEC-P13 **Final Action: Reject**
(700.27)

Submitter: Darrel Miller, LSW Engineers Arizona, Inc.
Recommendation: Revise text to read as follows:

700.27 Coordination. Emergency system(s) overcurrent devices shall be ~~selectively~~ coordinated with ~~all~~ supply side overcurrent protective devices. Selectivity shall meet the requirements of (A), (B), or (C).

(A) Selectivity shall be established, in the form of an engineering study, by a licensed professional engineer engaged regularly in the design or maintenance of coordinated electrical systems. The study shall be stamped by a licensed professional engineer and at a minimum include overcurrent device settings, supporting documentation, and a summary of limitations. This study shall be available to those authorized to design, install, inspect, maintain, and operate the system.

(B) Selectivity shall be established under engineering supervision by use of the selected overcurrent device manufactures tables and charts derived from tested combinations of devices. Applicability for each table and chart utilized shall be rigidly adhered to. All tables and charts shall be from the same manufacturer as the installed overcurrent devices.

(C) Selectivity shall be established under engineering supervision in existing installations. The engineer shall determine the extent of selectivity achievable based on review of the existing conditions. Use of methods (A), (B), or combination of each shall be permitted. A summary of limitations and recommendations shall be stamped by a licensed professional engineer and submitted to the authority having jurisdiction prior to the start of construction. Once accepted, the recommendations will establish the extent of retrofit required.

Exception: Selective coordination shall not be required in the following:

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exist on the transformer secondary.

(2) Between overcurrent protective devices or set of overcurrent protective devices ~~of the same ampere rating in series.~~ in series on opposite ends of the same feeder.

FPN: Overcurrent protective devices used for emergency circuit protection, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system. A similar increase in overall reliability can be experienced on the normal power system side.

Substantiation: Present text restricts the design professional from making appropriate judgments and technical decisions necessary to effectively coordinate the overcurrent protective devices. Historically, the design professional has had the responsibility of evaluating and selecting the appropriate equipment based on the individual project circumstances, refer to the ANSI/IEEE color series of recommended practice manuals. The modifications proposed loosen the prescriptive mandate which is creating compliance difficulties. It will also restore the design professionals' freedom to select the appropriate overcurrent devices for use within the emergency, legally required standby, and critical operations power systems. As you will see in the following discussions, coordination has never been expected to be 100% selective. There are often circumstances that are just "best case" even in the most highly coordinated systems. The ANSI/IEEE repeatedly uses language which conveys this understanding.

Many jurisdictions have considered and adopted codification of a 0.1 second fault duration time to establish a reasonable coordination point. In fact, until published Time-Current Curves (TCC's) are available from the majority of manufactures starting at a time line less than the 1st half cycle, 0.0083 seconds, this approach would provide a design basis that is universally workable. We understand the argument that this is an arbitrary point at which to start coordination. Accordingly, we have taken a different approach. The text presented was modeled after NEC 240.86. This article establishes a method for the design professional to make judgment for existing systems. We have provide options in stead of a one size fits all mentality, which is know to have issues; as evidenced by the large number of proposals surrounding this issue. The real concern is with the existing NEC text. It puts the engineer in a position that is contrary to other equally important recommended practices, of which we are also held accountable. The professional engineer does want to follow and is concerned with compliance with all applicable codes. In Arizona, as with other states, Rules of Professional Conduct have been established for the professional registrant. He/she is charged with protecting the public safety, much like the inspections departments are. By the nature of granting a license to practice engineering, the grantor (State) is agreeing that the professional registrant is competent to make such decisions.

In the proposed change, the issue of existing conditions and implementation has been addressed.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: Proposed (B) contains unenforceable language, such as "rigidly adhered to" and "selectively shall be established." The text in (C) is outside the normal application of the NEC since the authority having jurisdiction, the municipality, and the licensing board for engineers have control over the issues covered within this proposed text, such as what is necessary to be done before the start of construction. The designer, engineer, AHJ, electrical contractor, and owner may often be involved in the decisions related to selective coordination. The submitter states in his substantiation that the professional engineer has the mandate to select the appropriate overcurrent device and thus would be the sole decision-maker on the selective coordination. Again, this procedure is under the jurisdiction of the AHJ, the municipality, and the licensing board. The recommended FPN does not provide any additional information and is unnecessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 2

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

DEGNAN, J.: See my comment on proposal 13-195. While I agree with the panel's statement regarding (B) and (C), the panel did not directly address part (A) of the proposal. The submitter has presented detailed information citing standards and supporting data that substantiate acceptance of part (A) and that have not been refuted by the panel. The panel has accepted part of this proposal in its action on proposal 13-203. See my comment on 13-194 which is similar in intent to this proposal, and and my proposal 13-195.

13-201 Log #3718 NEC-P13 **Final Action: Reject**
(700.27, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add a fine print note to read as follows:

FPN: Selective coordination includes coordination between standard overcurrent devices and ground fault devices.

Substantiation: Fault and over current conditions may result from a variety of conditions that range from the rare and difficult to achieve bolted three phase fault to the more probable arcing single phase ground fault. Nevertheless it is a common oversight to consider phase protection selectivity and ground fault protection selectivity separately. A phase protective device considers all current over threshold to be an overload whereas ground fault devices are able to separate a ground current from other current. Because of this, in the case of the more probable ground faults, both devices may operate simultaneously or with either device ahead of the other if ground fault selectivity between the two devices is not planned. Hence, a well-coordinated system must consider ground fault protection and standard phase overcurrent protection simultaneously.

Panel Meeting Action: Reject

Panel Statement: Automatic opening of overcurrent protective devices under a ground-fault condition is not required by Article 700.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

CZARNECKI, N.: The proposal should be accepted. The panel action and statement does not address the concerns expressed in this proposal. The requirements in 700.26 do not prohibit the installation of ground fault protection of equipment for emergency systems. Selective coordination for phase to ground, phase to phase, and three phase short circuits is insufficient where ground fault protection of equipment is installed. The ground fault protective device used for equipment protection must be included for a selectively coordinated system.

13-202 Log #1162 NEC-P13 **Final Action: Accept in Principle**
(700.27 Exception)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Proposed change deletes Exceptions 1 & 2 and replaces them as shown below:

~~Exception: Selective coordination shall not be required in (1) or (2):~~

~~(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exist(s) on the transformer secondary, or~~

~~(2) Between overcurrent protective devices of the same size (ampere rating) in series.~~

Exception: Selective coordination shall not be required between two overcurrent devices in series with one another when no loads are connected in parallel with the downstream device.

Substantiation: The intent of selective coordination is to have only the overcurrent device closest to the fault (first upstream device) to open to clear that fault. This prevents unnecessary outages to other loads on the electrical systems.

The exceptions were added as 2 specific examples where no additional loads are affected if a second upstream device also opens.

The intent of this proposal is to clarify that so long as no additional loads are affected by the opening of the second upstream device, selective coordination offers no additional benefit, and should not be required.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

Exception: Selective coordination shall not be required between two overcurrent devices located in series ~~with one another~~ ~~when~~ if ~~where~~ no loads are connected in parallel with the downstream device.

Panel Statement: The changes are editorial to improve clarity and not intended as technical changes.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
DEGNAN, J.: The proposed language simplifies the code by using fewer words, and therefore is an improvement. However, this exception, and the two exceptions added in 2008, can be determined to be redundant to the definition of “Coordination, (Selective)” in Article 100.

13-203 Log #4678 NEC-P13 **Final Action: Reject**
(700.27 Exception No. 2 and FPN (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be reported as “Reject” because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee
Recommendation: Designate the existing exception as Exception No. 1 and add a second exception and fine print note to read as follows:
Exception No. 2: Where the emergency system design is under the control of a licensed professional engineer engaged in the design or maintenance of electrical installations, the selection of overcurrent protective devices shall be permitted to coordinate to the extent practicable. The design shall be documented, stamped by the professional engineer, and made available for review by the authority having jurisdiction.
FPN: Overcurrent protective devices used for emergency circuit protection, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system.
Substantiation: The current NEC rule is being improperly used to drive the market share of a particular species of overcurrent protective device, often frustrating legitimate design objectives of the engineering community, and without any documented loss experience to justify such a consequence. We have received compelling testimony from engineers that have been subjected to extraordinary hardship resulting from the lack of flexibility in the current NEC provisions. This proposal is consistent with NFPA 110 (which language underlies the fine print note) and provides the necessary flexibility to allow competent engineering work that maintains selective coordination as an important element in the electrical design process, but not to the exclusion of all other issues.
Panel Meeting Action: Accept in Principle in Part
Revise Section 700.27 to read:
700.27 Coordination. Emergency system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices. The selectively coordinated devices shall be selected by a licensed professional engineer engaged primarily in the design or maintenance of electrical installations. The selection shall be documented and stamped by the professional engineer. This documentation shall be available to those authorized to design, install, inspect, maintain, and operate the system.
Panel Statement: The panel action rejects the wording “where practicable” as this is not defined and subjective. The recommendation on the qualifications for those who design the system has been revised to use the text from 240.86 as this provides a more definitive description of those who can design these systems.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 9 Negative: 5
Explanation of Negative:
CZARNECKI, N.: The Panel should revisit this Proposal and evaluate the merits of wording in an Exception versus a Main Rule.
DEGNAN, J.: The panel has completely changed the intent of the submitter by deletion of “where practicable”. If the panel wishes to assure appropriate engineering judgement the panel should consider proposal 13-194. All of the data engineers use, whether its tables or TCCs, comes from manufacturers, and much of it is developed without a common standard. Engineers must rely on this information, and often write performance based criteria for manufacturers to follow. For government projects, that are competitively bid, this requirement could force coordination studies to be done three or four times, with the engineer basing a design on one manufacturer, other manufacturers or contractors doing it during bidding, and then again by the design engineer during construction to meet the code requirement with the actual product selected. In reality, compliance is determined by the manufacturer of the overcurrent protective devices.
It may also necessitate engineers doing designs twice, once before bidding and again after bidding, or deprive owners of competitive bids.
LITTLE, L.: We agree with the negative comment as written by Mr. Ode.
MOUTON, C.: I’m voting against the panel action. The panel action should have been to reject the proposal, even though it does have some merit, and the submitter properly characterizes the current environment in the industry resulting from the current selective device coordination language in Articles 700.27, 701.18, and 708.54. The proposal should have been rejected in preference of Proposal 13-194, which should have been accepted in principle in part (see my comments to Proposal 13-194). The proposal properly indicates that selective device coordination should be an optimization. The panels indifference to the wording “extent practicable” could have been easily dealt with in a manner similar to that proposed in Proposal 13-194, and spoken about in the NFPA 110 and IEEE 242 (the Buff Book), the IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems. The language that was accepted in principle in part by the panel action only adds additional bureaucracy in the process and does not adds any technical value to selective device coordination, since a 100% selectively coordinated system continues to be required. For many of the methods to achieve 100% coordination, a professional engineer is not needed, since it is an application of manufacturers data based on their testing of the devices. As stated in IEEE 242 on page 607 in Section 15.7.1, “complete selective coordination may not be achieved in all systems”. The original intent of the submitter’s proposal was completely stripped from the proposal by the panel action. Referencing the text used in 240.86 is inappropriate. The code requirements in 240.86 are technically more challenging to substantiate and provide sufficient documentation. Additionally, in public installations, most state electrical codes already require oversight of new installations by a licensed professional engineer to validate the engineering work for a facility. Restating this in the NEC is not required, unless it is for a specific and unique purpose, such as Article 240.86.
ODE, M.: The substantiation in the proposal and the panel statement for the Panel Action provided absolutely no technical substantiation to require selectively coordinated device installation design in an emergency, a legally required standby system, or a critical operations power system to be selected, documented, and stamped by a licensed professional engineer. The requirement for a licensed professional engineer to design and stamp drawings for these systems is overly restrictive, adds unnecessary cost to the installation, and negates a very viable resource in the use of manufacturers who provide this service on a regular basis. The owner, the electrical equipment manufacturer, the plant engineer, the electrical contractor, the AHJ, the utility company, as well as the design engineer are often involved in determining the requirements for initial design of new systems and to the extent that older systems must comply with selective coordination. In addition, 90.1(C) of the National Electrical Code states that the NEC is not intended as a design specification and, yet, the proposed text requiring a licensed professional engineer adds design requirements into the selective coordination process.
Comment on Affirmative:
CARON, D.: Although I agree with the panel action to accept this proposal, the submitters intent has been lost in the Panel’s rewrite. Also, the panel statement indicates “The panel action rejects the wording “where practicable” as this is not defined and subjective”. Yet, in Proposal 13-151, this same panel defends the word “practicable” stating “’Where practicable” leaves the decision up to the authority having jurisdiction...”. The word “practicable” appears in the National Electrical Code in no less than 70 other instances. See also my comments to Proposal 13-195.

ARTICLE 701 — LEGALLY REQUIRED STANDBY SYSTEMS

13-204 Log #2322 NEC-P13 **Final Action: Reject**
(701)

Submitter: Dale Rooney, Municipality of Anchorage
Recommendation: Add ‘(Essential Safety)’ after the word ‘Standby’ in the title and throughout Article 701.
Substantiation: This change is a companion to a proposal for Article 700 and is intended to be the first step in a three cycle process (similar to the process used for Luminaires) which will more clearly identify the purpose for which the system is used. The extended process will allow related standards to adapt their language.
Panel Meeting Action: Reject
Panel Statement: Article titles and scope statements are the jurisdiction of the NEC Technical Correlating Committee. Panel 13 can only make recommendations to the TCC on proposed revisions. Panel 13 recommends rejecting the proposed action because adding “essential safety” does not add any more meaning than the present title. See the panel action and statement on Proposal 13-137.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-205 Log #3030 NEC-P13 **Final Action: Reject**
(701)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
ARTICLE 701 Legally Required Standby Systems
I. General
701.1 Scope. Text to remain unchanged.
701.2 Definition. Text to remain unchanged.
701.3 Application of Other Articles. Text to remain unchanged.
701.4 Equipment Approval. Text to remain unchanged.
701.5 Tests and Maintenance ~~for Legally Required Standby Systems.~~ Text to remain unchanged.
701.6 Capacity and Rating. Text to remain unchanged.
701.7 Transfer Equipment. Text to remain unchanged.
701.8 Signals. Text to remain unchanged.
701.9 Signs.
(A) Text to remain unchanged.
Exception: A sign shall not be required for individual unit equipment as specified in 701.12(G) ~~701.11(G)~~.
(B) Grounding. Where the grounded circuit conductor connected to the legally required standby power source is connected to a grounding electrode conductor at a location remote from the legally required standby power source, there shall be a sign at the grounding location that shall identify all legally required standby power and normal sources connected at that location.
II. Circuit Wiring
~~701.10~~ 701.11 Wiring Legally Required Standby Systems. Text to remain unchanged.
III. Sources of Power
701.12 General Requirements.~~701.11 Legally Required Standby Systems.~~ Current supply shall be such that, in the event of failure of the normal supply to, or within, the building or group of buildings concerned, legally required standby power will be available within the time required for the application but not to exceed 60 seconds. The supply system for legally required standby purposes, in addition to the normal services to the building, shall be permitted to comprise one or more of the types of systems described in ~~701.11~~ 701.12(A) through (F). Unit equipment in accordance with ~~701.11~~ 701.12(G) shall satisfy the applicable requirements of this article.
In selecting a legally required standby source of power, consideration shall be given to the type of service to be rendered, whether of short-time duration or long duration.
Consideration shall be given to the location or design, or both, of all equipment to minimize the hazards that might cause complete failure due to floods, fires, icing, and vandalism.
FPN: Assignment of degree of reliability of the recognized legally required standby supply system depends on the careful evaluation of the variables at each particular installation.
(A) Storage Battery. Text to remain unchanged.
(B) Generator Set. Text to remain unchanged.
(C) Uninterruptible Power Supplies. Uninterruptible power supplies used to provide power for legally required standby systems shall comply with the applicable provisions of ~~701.11~~ 701.12(A) and (B).
(D) Separate Service. Text to remain unchanged.
(E) Connection Ahead of Service Disconnecting Means. Text to remain unchanged.
(F) Fuel Cell System. Text to remain unchanged.
(G) Unit Equipment. Text to remain unchanged.
IV. Overcurrent Protection
701.25 ~~701.15~~ Accessibility. Text to remain unchanged.
701.26 ~~701.17~~ Ground-Fault Protection of Equipment. Text to remain unchanged.
701.27 ~~701.18~~ Coordination. Text to remain unchanged.
Substantiation: This proposal is part of a series of proposals intended to create a parallel numbering system for Articles 700, 701 and 702.
Panel Meeting Action: Reject
Panel Statement: The proposed parallel numbering system for Articles 700, 701, and 702 is unnecessary since the articles are not large and complex articles. While there are some common titles and text, there are also titles and text that are different from one article to another. Code Making Panel 13 recommends rejection of the renumbering of Article 701.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-206 Log #2812 NEC-P13 **Final Action: Accept**
(701.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~701.3 Application of Other Articles.~~
~~Except as modified by this article, all applicable articles of this Code shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 701.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-207 Log #3626 NEC-P13 **Final Action: Reject**
(701.3)

Submitter: David A. Williams, Delta Township
Recommendation: Revise text to read as follows:
701.3 Application of Other ~~Articles~~ Requirements.
Except as modified by this article, all applicable articles of this Code shall apply. Legally required standby systems shall be installed in accordance with this Code and NFPA 110 and NFPA 111.
Substantiation: The provisions of NFPA 110 and 111 are very important to the installations of emergency systems and these requirements should be referenced in the NEC. The International Building and Fire Codes have similar wording in Section 2702. Electrical installers need to be aware of these requirements.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-143.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-208 Log #4292 NEC-P13 **Final Action: Accept**
(701.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~701.3 Application of Other Articles.~~
~~Except as modified by this article, all applicable articles of this Code shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 701.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-209 Log #188 NEC-P13 **Final Action: Accept**
(701.4)

Submitter: Bryan P. Holland, City of North Port
Recommendation: Delete the following text:
~~701.4 Equipment Approval. All equipment shall be approved for the intended use.~~
Substantiation: This section is redundant and unnecessary. Sections 90.7, 110.2, and 110.3 already contain this provision. There is no special listing, labeling, or marking which identifies equipment as suitable for this type of system, thus, no special evaluation beyond 90.7, 110.2 and 110.3 is needed.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-210 Log #1407 NEC-P13 **Final Action: Reject**
(701.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first paragraph as follows: A legally required standby system shall have ~~adequate capacity and~~ rating(s) not less than required for the supply of all equipment intended to be operated simultaneously. ~~at one time.~~ Legally required standby systems shall be ~~suitable~~ identified for the maximum available fault current at its terminals.
(1) Where the alternate means has ~~adequate capacity~~ ratings not less than required to ~~handle~~ supply all ~~connected~~ calculated loads
(2) Where automatic selective load pickup and load shedding is provided that will ensure ~~adequate~~ continuous power to the legally required standby system circuits.
Substantiation: Edit. "Adequate" and "suitable" are subjective and terms to be avoided per the Style Manual. "Connected" loads are not identified. The provision should apply to calculated loads whether or not actually connected equipment.
Panel Meeting Action: Reject
Panel Statement: The panel rejects all of the proposed editorial revisions. While the NEC style manual may list terms to be avoided, it is not a prohibition of those terms. The context of this section is clear and the suggested revisions do not improve clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-211 Log #3029 NEC-P13 **Final Action: Reject**
(701.6)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
701.6 Capacity ~~and Rating.~~
A legally required standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. ~~Legally required standby system equipment shall be suitable for the maximum available fault current at its terminals.~~
Remainder of text to be unchanged.
Substantiation: This requirement is already found in 110.9/110.10, and a similar requirement is not found in 700.5. For the purposes of consistency, if nothing else, this sentence should be removed.
Alternatively, it could be added into 700.5. A similar proposal is being made to 702.5 for correlation.
Panel Meeting Action: Reject
Panel Statement: No substantiation has been provided for removing "and Rating" from the title. For purposes of consistency, the second sentence should not be removed, as 700.5 contains the same language.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-212 Log #2902 NEC-P13 **Final Action: Accept**
(701.7)

Submitter: Wendell Whistler, Whistler Consulting & Technical Services
Recommendation: Add new text to read as follows:
701.7 Transfer Equipment.
(A) General. Transfer equipment, including automatic transfer switches, shall be automatic and identified for standby use and approved by the authority having jurisdiction. Transfer equipment shall be designed and installed to prevent the inadvertent interconnection of normal and alternate sources of supply in any operation of the transfer equipment. Transfer equipment and electric power production systems installed to permit operation in parallel with the normal source shall meet the requirements of Article 705.
(B) Bypass Isolation Switches. Means to bypass and isolate the transfer switch equipment shall be permitted. Where bypass isolation switches are used, inadvertent parallel operation shall be avoided.
(C) Automatic Transfer Switches. Automatic transfer switches shall be electrically operated and mechanically held. Automatic transfer switches, rated 600 VAC and below, shall be listed for ~~legally required standby system~~ emergency use.
Substantiation: UL white book references emergency use transfer switch, however, the legally required standby system refers you back to emergency use.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-213 Log #1406 NEC-P13 **Final Action: Reject**
(701.7(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "inadvertent" in (A).
Revise last sentence of (B) as follows: Where bypass operation switches or circuit breakers are used ~~inadvertent~~ parallel operation in the closed position shall be ~~avoided~~ prevented by approved identified means.
Substantiation: Edit. (A) should apply whether or not interconnection is "inadvertent". (B) should include circuit breakers, and parallel operation should be prevented.
Panel Meeting Action: Reject
Panel Statement: Legally required standby power sources can be connected to the utility company power grid as interconnected electric power production sources in accordance with Article 705. The word "inadvertent" emphasizes that the power source must not be inadvertently connected in a parallel with the normal source unless the system is designed as an interconnected electric power production source.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-214 Log #2923 NEC-P13 **Final Action: Reject**
(701.8)

Submitter: Merv Lapp, Hillsboro, OR
Recommendation: Revise text to read as follows:
701.8 Signals.
Audible and visual signal devices shall be provided, ~~where practicable~~, for the purpose described in 701.8(A), (B), and (C).
Substantiation: This wording is not enforceable. All new installations can be purchased with the needed contacts to provide the signal.
NOTE: Related section NEC 700.7.
Panel Meeting Action: Reject
Panel Statement: There may be older equipment still in operation without the necessary contacts for this functions; therefore, "where practicable" must remain.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-215 Log #2925 NEC-P13 **Final Action: Reject**
(701.8)

Submitter: Merv Lapp, Hillsboro, OR
Recommendation: Revise text to read as follows:
701.8 Signals.
Audible and visual signal devices shall be provided, where practicable, for the purpose described in 701.8(A), (B), and ~~(C)~~ (D).
(D) Generator Trouble. To provide a generator trouble signal to the Fire Alarm Panel.
Substantiation: This addition will permit the generator to be supervised 24/7 the same as the rest of the Fire Alarm Life Safety equipment. The existing generator remote annunciator is normally located in the Fire Command Room that is not manned 24/7. A problem may exist for several days, stopping the generator from functioning, which could jeopardize the lives of the building occupants.
NOTE: Related section NEC 700.7.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-152.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-216 Log #2924 NEC-P13 **Final Action: Reject**
(701.8(A))

Submitter: Merv Lapp, Hillsboro, OR
Recommendation: Revise text to read as follows:
701.8 Signals.
Audible and visual signal devices shall be provided, where practicable, for the purpose described in 701.8(A), (B), and (C).
(A) Derangement. To indicate derangement of the standby source.
(1) Generator main circuit breaker to be alarmed in the off position (Not-in-Auto).
Substantiation: Clarification of the derangement signal: The generator engine control can be in the auto position, indicating it is in the ready state, when the main circuit breaker is in the open, or off, position. In this mode you do not have an emergency generator available to power the Life Safety Systems; Egress Lighting, Fire Pumps, Pressurization fans.
NOTE: Related section NEC 700.7(A).
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-153.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-217 Log #1405 NEC-P13 **Final Action: Reject**
(701.8(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Substitute “supplying” for “carrying”.
Substantiation: Edit.
Panel Meeting Action: Reject
Panel Statement: “Edit” is not sufficient substantiation and does not explain the need for this change.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-218 Log #2813 NEC-P13 **Final Action: Accept**
(701.8(D))

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Add new 701.8(D) as follows:
701.8(D) Ground Fault. To indicate a ground fault in solidly grounded wye legally required standby systems of more than 150 volts to ground and circuit-protective devices rated 1000 amperes or more. The sensor for the ground-fault signal devices shall be located at, or ahead of, the main system disconnecting means for the legally required standby source, and the maximum setting of the signal devices shall be for a ground-fault current of 1200 amperes, Instructions on the course of action to be taken in event of indicated ground fault shall be located at or near the sensor location.
FPN: For signals for generator sets, see NFPA 110-2005, Standard for Emergency and Standby Power Systems.
Substantiation: Companion proposal has been submitted to section 701.17 to require ground-fault indication for legally required standby systems. For general applications, ground fault protection of equipment is required for grounded wye feeders, 1,000 amperes or greater for nominal 480Y/277 volt systems. The basis for the general requirement in 215.10 is the unusually high number of burndowns reported on feeders in this voltage range. While the requirement to automatically disconnect the circuit has been relaxed in Article 700 for emergency systems, provisions for indication and potential actions are required for these emergency systems. Currently, Article 701 would allow a ground-fault to occur without shut down or even an indication.
Panel Meeting Action: Accept
Panel Statement: The panel understands that the existing fine print note is to be relocated to follow the recommended text.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-219 Log #3979 NEC-P13 **Final Action: Reject**
(701.9 (New))

Submitter: Michael A. Anthony, University of Michigan Business Operations
Recommendation: Add text to read as follows:
700.9 Illumination of Emergency Source Switchgear. The area around the service equipment and emergency switchgear in non-dwelling unit occupancies 200 amperes and above shall be automatically illuminated upon loss of power. For a period of 90 minutes illumination levels shall be 1-footcandle on the egress path from the switchgear and 3-footcandles on the vertical surfaces of the service equipment.
Substantiation: The need for illumination during power outages should be intuitive. It provides illumination for a) the electrician who is working in the service equipment area without a flashlight, b) for the maintenance mechanic who may neither be an electrician nor familiar with the electric service equipment to work on it in the dark.
Electric service panels are not always installed along either the primary or secondary egress path required by the Life Safety Code and CMP-1 should not leave it to other standards to assert this requirement.
Other NFPA documents have been examined and a short summary of this examination appears below. [Underline emphasis has been added]
NFPA 101
There is no provision for any emergency illumination other than egress illumination for occupant safety in Section 7.8 of NFPA 101-2009. Egress safety for the occupants of an electrical room is not specifically addressed. In some cases, the cause of a building outage originates in the electrical service switchgear area. In any case, it is likely that there will be activity to and from the electrical service equipment area during a power outage.
An excerpt from this standard is copied below for your convenience:
NFPA 110
An excerpt from this standard is copied below for your convenience:
7.3.1 The Level 1 or Level 2 EPS equipment location(s) shall be provided with battery-powered emergency lighting. This requirement shall not apply to units located outdoors in enclosures that do not include walk-in access.
7.3.2 The emergency lighting charging system and the normal service room lighting shall be supplied from the load side of the transfer switch.
7.3.3* The intensity of illumination in the separate building or room housing the EPS equipment for Level 1 shall be 32.3 lux (3.0 ft-candles), unless otherwise specified by a requirement recognized by the authority having jurisdiction.
Although this standard is seen four times in the NEC, all appearances are Fine Print Notes, and may be unenforceable at the local level, even if it is known to be applicable.
NFPA 70E
An excerpt is copied below for your convenience:
130.6 Other Precautions for Personnel Activities.
(B) Blind Reaching. Employees shall be instructed not to reach blindly into areas that might contain exposed energized electrical conductors or circuit parts where an electrical hazard exists.
(C) Illumination.
(1) General. Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely.
(2) Obstructed View of Work Area. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists…
Without this specific provision, emergency illumination “falls between the cracks” and remains a design option.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-154.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-220 Log #1404 NEC-P13 **Final Action: Reject**
(701.9(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise latter part: That shall identify all legally required standby system and ~~normal~~ other sources and their location(s) that are grounded ~~connected~~ at that location.
Substantiation: Edit. Location of the sources is an important consideration. There may be other sources than “normal” such as fire pump and emergency systems.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-155.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-221 Log #4679 NEC-P13 **Final Action: Reject**
(701.9(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows: “Where the removal of a main or system bonding jumper interrupts the continuity of the grounding connection to an alternate source grounded conductor, a permanent sign shall be installed on or at the equipment in which the bonding jumper is installed identifying all alternate sources having grounded conductors connected to ground through the main or system bonding jumper.”
Substantiation: With changes in grounding terminology, the intent of this section is being lost. Some think this is about a connection between a grounding electrode and a grounding electrode conductor, for example. This requirement resulted from an actual case where the emergency source was supplying power, and during that period maintenance personnel disconnected the normal source grounded conductor for testing purposes. The personnel did not realize that they were also disconnecting the grounding connection for the emergency source at the same time, since the grounded system conductor was only connected to the grounding electrode conductor in the main switchboard. This rewrite makes the intent very clear.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-156.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LITTLE, L.: This proposed revision clarifies the intent of this requirement and enhances usability. The proposed text is not more complex than the existing requirement. This revision provides clear, prescriptive text on where the required sign is to be located. It is the removal of a main or system bonding jumper that would interrupt the continuity of the grounding connection to an alternate source grounded conductor that this first level subdivision seeks to prevent.
The submitter is correct. The proposed revision makes the intent of this requirement very clear.

13-222 Log #736 NEC-P13 **Final Action: Reject**
(701.10)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text and a new Fine Print Note to read as follows:
701.10 Wiring, Legally Required Standby Systems.
The legally required standby system wiring shall be permitted to occupy the same raceways, cables, boxes, and cabinets with other general wiring.
All boxes and enclosures (including transfer switches, generators, and power panels) for legally required standby circuits shall not be permitted to be marked with the words "Emergency" or "Emergency Circuit" or "Emergency System", so that they will be readily distinguishable from those boxes and enclosures identified as a component of an emergency circuit or system, unless otherwise permitted in 700.9(B)(1) through 700.9(B)(5).
FPN: See 700.9(A) for identification of an emergency circuit or system.
Substantiation: Manufacturers of surface raceways, both metal (*NEC*® Article 386) and nonmetallic (*NEC*® Article 388), and of multi-outlet assemblies (*NEC*® Article 380) derived from surface raceways have had numerous inquiries from specifiers and installers for applications of surface raceways where used for Emergency Systems (*NEC*® Article 700) AND for either Legally Required Standby Systems (*NEC*® Article 701) or Optional Standby Systems (*NEC*® Article 702) AND for other general wiring (power, lighting, signaling) in the same installation. Despite the requirement of 900.9(B), these specifiers and installers are believed to be marking raceways with "EMERGENCY STANDBY", without distinction between "EMERGENCY" (*NEC*® Article 700 circuits) and "STANDBY" (*NEC*® Article 701 or Article 702 circuits), leading to confusion as to the identity of the circuit (*NEC*® Article 700 or Article 701 or Article 702) within the single-channel or multiple-channel surface raceway (or multi-outlet assembly) overall or within a specific channel of a multiple-channel surface raceway.
Editorial: Comma added in title, consistent with the similar title in Article 700.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-158.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-223 Log #1403 NEC-P13 **Final Action: Reject**
(701.11)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
(A) A storage battery shall ~~be suitable~~ have ratings not less than required to supply and maintain...". (remainder unchanged).
In (B)(4) insert "identified" in lieu of "suitable"
In (G) revise the first sentence of the last paragraph: Unit equipment shall be permanently fixed in place ~~(i.e., not portable)~~ and shall have all supply wiring installed ~~in accordance with the requirements of any of the wiring methods of Chapter 3~~ with an identified wiring method.
Revise the last sentence of (G): Legally required standby Luminaires and lampholders that obtain power from a unit equipment and are not an integral part of the unit equipment shall be wired to the unit equipment by ~~one of the~~ an identified wiring method(s) ~~of Chapter 3.~~
Substantiation: Edit. "Suitable" is subjective and a term to be avoided per the Style Manual. "Any wiring method" can be construed as modifying "not permitted uses". Lampholders should be included in (G). Remote luminaries are a part of the unit equipment, but not an integral part.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation for the proposed changes. The term "suitable" is more than descriptive enough to provide the user with the description of the type and size of battery necessary for the application and the proposed text, therefore, is unnecessary. The definition of "identified" uses the term "suitable." The substantiation has not identified a problem with the use or misuse of the term "suitable" in this particular application. The phrase "in accordance with the wiring methods of Chapter 3" provides the user of the NEC specific direction on what wiring methods to use and where to obtain the requirements for the wiring methods, whereas the suggested text does not. There was not technical substantiation to include lampholders with luminaires.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MOUTON, C.: The last sentence of the panel statement should be edit to change "not" to "no".

13-224 Log #4680 NEC-P13 **Final Action: Accept**
(701.11(B)(2))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add the following sentence: "Where power is needed for the operation of the fuel transfer pumps to deliver fuel to a generator set day tank, this pump shall be connected to the legally required standby power system.
Substantiation: This rule now appears in 700.12(B)(2) for emergency systems it only seems to be a matter of common sense that a legally-required system should have the same protection. A generator without fuel is no standby source at all.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-224a Log #CP1304 NEC-P13 **Final Action: Accept**
(701.11(B)(3))

Submitter: Code-Making Panel 13,
Recommendation: Revise the title of the section to read:
(3) Dual ~~Fuel~~ Supplies.
Substantiation: This section covers water supplies in addition to fuel supplies. This action correlates with similar actions taken on proposals for Articles 700 and 708.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-225 Log #1309 NEC-P13 **Final Action: Accept in Part**
(701.11(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence:
The legally required standby service shall be ~~sufficiently~~ separated from ~~the normal main~~ all other service(s) ~~disconnecting means~~ to ~~prevent~~ minimize the likelihood of simultaneous interruption of supply ~~through~~ due to an occurrence in another electrical supply system ~~within~~ for the building(s) or premises or groups of buildings served.
Substantiation: For reliability, separation should apply to all other services. Separation can minimize simultaneous interruption, but not prevent it (such as caused by utility power outage). Separation should apply to the entire service (such as service drops) not just the disconnecting means. 702.12 for example does not limit failure to within the building.
Panel Meeting Action: Accept in Part
The Panel accepts only the word "minimize" to replace "prevent" and rejects the remainder of the recommendation.
Panel Statement: Use of the phrase "the likelihood of" does not provide additional clarity. There is insufficient substantiation to support the remainder of the recommendation, and the proposed editorial revisions do not improve the clarity of the existing requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-226 Log #3286 NEC-P13 **Final Action: Accept in Part**
(701.11(E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Where acceptable to the authority having jurisdiction, a legally required standby system shall be permitted to be supplied by connections located ahead of and not within the same cabinet, enclosure, or vertical switchboard or motor control section as the normal service disconnecting means. ~~Shall be permanent.~~ The legally required standby service shall be ~~sufficiently~~ separated from the ~~normal~~ other services disconnecting means except at the point of connection to the normal service to ~~prevent~~ minimize the likelihood of simultaneous interruption of supply through due to an occurrence in any other service ~~within the buildings or groups of buildings served~~.
Substantiation: Connections should be specified as ahead of the "normal" service disconnecting means since "service" can include emergency or fire pump services. Separation should apply to all other services and can minimize simultaneous interruption but not prevent interruption due to power outages. Subsection (D) uses the word "minimize". Separation should be intended to minimize interruption of power whether or not the "occurrence" is within the building served.
Panel Meeting Action: Accept in Part
The panel accepts the only the word "minimize" to replace "prevent" and rejects the remainder of the recommendation.
Panel Statement: Use of the phrase "the likelihood of" does not provide additional clarity. The title of the Section 701.11 contains the term "legally required standby system"; and it is not necessary to repeat it in 701.11(E). It is not necessary to add "motor control" because it is encompassed by the terms "enclosure" and "cabinet". The substantiation does not support the remainder of the recommended revisions and does not demonstrate that the intent of the current text is misunderstood. See the panel action and statement on Proposal 13-225.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-227 Log #1586 NEC-P13 **Final Action: Reject**
(701.11(G)(4) Exception)

Submitter: Stanley J. Folz, Henderson, NV
Recommendation: Revise text to read as follows:
Exception: In a separate and uninterrupted area supplied by a minimum of three normal lighting circuits, a separate branch circuit for unit equipment shall be permitted if it originates from the same panelboard as that of the normal lighting circuits and is ***lockable in the closed position.*** ~~*provided with a lock-on feature.*~~
Substantiation: This lockable disconnect concept is used through the code. One definition in Article 100 would harmonize its use in all Articles. This proposal was developed by a Task Group that was appointed by the NEC Technical Correlating Committee and consisted of Stanley J. Folz, Chair, Monte Ewing, Ralph Pritchard, Sondra Todd, and Randy Yasenchak.
A companion proposal has been submitted to Article 100 containing a new definition for "Disconnecting Means, Lockable."
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-184.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-228 Log #2814 NEC-P13 **Final Action: Accept in Principle**
(701.17)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
701.17 Ground-Fault Protection of Equipment.
The alternate source for legally required standby systems shall not be required to have ground-fault protection of equipment <u>with automatic disconnecting means. Ground-fault indication of the legally required standby source shall be provided per 701.8(D).</u>
Substantiation: Companion proposal has been submitted to add new section 701.8(D) that is similar to text currently located in 700.7(D) for ground-fault indication. For general applications, ground fault protection of equipment is required for grounded wye feeders, 1,000 amperes or greater for nominal 480Y/277 volt systems. The basis for the general requirement in 215.10 is the unusually high number of burndowns reported on feeders in this voltage range. While the requirements to automatically disconnect the circuit has been relaxed in Article 700 for emergency systems, provisions for indication and potential actions are required for these emergency systems. Currently, Article 701 would allow a ground-fault to occur without shut down or even an indication.
Panel Meeting Action: Accept in Principle
Revise the recommendation to read:
701.17 Ground-Fault Protection of Equipment. The alternate source for legally required standby systems shall not be required to have ground-fault protection of equipment with automatic disconnecting means. Ground-fault indication of the legally required standby source shall be provided <u>in accordance with</u> ~~per~~ <u>701.8(D).</u>
Panel Statement: The panel action meets the NEC Style Manual and correlates with the panel action on Proposal 13-189.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-229 Log #3691 NEC-P13 **Final Action: Reject**
(701.17)

Submitter: Christopher G. Walker, Eaton Corp.
Recommendation: Add new text to read as follows:
<u>(A) Feeders</u>
<u>Where ground-fault protection has been provided for the operation of the service disconnecting means or feeder disconnecting means as specified by 230.95 or 215.10, an additional step of ground-fault protection shall be provided in all next level feeder disconnecting means downstream toward the load.</u>
<u>Such protection shall consist of overcurrent devices, current transformers, or other equivalent protective equipment that shall cause the feeder disconnecting devices to open.</u>
<u>The additional levels of ground-fault protection shall NOT be installed as follows:</u>
<u>1. On electrical systems that are not solidly grounded wye systems with greater than 150 volts to ground, but not more than 600 volts phase-to-phase.</u>
<u>2. On electrical systems where a non-orderly shutdown of power will introduce additional or increased hazards.</u>
<u>Where ground-fault protection has been provided for the operation of service level or feeder level disconnecting means, these means shall be selectively coordinated such that the feeder level device, but not the service level device, shall open on ground faults on the load side of the feeder level device.</u>
<u>A 6-cycle minimum separation time between the service and feeder ground fault trip response bands shall be provided.</u>
Substantiation: Ground faults are typically believed to be the most common type of fault experienced in operating energized electrical systems, per ANSI/IEEE Std 242-1986 Buff book, chapter 7. Professional design engineers tell stories of ballast or small motor failures that have caused main or feeder devices to open. Why is this so? In some instances, a ground fault condition existed that went undetected and precipitated the protective device to open. In other cases, ground fault protective devices were improperly set, or not set at all. In others, a selective coordination study may not have been done, or may have been done improperly.
Therefore, with the goal of using selective coordination as the process by which electrical systems may achieve maximum uptime, it is important that all he key areas of impact are addressed in the design of these electrical systems.
The NEC has for many years required ground fault protection of equipment, but only at the service disconnect level (with noted special exceptions), per Article 230.95. The relatively recent 2005 and 2008 NEC versions, requires selective coordination in applications related to life safety, public safety, and/or national security applications where reliable electrical power systems are required.
These relatively new requirements for selective coordination in these types of applications are needed throughout the entire service level, feeder and branch levels of the electrical system.
With the goal in mind of maximizing the reliability and uptime of electrical systems, and giving consideration that the most common types of faults are ground fault related, it becomes a reasonable approach that whenever selective coordination is required by the Code, that the requirements for ground fault protection of equipment be extended to all appropriate areas in the electrical system beyond just the service level.
This proposal mirrors a similar requirement for ground fault protection of equipment that currently exists in NEC Article 708.52 for Critical Operations Power Systems (COPS). This proposal therefore recommends enhancing the reliability of the electrical system by requiring ground fault protection of equipment in all appropriate levels of the system whenever there are also requirements for selective coordination in that system.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-190.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

(Note: Sequence 13-230 moved to follow 13-232 on page 962)

13-231 Log #3928 NEC-P13 **Final Action: Reject**
(701.17)

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Revise 701.17.
701.17 Ground-Fault Protection of Equipment.
<u>(A) Alternate Source.</u> The alternate source for legally required standby systems shall not be required to have ground-fault protection of equipment. <u>Ground-fault indication in the legally required standby (alternate) source shall be provided per the requirements in 700.7(D).</u>
<u>(B) Normal Source. Ground-fault protection shall not be required for a disconnecting means in the normal source supplying a legally required standby system where the disconnecting means supplies only fire pumps, emergency systems, or legally required standby systems. Ground-fault indication in the legally required standby (normal) source shall be provided per the requirements in 700.7(D).</u>
Substantiation: Where a disconnecting means supplies only fire pumps, emergency loads, and legally required standby loads, that disconnecting means should be
allowed to operate as long as possible during a ground fault, without opening the life-safety-related loads. Keep the loads on as long as possible.
Because ground-fault operation of the disconnecting means is not provided, signaling would provide an extra degree of safety. This proposal
provides the same "safety logic" for the normal source as the Code already provides for the alternate source.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-192.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-232 Log #3935 NEC-P13 **Final Action: Reject**
(701.17)

Submitter: Malcolm Allison, Ferraz Shawmut / Rep. National Electric Fuse Association (NEFA)
Recommendation: Add a second paragraph.
<u>Ground fault relays on the normal source side (line side of the transfer switch) that supply legally required standby systems are permitted to be restrained from operating for ground faults on the loadside of the transfer switch if the system complies with both of the following:</u>
<u>(A) Ground fault protection relays on the normal source side (line side of the transfer switch) are not restrained from operation for ground faults on the normal source side (line side of the transfer switch)</u>
<u>(B) Audible and visual signal devices indicate whenever a ground fault relay has been restrained. Instructions on the course of action to be taken in the event of an indicated ground fault shall be located g or near the sensor location.</u>

Substantiation: For life-safety purposes and system reliability for the prevention of blackouts, it is desirable that a ground-fault on the load side of a transfer switch in a legally required standby system not take out the ground fault protection on the normal source. This proposal allows the ground fault protection on the normal source to be restrained from operating and taking down all or a large portion of the normal system because of a ground fault on the load side of the transfer switch. For these critical life-safety-related applications, it requires both audible and visual signaling that a ground fault has occurred and that it is being restrained.

Restraining the normal system ground fault protection relays for faults on the load side of the transfer switch is consistent with the concept of continuity of service for emergency systems (700.26 & 700.7(D)). legally required standby systems (701.17), and healthcare essential electrical svstems (517.17(B)).

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-191.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-230 Log #3693 NEC-P13 **Final Action: Reject**
(701.18)

Submitter: Christopher G. Walker, Eaton Corp.

Recommendation: Add new text to read as follows:

Overcurrent devices shall be selected by a qualified person to optimize selective coordination and arc flash protection (NFPA 70E).

Substantiation: Designing electrical systems with overcurrent protective devices that are to be selectively coordinated involves using data from the device manufacturers, and conducting analyses of the various conditions that the electrical system may experience. The choice of overcurrent protective devices involves the study and analysis of both phase and ground fault currents, and cover currents that ranges from low level overloads up to high short circuit fault current levels.

In addition, there are applications that are justified per NFPA 70E-2004 that allow installation and maintenance personnel to perform work close to energized conductors. For these applications where personnel are working in close contact with energized conductors, design studies are to be conducted to determine the possible levels of arc flash energy that personnel may be exposed to, and the subsequent levels of protective equipment that should be in place.

It should be evident that the correct selection of protective devices is very important to minimize damage to equipment, minimize the loss of power in key electrical systems, and minimize the arc flash energy exposure to personnel whenever electrical fault conditions occur. The correct selection of the protective devices that will satisfy these conditions must be done by persons that are qualified to perform the appropriate types of analysis and studies. A thorough analysis is needed to ensure optimal selection of protective devices, otherwise, it may result in excessive equipment damage and/or personnel injury.

The current National Electric Code specifies the types of systems that require selective coordination. The Code does not identify who is responsible for ensuring that the electrical systems meet the selective coordination requirements.

Therefore, this proposal simply adds verbiage to clarify who is responsible for ensuring that the electrical systems meet the current selective coordination requirements, while also addressing equipment protection and personnel safety.

Panel Meeting Action: Reject

Panel Statement: In Section 215.5, an authority having jurisdiction (AHJ) can require a diagram showing feeder details prior to the installation of the feeders and then can require a certain level of expertise for the design of these feeders. Section 240.12 already permits selective coordination for orderly shutdown of the system as a permissive rule.

Section 110.16 requires a sign be posted at the distribution equipment, panelboards, switchboards, and similar equipment warning qualified personnel of the potential electric arc flash hazard. The NEC covers the installation of the electrical system, and NFPA 70E provides coverage once the system has been energized. There may be many reasons a designer provides a particular type of overcurrent protective device for a certain system, with arc flash as one of the many considerations and selective coordination as another.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 2

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept in principle in part. The proposal should not have been rejected since it properly indicates that selective device coordination should be an optimization. See my additional comments for Proposal 13-194 that relate to this proposal also.

13-233 Log #3955 NEC-P13 **Final Action: Reject**
(701.18)

Submitter: James E. Degnan, Sparling

Recommendation: Revise text to read as follows:

701.18 Coordination Legally required standby system(s) overcurrent devices shall be selectively coordinated with all <u>legally required and emergency system</u> supply side overcurrrent protective devices <u>for faults with a duration of 0.1 seconds and longer.</u>

Substantiation: The text used in the comment is preferred over the original text for the following reasons:

1. Language similar to this language is being utilized by some states, for example Oregon & Florida, as a means to apply the intent of selective coordination.

2. Article701.1 states that the scope of Article 701 is: "The provisions of this article apply to the electrical safety of the installation, operation and maintenance of emergency systems ….to required facilities when the normal electrical supply or system in interrupted." If the normal system has been interrupted there is no need for the emergency system to selectively coordinate with it. Changing "all supply side" to "all legally required and emergency system supply side" will make this intent clear.

3. The balance of the substantiation is the same as is listed in my proposal on Section 700.27.

Panel Meeting Action: Reject

Panel Statement: The 0.1 second limit in this proposal could reduce the level of safety by limiting the types of overcurrents that would need to be isolated to the nearest upstream device. Requiring selective coordination down to only 0.1 seconds will cover only overloads and a few minor phase-to-phase and minor ground faults.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 11 Negative: 3

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

DEGNAN, J.: See My Explanation of Negative on 13-195.

MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept in principle in part. The proposal should not have been rejected since it properly indicates that selective device coordination should be an optimization, with the 0.1 seconds limitation one of many methods to achieve the optimization. See my additional comments for Proposal 13-195 that relate to this proposal also.

13-234 Log #4325 NEC-P13 **Final Action: Reject**
(701.18)

Submitter: Malcolm Allison, Ferraz Shawmut

Recommendation: Amend 701.18 as follows.

<u>**701.18 Coordination.**</u>

<u>**(A) Normal System.** Normal system overcurrent protective devices on the supply side of the legally required standby system overcurrent protective devices shall not be required to be selectively coordinated with other supply side, normal system overcurrent protective devices.</u>

<u>**(B) Legally Required Standby System.**</u> Legally Required Standby System(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices <u>unless one of the following conditions in (1) through (5) are met.</u>

(1) <u>Transformer Overcurrent Protective Devices.</u> Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.

<u>(2) Overcurrent Protective Devices of the Same Size.</u> Between overcurrent protective devices of the same size (ampere rating) installed in series.

<u>(3) Expansion of an Existing Legally Required Standby System - Existing Overcurrent Protective Devices. Between existing legally required standby system overcurrent protective devices and any existing supply side overcurrent protective devices, where the legally required standby system is expanded.</u>

<u>(4) Expansion of an Existing Legally Required Standby System - New Overcurrent Protective Devices. Between new legally required standby system overcurrent protective devices and any existing supply side overcurrent protective devices, where the legally required standby system is expanded.</u>

<u>(5) Designed Under Engineering Supervision. Where a licensed professional engineer, engaged primarily in the design of electrical installations, provides stamped documentation showing the specific circuit that cannot be selectively coordinated, and substantiation of the design alternatives that were analyzed in the failed attempt to achieve selective coordination. This documentation shall be available to those authorized to design, install, inspect, maintain, and operate the system.</u>

<u>FPN: These are several techniques that help to selectively coordinate an electrical distribution system</u>

(a) <u>Where transfer switches are utilized, utilizing several smaller transfer switches rather than one larger transfer switch, and moving the transfer switches down in the system, closer to the loads.</u>

(b) <u>Utilizing short-time delay</u>

(c) <u>Utilizing devices with an adjustable instantaneous trip</u>

(d) <u>Utilizing smaller downstream devices</u>

(e) Utilizing several smaller downstream devices rather than one larger downstream device
(f) Utilizing upstream devices with larger frame sizes
(g) Utilizing fuse manufacturers' ratio charts
(h) Utilizing circuit breaker manufacturers' selective coordination charts
(i) Utilizing differential relays
(j) Utilizing isolation transformers
(k) Minimizing the number of levels in a distribution system
(I) Utilizing a greater number of smaller feeders, rather than a smaller number of larger feeders
(m) Utilizing impedance grounded systems
(n) Utilizing high-instantaneous trip circuit breakers

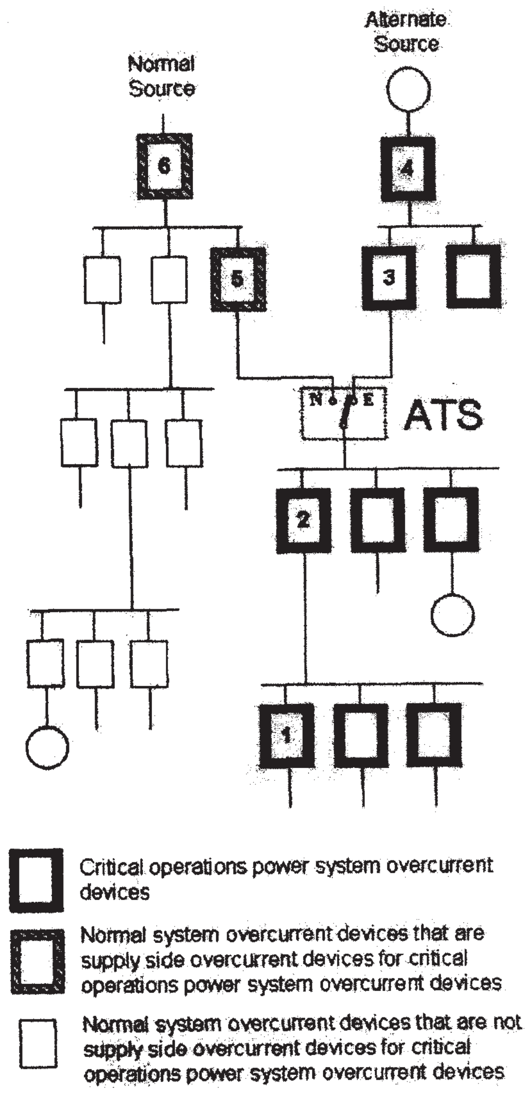

Figure 701.18 Clarification of Selective Coordination Requirements

Substantiation: This proposal is an attempt to clarify the confusion concerning selective coordination requirements.
(1) Figure 701.18 has been added to clarify which devices are legally required standby side devices, and which are normal side devices. This figure should be included in the NEC® text. Figure 701.18 was based upon a figure from an necdigest® article, Keep The Power On For Vital Loads, by Evangelos Stoyas, December 2007 Copyright© 2007,
National Fire Protection Association, Quincy, MA.
(2)"(A) Normal System" was added because there have been questions about the need for selective coordination of the overcurrent devices on the normal side, on the line side of the transfer switch. Since Devices 5 and 6 are not really part of the legally required standby system, 701.18 does not apply, and therefore 5 and 6 do not need to selectively coordinate with each other.
(3)"(B) (1)" and "(B)(2)" are taken from existing text. No changes made
(4) "(B)(3)" was added because there have been questions about the need for existing devices to selectively coordinate when a legally required standby system is expanded or modified. This proposal clarifies that existing devices do not have to be replaced if they do not already selectively coordinate.
(5) "(B)(4)" was added because there have been questions about the need for new devices to selectively coordinate with existing devices when a legally required standby system is expanded or remodeled. This clearly states that new devices do not have to selectively coordinate with the existing devices.
(6) "(B)(5)" was added for those few cases where selective coordination is simply not possible. It is not meant to be a "blank check" to allow designers to avoid their responsibility to provide a selectively coordinated system. The requirements are very similar to those found in 240.86 and are meant to ensure that all reasonable attempts have been made to achieve the objective. Once all attempts have been exhausted, the engineer simply documents the circuit in question and shows the techniques that were attempted.
(7) The FPN was added to provide some of the common methods that experienced engineers utilize to obtain selective coordination. It is not all-inclusive, and has been carefully worded so as not to include any requirements.
Panel Meeting Action: Reject
Panel Statement: The proposal for "(A) Normal System" covers devices in the normal source that are outside the scope of Article 700. While the concept is correct, the additional text is unnecessary. The proposed figure is also unnecessary.
While the concepts in (B), (B)(1), and (B)(2) are basically unchanged from the 2008 NEC, the change is not needed because all other portions of this proposal are also rejected.
(B)(3) is rejected because 700.27 is not retroactive for existing systems.
(B)(4) is rejected because no technical substantiation was provided to justify the reduced continuity of service that would result from the elimination of the requirement of new devices to selectively coordinate with upstream existing devices.
(B)(5) is rejected because no technical justification was provided as to why selective coordination cannot be achieved in all situations. In addition, no information was provided as to which or how many design alternatives the consulting engineer needs to analyze and submit in the required documentation.
The FPN is rejected because technical substantiation was not provided for any of the 14 listed techniques.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
CARON, D.: See my comments to Proposal 13-195.

13-235 Log #4341 NEC-P13 **Final Action: Reject**
(701.18)

Submitter: Dan Giblin, National Electric Fuse Assn. (NEFA)
Recommendation: Revise text as follows:
701.18 Coordination.
(Keep present text and add the following at the end)
Selective coordination is required for the full range of overcurrents up to the highest available short-circuit current available at the lineside of each overcurrent protective device. The consideration shall include evaluation for the available short-circuit current from the normal supply and alternate supply as well as the transfer switch type.
Substantiation: The purpose of this addition is to clarify that selective coordination is for the full range of available overcurrents. Some people in the industry have contended that the present requirement is not clear on the range of overcurrent that must be considered. When 700.27 was voted as a requirement during the 2005 NEC cycle and then reaffirmed during the 2008 cycle, Code Making Panel 13 substantiated that this requirement is for the full range of overcurrents. For instance, Comment 20-13 in part "…*Selective coordination increases the reliability of the emergency system. The current wording of the NEC® is adequate.* ***The instantaneous portion of the time-current curve is no less important than the long time portion.***"
The available short-circuit current must be considered for the worst case from the normal source, alternate source, or both for a closed transition transfer switch. If a fault occurs on an emergency load being supplied by the normal source and both the emergency branch circuit overcurrent protective device and emergency feeder overcurrent protective device open, then when the power is transferred to the alternate source, loads supplied by the affected feeder will unnecessarily be interrupted.
There is no simple alternative to use other than for the full range of available short-circuit currents. Some in the industry are advocating changing the selective coordination requirement to only times greater than 0.1 second. The paragraphs below illustrate why this is not viable.
Permitting the selective coordination requirement to be for times only greater than 0.1 second will allow non-coordinated operation of multiple levels of overcurrent protective devices (cascading) under short-circuit current (fault) conditions, which reduces the reliability of the system to deliver power to vital loads. Requiring selective coordination for times only greater than 0.1 second provides coordination for only overloads and does not provide assurance that typical ground faults and arcing faults will not cascade multiple levels of overcurrent protective devices, thereby unnecessarily losing power to critical loads. While both overloads and short-circuits occur on branch circuits, the predominance of overcurrent interruptions on feeder and service circuits are short-circuits (of all types). Graphs A and B depict the time-current curves of the same 30A, 200A, and 800A system. Graph A shows the portion of the circuit breaker time-current curves that would be analyzed for selective coordination for times only down to 0.1 seconds. Graph B depicts the circuit

breaker curves showing the crossover of the circuit breakers in their instantaneous trip region. The cross over is a lack of selective coordination for overcurrents at that level and greater. Graph B shows a lack of coordination between the 30A and 200A circuit breakers for ground, arcing, and any combination of phase faults as low as 800A. Any type of fault as low as 2200A can take out the 800A circuit breaker as well. These are low available fault currents, easily achieved in almost every essential electrical system via a line-ground fault, line-line fault or three phase fault.

All circuit breakers with an instantaneous trip will open in less than 0.1 seconds when fault current is above the instantaneous trip setting. Requiring selective coordination for times only greater than 0.1 second will permit the design of vital electrical systems without regard to proper engineering attention being given to the instantaneous trip region.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The existing text of 701.18 already requires selective coordination for the full range of overcurrents, from overloads through the available short-circuit current, with all upstream devices. Specific additional text is not necessary. Substantiation was not provided for the reference to the transfer switch type.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

MOUTON, C.: I'm voting in the affirmative for the panel action, but would like to make the following comments regarding the proposal, which need to be added into the panel statement in whole or in part, to correctly address incorrect statements made in the proposal substantiation by the submitter. See my comments for Proposal 13-198 that relate to this proposal also.

13-236 Log #4380 NEC-P13 **Final Action: Reject**
(701.18)

Submitter: Alan Manche, Square D Company/Schneider Electric

Recommendation: Add a new sentence to the end of the main paragraph of 701.18:

Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices. A means to intentionally defeat selectivity shall not be permitted.

Substantiation: Although no data was presented during the 2005 or the 2008 NEC to support the requirement for selective coordination, the panel clearly acted to include the requirement for life safety reasons. Establishing selectively coordinated systems can increase the arc-flash hazard when maintenance is performed on the system depending upon the design of the system. The concern of increased arc-flash hazard was presented to the panel in past cycles and the panel accepted those risks in favor of the benefit of selectivity on these systems. Some system designers are now including a means to defeat selectivity by installing systems that can turn the selectivity off by temporarily changing breaker settings via a switch or sensor in order to protect the electrical worker. There is no prohibition established in the NEC to restrict defeating selectivity, or the life safety aspect for which it was installed, in order to protect the electrical worker.

Unfortunately the enhanced protection for the electrical worker can be a trade-off by defeating the life safety function of the selectively coordinated system in the emergency system. The most likely time for an incident to happen that would require the system to be selective is when a working is doing maintenance on the system. If the selectivity is defeated, an arc event small or large could initiate a fire hazard or take down lighting, ventilation, or critical circuits leaving a system inoperable which places the life safety of others in a dangerous position.

There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety.

Panel Meeting Action: Reject

Panel Statement: The panel supports the use of energy reduction means for the protection of personnel during periods of maintenance of energized equipment. Use of these types of devices should be left to the discretion of the facility operator. The panel recognizes that the selective coordination is not available in the system at the time the energy reduction means is operational.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Abstain: 1

Explanation of Abstention:

DEGNAN, J.: See My Abstention on 13-199.

13-237 Log #4423 NEC-P13 **Final Action: Reject**
(701.18)

Submitter: Darrel Miller, LSW Engineers Arizona, Inc.

Recommendation: Revise text to read as follows:

701.18 Coordination. Legally requires standby system(s) overcurrent devices shall be ~~selectively~~ coordinated with ~~all~~ supply side overcurrent protective devices. Selectivity shall meet the requirements of (A), (B), or (C).

(A) Selectivity shall be established, in the form of an engineering study, by a licensed professional engineer engaged regularly in the design or maintenance of coordinated electrical systems. The study shall be stamped by a licensed professional engineer and at a minimum include overcurrent device settings, supporting documentation, and a summary of limitations. This study shall be available to those authorized to design, install, inspect, maintain, and operate the system.

(B) Selectivity shall be established under engineering supervision by use of the selected overcurrent device manufactures tables and charts derived from tested combinations of devices. Applicability for each table and chart utilized shall be rigidly adhered to. All tables and charts shall be from the same manufacturer as the installed overcurrent devices.

(C) Selectivity shall be established under engineering supervision in existing installations. The engineer shall determine the extent of selectivity achievable based on review of the existing conditions. Use of methods (A), (B), or combination of each shall be permitted. A summary of limitations and recommendations shall be stamped by a licensed professional engineer and submitted to the authority having jurisdiction prior to the start of construction. Once accepted, the recommendations will establish the extent of retrofit required.

Exception: Selective coordination shall not be required in the following:

(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exist on the transformer secondary.

(2) Between overcurrent protective devices or set of overcurrent protective devices ~~of the same ampere rating in series.~~ in series on opposite ends of the same feeder.

FPN: Overcurrent protective devices used for legally requires standby circuit protection, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system. A similar increase in overall reliability can be experienced on the normal power system side.

Substantiation:

Present text restricts the design professional from making appropriate judgments and technical decisions necessary to effectively coordinate the overcurrent protective devices. Historically, the design professional has had the responsibility of evaluating and selecting the appropriate equipment based on the individual project circumstances, refer to the ANSI/IEEE color series of recommended practice manuals. The modifications proposed loosen the prescriptive mandate which is creating compliance difficulties. It will also restore the design professionals' freedom to select the appropriate overcurrent devices for use within the emergency, legally required standby, and critical operations power systems. As you will see in the following discussions, coordination has never been expected to be 100% selective. There are often circumstances that are just "best case" even in the most highly coordinated systems. The ANSI/IEEE repeatedly uses language which conveys this understanding.

Many jurisdictions have considered and adopted codification of a 0.1 second fault duration time to establish a reasonable coordination point. In fact, until published Time-Current Curves (TCC's) are available from the majority of manufactures starting at a time line less than the 1st half cycle, 0.0083 seconds, this approach would provide a design basis that is universally workable.

We understand the argument that this is an arbitrary point at which to start coordination. Accordingly, we have taken a different approach. The text presented was modeled after NEC 240.86. This article establishes a method for the design professional to make judgment for existing systems. We have provide options instead of a one size fits all mentality, which is know to have issues; as evidenced by the large number of proposals surrounding this issue. The real concern is with the existing NEC text. It puts the engineer in a position that is contrary to other equally important recommended practices, of which we are also held accountable. The professional engineer does want to follow and is concerned with compliance with all applicable codes. In Arizona, as with other states, Rules of Professional Conduct have been established for the professional registrant. He/she is charged with protecting the public safety, much like the inspections departments are. By the nature of granting a license to practice engineering, the grantor (State) is agreeing that the professional registrant is competent to make such decisions.

In the proposed change, the issue of existing conditions and implementation has been addressed.

The design professional is responsible to assess the needs of the client and make a professional judgment as to the type of system best suited for the application, including system coordination. Professional Registration process has been set up by States, recognized by the Federal Government, to establish the minimum standards for persons competent to engage in the practice of protecting the public from engineering hazards. The professional engineer has been deemed competent to make these type judgments. This has long been the role of the design professional. The following is a list of concerns, quotes, and comments from multiple recognized standards, NFPA, ANSI/IEEE, etc.

1. The NEC definition of selective "coordination is defined in Article 100, as the localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the choice of overcurrent protective devices and their ratings or settings." Article 700.27 (701.18 similar) interjects emphasis on any question of how far the design engineer is to carry the out rule, stating "… with all supply side overcurrent protective devices".

Based on a strict interpretation of this definition, the only overcurrent protection device allowed to operate is the ***one immediately upstream from the fault or overcurrent.*** Depending on the fault level, L-L, L-G, 3Ø bolted fault, this requirement is very difficult to meet using circuit breakers and is possible using fuses. Generally, for overcurrent conditions circuit breakers or fuses can be selected to coordinate. The use of a totally fused distribution system is not recommended, especially at the branch circuit level. Only recently have fused branch circuit panelboards returned to the market. Although this equipment is a current design, there are numerous disadvantages to using fuses in lieu of circuit breakers, listed below:

a. Replacement fuses are not always readily available of the same class and rating of the blown fuse.

b. There is a tendency to replace a blown fuse with a fuse of a different class and/or rating in order to restore power immediately, which would have serious consequences in providing future protection. In order to maintain selective coordination, the exact replacement fuse must be used.

c. Even with available fuses, the amount of time to restore power would be longer.

d. The replacement of the fuse(s) would require PPE where the supply side was not de-energized.

e. When only one fuse blows in a three phase circuit, the resultant downstream panels would experience single phasing which would be detrimental to certain three phase loads.

f. Fuse replacement normally requires disconnecting the power to the affected panel as a safety precaution and therefore counteracting the benefits of selective coordination.

g. The majority of emergency, standby, and essential systems currently do not employ solely fuse overcurrent devices. Modifications of an existing facility to provide compliance to these NEC articles will most certainly result in existing distribution system equipment and downstream panel replacement. The replacement equipment in most cases will require more physical space. The result will be architectural remodeling to accommodate the larger equipment. These modifications will result in significant added construction costs and disruption of owner operations.

2. Arguments during the previous code cycle have thrown out any consideration of initial cost for the systems necessary to comply with the present NEC articles. The following quotes highlight statements within the recognized standards which have always considered system initial cost as a factor of design consideration. The use of circuit breakers on emergency, legally required standby, and critical operation power systems are preferred. However, compliance with the present NEC requirements using circuit breakers is very costly. A typical molded case circuit breaker can only be used at the branch circuit level. Upstream devised at the distribution level, in most cases must be capable of defeating the instantaneous setting. This feature is presently available on insulated case circuit breakers and occasionally on electronic trip molded case circuit breakers. The cost for this type of equipment is 2-3x the cost of a similar electronic trip molded case unit. Additionally, enclosure to house these breaker types will go up in class, panelboard to switchboard, switchboard to compartmentalized switchboard, etc. The larger class equipment footprint is most often double the depth, subsequently creating other issues for the architectural designer.

a. "It is important that the various overcurrent devices be coordinated***, as far as practicable***, to isolate faulted circuits and to protect against cascading operation on short circuit faults***. In many systems, however, full coordination is not practicable without using equipment that could be prohibitively costly or undesirable for other reasons.***" [1]. This NFPA article recognizes there is a balance between cost and protection. For reference, Webster defines "practicable" as: 1) possible to practice or perform: feasible. 2) capable of being used: usable.

b. "Safety. Safety of Life and preservation of property are two of the most important"[2] things required of system coordination. ANSI/IEEE goes on to say of reliability (continuity of service) …the system should be designed to isolate faults ***with minimum disturbance to the system*** and should have features to give the maximum dependability consistent with the plant requirements ***and justifiable cost***." This ANSI/IEEE std recognizes the balance between cost and protection.

c. "***Safety has priority*** over service continuity, equipment damage, or economics."[3] The term "safety" here is relating to the prevention of human injury from the electrical system. This includes the persons, maintenance staff or otherwise, that will be resetting the breakers and/or replacing the fuses. This should not be interchanged with "service continuity", which is a separate concern. There has been a scare tactic employed by some to associate "Life Safety" with the term "safety". In an electrical system as discussed in the ANSI/IEEE standards, the safety they are concerned with is 1) electricians or other trained operating personnel, and 2) protecting the public from inadvertent contact with electrical system components. The term "Life Safety" systems is used in the building codes relative to protecting those within the building from smoke or fire to allow safe egress during an event and only occurs in NEC 517.32 to describe a branch of the essential electrical system, similar to that of NEC Article 700. When reviewing the function of the Article 700 system, we see there are several methods of compliance, unit equipment, generator, and other reliable source. The reader must assume that unit equipment can provide the same reliability as the generation system, otherwise it could not be considered for this application. How often have we seen emergency lights out of service? Often. These units require regular testing and eventually maintenance. The batteries tend to fail prematurely in our climate, 3-5 years. These small point-of-use emergency sources do not appear to be nearly as reliable as generator systems, yet they are considered equivalent.

d. "Economic Considerations***. The cost of system protection can never be ignored***, and will determine the degree of system protection that can be feasibly designed into a system. ***Many features can be added*** that will improve performance, reliability, and flexibility***, but will increase initial cost***."[4] This ANSI/IEEE std recognizes that cost is a consideration in the selection of a protection system.

e. "First Cost. ***While first costs are important***, safety, reliability, voltage regulation, maintenance, and the potential for expansion must be considered in selecting the best [overcurrent system] from alternate plans."[5] This ANSI/IEEE std recognizes that cost is a consideration in the selection of a protection system.

3. Where is the issue of concern that introduced these articles? How many occurrences have been documented where a branch circuit level short circuit has taken out the main supply system of emergency system, or large portions of the distribution? If there were occurrences that can be studied, how many resulted from errant settings vs. engineered settings? Substantiation for the necessity of these articles appears to be missing.

4. Interpretation of the Time Current Curves. The industry standard published time current curves (TCC) start the time element at 0.01 seconds. The peak current in a faulted electrical system occurs in the first ½ cycle, or 0.0083 seconds. Therefore the engineer can not design with the traditional tools (TCC) used to coordinate the protective devices within this critical range, below 0.01 seconds. These traditional TTC's are tools which enabled the selection and specification of devices with confidence multiple manufacturers can provide similar units. Comparison between the coordination curves was direct and reliable. To assist with the 2005 selective coordination rules, many of the manufacturers have created tables which list breaker types and classes which selectively coordinate. Each set of tables is unique to each manufacturer. In table form. Because the tables contain only lists of product models, the design engineer is now forced to select a single manufactures equipment to design around. Without the data in the critical region of the TCC, less than 0.01 seconds, design engineers can not evaluate the cross over between manufacturer products. Therefore, the design engineer has no choice but to require a selective coordination study be submitted by the successful bidding manufacturer to confirm their equipment will selectively coordinate. The result of this study, if not of the same manufacture as the basis of design, will require system changes; dimensional modifications, devices frame size and overcurrent device trip changes, related feeder size changes, transformer upsizing, and similar. At the time of bid, these conditions will create a problem. Fair and equitable bidding will be severely hampered. Not to mention legal issues with proprietary

1 NFPA 110 Annex A, 2005 edition, A.6.5.1.

2 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 2.2.

3 ANSI/IEEE Std 242-1986 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, 1.1.1.

4 ANSI/IEEE Std 242-1986 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, 1.1.3.

5 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 2.2.7.

specifications for governmental projects. How will the permitting agencies handle these type of changes after there is a permit issued? Certainly a follow-up review will be necessary.

Nationally, there are many jurisdictions wrestling with the level of enforcing they can handle for this issue. The following States have implemented changes to the present text to give working parameters for this code article.

a. Tucson, Arizona, deleted the article.

b. California Office Of Statewide Health Planning And Development (OSHPD), deleted the article for hospital occupancies.

c. State of Florida Agency for Health Care Administration (AHCA), amended to 0.1 second and above for coordination.

d. State of Massachusetts, 527 CMR 12 Massachusetts Electrical Code, amended to 0.1 second and above for coordination.

e. City of New York, Interpretation only considers overload selectivity.

f. State of Wisconsin (recent vote, outcome unknown), amended to 0.1 second and above for coordination.

g. NFPA 99 Proposal 99-73 Log #CP308 HEA-ELS, amending the extent of selective coordination in part to "…selectively coordinated down to 0.1 seconds." Final Action: Accept.

5. Arguments from an equipment manufacturer (fuse) allege the mere fact that something could happen warrants a solution, ie; since a bolted fault can occur, the protection system must be able to isolate such an occurrence without affecting any other systems components. ANSI/IEEE makes the following statements regarding this issue in their discussions of coordination:

a. "Practical Limits of Protection…However, ***some fault possibilities may be legitimately considered as too improbable to justify the cost of specific protection.*** Before accepting the risk in this basis alone, the magnitude of the probable damage should also be seriously considered."[6] Here the ANSI/IEEE recognizes there are some cases where the improbability of an occurrence negates the need for elimination, rather, an evaluation and recognition of the risks is prudent action.

b. "Nature of the Problem…Operating records show ***that the majority of electric circuit faults originate as a line-to-ground failure***."[7] Here the ANSI/IEEE states the most common faults are not bolted 3-phase (the most difficult to coordinate). If this is true, why does the NEC only require Ground Fault Protection on systems operating at 277V to ground greater than 1200 amps? It seems it would be more prudent to prescriptively require GFP at lower voltages.

c. "A choice of the most suitable current and time settings is made for the device to provide the best possible protection and safety to personnel and electrical equipment and also to function selectively with other protective devices to disconnect the faulted equipment ***with as little disturbance as possible to the rest of the system.***"[8] Here the ANSI/IEEE recognizes there can be disturbance in other portions of the system and advises that the design engineer work to minimize it.

d. "The bolted fault value of short-circuit current results when the fault offers no impedance to the flow of the short-circuit current and the magnitude of current is limited only by the impedance of the circuit elements. This condition results on the maximum short-circuit current. ***Bolted short-circuits are very rare***, however, and the fault usually involves arcing and burning. Under these conditions ***fault currents may be very much lower than bolted-fault values*** and may ***present special problems of detection and isolation***"[9]

e. "The major objectives of the electrical power system designer is to design a system such that faults will be removed in the shortest period of time possible, while maintaining a high degree of service continuity. ***The area of the outage should be restricted as far as practical.*** The goals of maximum protection and maximum service continuity can most nearly be realized by proper selection and adjustment of high-speed protective devices."[10]

The proposed changes will provide a condition no worse than the existing historical situations while setting a standard for going forward in a way that can be readily achieved.

6. Existing Conditions. The NEC has not provided any suggestions as to implementation of these sections within existing system proposed to be modified, whether through remodel of additions. It is not assumed these circumstances would precipitate total replacement of existing equipment. Is there a time period that should be considered for implementation? Is there a point at which the existing system must be replaced? Washington State has implemented regulations that address this issue.

a. "The requirements for selective coordination described in NEC 700.27 are not required where the emergency system was ***installed prior to June 1, 2006***. For ***new emergency systems that are supplied from an existing emergency system installed prior to June 1, 2006***, ***the new portion of the emergency system must comply*** with NEC 700.27."[11] Here the state has resolved the conflict with new and existing systems.

The proposed change would resolve the above issues.

7. Mixing Overcurrent Protective Devices (OCPD's) from different manufacturers or mixing fuses and circuit breakers requires using time current curves (TCC) only. As previously mentioned the TCC curves do not address the region between 0 & 0.01 seconds. As a result, the system will need to be all circuit breakers or all fuses made by the same manufacturer, **for the life of the system**. Also, Fuse ratio or circuit breaker tables cannot be used. Short circuit selective coordination cannot be assured.

The proposed change would resolve the above issue.

8. Bid and Design Complications. Traditionally, the equipment manufacturer would not be selected until the bid is awarded. At this point in the design, construction documents would be completed and signed for permit submission. However, with the new requirements, before a project can go to bid, at least a preliminary selective coordination study must be conducted as it may affect the system design. This sounds simple, but the fact is that the industry conducts business does not accommodate these new requirements**. Somehow the manufacturer of the electrical equipment must be known prior to the completion of Design Development drawings.** It would appear that an Owner would have to engage a manufacturer so they could evaluate the proposed systems selectivity, based solely on their product. This must occur at the Design Development stage because at it's completion the overall building design is set, including the electrical room sizes and placement. Change after this point, other than minor coordination adjustments would be out of sequence work (as defined by the AIA) and contractually chargeable by the design team.

The suggestion has been made that electrical equipment manufacturers could be required to provide the coordination study needed as part of the bid. Also suggested has been specification language such as "vendor shall provide fully selective equipment" has been offered. The problem with this is, in order to bid the project each prospective equipment vendor (and there are at least four major ones), would have to perform a selective coordination study in order to bid. This does not take into account the real possibility of changes to the building to accommodate larger equipment at minimum. The cost of bidding just went up substantially. **Delegation of the coordination elements of design to the vendor via specification language is not practical or effective.**

Potential design changes consist of:

a. Upstream circuit breakers and fuses will need to increase in size, hence equipment sizes and costs may increase.

b. This may necessitate increasing the size of panelboards and feeder conductors.

c. Very high levels of short circuit selective coordination may be achieved by using high amp frame electronic trip circuit breakers

6 ANSI/IEEE Std 242-1986 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, 4.2.5.

7 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 4.2.1.

8 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 4.7.1.

9 ANSI/IEEE Std 241-1983 Recommended Practice for Electric Power Systems in Commercial Buildings, 9.1.

10 ANSI/IEEE Std 241-1983 Recommended Practice for Electric Power Systems in Commercial Buildings, 9.7.

11 WAC 296-46B-700 Emergency systems. WAC 296-46B-701 Legally required standby systems..

with low amp sensors and/or lower ampere rating adjustments (but equipment may need to be larger).

d. Voltages may need to be reduced. If the desired level of selective coordination cannot be achieved using a 480Y/277Vac panelboard, feeding a 208Y/120Vac panelboard through a transformer may need to be considered.

e. Loads may need to be split up (multiple smaller transformers).

f. Impedance may need to be inserted - longer run of wire, 1:1 or higher impedance transformer or reactors.

The proposed change would resolve the above issues.

Arc Flash Concerns. Selective coordination impact on arc flash PPE levels should be considered. Typically, for the lowest PPE level, the smallest and fastest possible OCPDs will be needed upstream. But for the best levels of selective coordination, upstream devices will typically need to be larger and slower reacting. These are in opposition to each other. Arguments from an equipment manufacturer (fuse) allege these are separate issues. However, from an engineering perspective, Arch Flash is a competing directly against Selective Coordination. See discussion in 2nd and 3rd paragraphs at the beginning of this Substantiation.

Panel Meeting Action: Reject

Panel Statement: Proposed (B) contains unenforceable language, such as "rigidly adhered to" and "selectively shall be established." The text in (C) is outside the normal application of the NEC since the authority having jurisdiction, the municipality, and the licensing board for engineers have control over the issues covered within this proposed text, such as what is necessary to be done before the start of construction. The designer, engineer, AHJ, electrical contractor, and owner may often be involved in the decisions related to selective coordination. The submitter states in his substantiation that the professional engineer has the mandate to select the appropriate overcurrent device and thus would be the sole decision-maker on the selective coordination. Again, this procedure is under the jurisdiction of the AHJ, the municipality, and the licensing board. The recommended FPN does not provide any additional information and is unnecessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 2

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

DEGNAN, J.: See My Explanation of Negative on 13-200.

13-238 Log #3719 NEC-P13 **Final Action: Reject**

(701.18, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Add a fine print note to read as follows:

FPN: Selective coordination includes coordination between standard overcurrent devices and ground fault devices.

Substantiation: Fault and over current conditions may result from a variety of conditions that range from the rare and difficult to achieve bolted three phase fault to the more probable arcing single phase ground fault. Nevertheless it is a common oversight to consider phase protection selectivity and ground fault protection selectivity separately. A phase protective device considers all current over threshold to be an overload whereas ground fault devices are able to separate a ground current from other current. Because of this, in the case of the more probable ground faults, both devices may operate simultaneously or with either device ahead of the other if ground fault selectivity between the two devices is not planned. Hence, a well-coordinated system must consider ground fault protection and standard phase overcurrent protection simultaneously.

Panel Meeting Action: Reject

Panel Statement: Automatic opening of overcurrent protective devices under a ground-fault condition is not required by Article 701.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

CZARNECKI, N.: The proposal should be accepted. The panel action and statement does not address the concerns expressed in this proposal. The requirements in 701.18 do not prohibit the installation of ground fault protection of equipment for emergency systems. Selective coordination for phase to ground, phase to phase, and three phase short circuits is insufficient where ground fault protection of equipment is installed. The ground fault protective device used for equipment protection must be included for a selectively coordinated system.

13-239 Log #1164 NEC-P13 **Final Action: Accept in Principle**

(701.18 Exception)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Proposed change deletes Exceptions 1 & 2 and replaces them as shown below:

~~Exception: Selective coordination shall not be required in (1) or (2):~~

~~(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exist(s) on the transformer secondary, or~~

~~(2) Between overcurrent protective devices of the same size (ampere rating) in series.~~

Exception: Selective coordination shall not be required between two overcurrent devices in series with one another when no loads are connected in parallel with the downstream device.

Substantiation: The intent of selective coordination is to have only the overcurrent device closest to the fault (first upstream device) to open to clear that fault. This prevents unnecessary outages to other loads on the electrical system.

The exceptions were added as 2 specific examples where no additional loads are affected if a second upstream device also opens.

The intent of this proposal is to clarify that so long as no additional loads are affected by the opening of the second upstream device, selective coordination offers no additional benefit, and should not be required.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

Exception: Selective coordination shall not be required between two overcurrent devices located in series ~~with one another~~ ~~when~~ if ~~where~~ no loads are connected in parallel with the downstream device.

Panel Statement: The changes are editorial to improve clarity and not intended as technical changes.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

DEGNAN, J.: See My Affirmative with Comment on 13-202.

13-240 Log #4681 NEC-P13 **Final Action: Reject**

(701.18 Exception No. 2 and FPN (New))

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee

Recommendation: 701.18. Designate the existing exception as Exception No. 1 and add a second exception and fine print note to read as follows:

Exception No. 2: Where the legally required standby system design is under the control of a licensed professional engineer engaged in the design or maintenance of electrical installations, the selection of overcurrent protective devices shall be permitted to coordinate to the extent practicable. The design shall be documented, stamped by the professional engineer, and made available for review by the authority having jurisdiction.

FPN: Overcurrent protective devices used for legally required standby circuit protection, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system.

Substantiation: The current NEC rule is being improperly used to drive the market share of a particular species of overcurrent protective device, often frustrating legitimate design objectives of the engineering community, and without any documented loss experience to justify such a consequence. We have received compelling testimony from engineers that have been subjected to extraordinary hardship resulting from the lack of flexibility in the current NEC provisions. This proposal is consistent with NFPA 110 (which language underlies the fine print note) and provides the necessary flexibility to allow competent engineering work that maintains selective coordination as an important element in the electrical design process, but not to the exclusion of all other issues.

Panel Meeting Action: Accept in Principle in Part

Revise Section 700.18 to read:

700.18 Coordination. Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices. The selectively coordinated devices shall be selected by a licensed professional engineer engaged primarily in the design or maintenance of electrical installations. The selection shall be documented and stamped by the professional engineer. This documentation shall be available to those authorized to design, install, inspect, maintain, and operate the system.

Panel Statement: The panel action rejects the wording "where practicable," as this is not defined and subjective. The recommendation on the qualifications for those who design the system has been revised to use the text from 240.86, as this provides a more definitive description of those who can design these systems.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 9 Negative: 5
Explanation of Negative:
CZARNECKI, N.: See NEMA statement for Proposal 13-203.
DEGNAN, J.: See My Explanation of Negative on 13-203.
LITTLE, L.: We agree with the negative comment as written by Mr. Ode.
MOUTON, C.: I'm voting against the panel action. The panel action should have been to reject the proposal, even though it does have some merit, and the submitter properly characterizes the current environment in the industry resulting from the current selective device coordination language in Articles 700.27, 701.18, and 708.54. The proposal should have been rejected in preference of Proposal 13-194, which should have been accepted in principle in part (see my comments to Proposal 13-194). See my additional comments for Proposal 13-203 that relate to this proposal also.
ODE, M.: The substantiation in the proposal and the panel statement for the Panel Action provided absolutely no technical substantiation to require selectively coordinated device installation design in an emergency, a legally required standby system, or a critical operations power system to be selected, documented, and stamped by a licensed professional engineer. The requirement for a licensed professional engineer to design and stamp drawings for these systems is overly restrictive, adds unnecessary cost to the installation, and negates a very viable resource in the use of manufacturers who provide this service on a regular basis. The owner, the electrical equipment manufacturer, the plant engineer, the electrical contractor, the AHJ, the utility company, as well as the design engineer are often involved in determining the requirements for initial design of new systems and to the extent that older systems must comply with selective coordination. In addition, 90.1(C) of the National Electrical Code states that the NEC is not intended as a design specification and, yet, the proposed text requiring a licensed professional engineer adds design requirements into the selective coordination process.
Comment on Affirmative:
CARON, D.: See my comments to Proposal 13-203.

ARTICLE 702 — OPTIONAL STANDBY SYSTEMS

13-241 Log #3033 NEC-P13 **Final Action: Reject**
(702)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
ARTICLE 702 Optional Standby Systems
I. General
702.1 Scope. Text to remain unchanged.
702.2 Definition. Text to remain unchanged.
702.3 Application of Other Articles. Text to remain unchanged.
702.4 Equipment Approval. Text to remain unchanged.
702.6 ~~702.5~~ Capacity and Rating. Text to remain unchanged.
702.7 ~~702.6~~ Transfer Equipment. Text to remain unchanged.
702.8 ~~702.7~~ Signals.
Audible and visual signal devices shall be provided, where practicable, for the following purposes.
(1) Derangement. Text to remain unchanged.
(2) Carrying Load. To indicate that the optional standby source is carrying load.
Exception: Signals shall not be required for portable standby power sources.
702.9 ~~702.8~~ Signs. Text to remain unchanged.
II. ~~Circuit~~ Wiring
702.9 Wiring Optional Standby Systems.
Text to remain unchanged.
~~III. Grounding~~
702.11 ~~702.10~~ Portable Generator Grounding. Text to remain unchanged.
702.12 ~~702.11~~ Outdoor Generator Sets. Text to remain unchanged.
Substantiation: This proposal is part of a series of proposals intended to create a parallel numbering system for Articles 700, 701 and 702.
Panel Meeting Action: Reject
Panel Statement: The proposed parallel numbering system for Articles 700, 701, and 702 is unnecessary since the articles are not large and complex articles. While there are some common titles and text, there are also titles and text that are different from one article to another. Code Making Panel 13 recommends rejection of the renumbering of Article 701.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-242 Log #2815 NEC-P13 **Final Action: Accept**
(702.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Delete this section and associated text
~~702.3 Application of Other Articles~~.
~~Except as modified by this article, all applicable articles of this Code shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 522.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-243 Log #4291 NEC-P13 **Final Action: Accept**
(702.3)

Submitter: Donald R. Cook, Shelby County Development Services
Recommendation: Delete this section.
~~702.3 Application of Other Articles.~~
~~Except as modified by this article, all applicable articles of this Code shall apply.~~
Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 702.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-244 Log #189 NEC-P13 **Final Action: Accept**
(702.4)

Submitter: Bryan P. Holland, City of North Port
Recommendation: Delete the following text:
~~702.4 Equipment Approval. All equipment shall be approved for the intended use.~~
Substantiation: This section is redundant and unnecessary. Sections 90.7, 110.2, and 110.3 already contain this provision. There is no special listing, labeling, or marking which identifies equipment as suitable for this type of system, thus, no special evaluation beyond 90.7, 110.2 and 110.3 is needed.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-245 Log #1402 NEC-P13 **Final Action: Reject**
(702.5)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A) change "suitable" to "identified".
Revise first sentence of (B)(1) as follows: Where manual transfer equipment is used, an optional standby system shall have ~~adequate capacity~~ ratings not less than required for the supply of all equipment ~~intended to be~~ that is operated simultaneously ~~at one time~~
Revise (B)(2)(b) as follows: Load Management. Where a system is employed that ~~will~~ automatically manage(s) the connected load, the standby source shall have ~~a capacity sufficient to~~ ratings not less than those required to supply the maximum computed load that ~~will be~~ is connected by the load management system.
Substantiation: "One time" is not necessarily the same as "simultaneously." "Adequate" and "sufficient" are subjective and terms to be avoided per the Style Manual. "Capacity" is not defined; "ratings" include voltage, ampere, frequency, etc. "Connected" load is not defined; some loads are computed even though no current utilizing equipment is connected.
Panel Meeting Action: Reject
Panel Statement: The panel rejects all of the proposed editorial revisions. While the NEC Style Manual may list terms to be avoided, it is not a prohibition of those terms. The context of this section is clear, and the suggested revisions do not improve clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-246 Log #3031 NEC-P13 **Final Action: Reject**
(702.5)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
702.5 Capacity ~~and Rating.~~
~~(A) Available Short-Circuit Current. Optional standby system equipment shall be suitable for the maximum available short-circuit current at its terminals.~~
~~(B) System Capacity.~~ The calculations of load on the standby source shall be made in accordance with Article 220 or by another approved method.
~~(1)~~ (A) Manual Transfer Equipment. Where manual transfer equipment is used, an optional standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. The user of the optional standby system shall be permitted to select the load connected to the system.
~~(2)~~(B) Automatic Transfer Equipment. Where automatic transfer equipment is used, an optional standby system shall comply with (B)(1) or (B)(2). ~~(2)(a) or (2)(b).~~
~~(a)~~(1) Full Load. The standby source shall be capable of supplying the full load that is transferred by the automatic transfer equipment.
~~(b)~~(2) Load Management. Where a system is employed that will automatically manage the connected load, the standby source shall have a capacity sufficient to supply the maximum load that will be connected by the load management system. Remainder of text to be unchanged.
Substantiation: This requirement is already found in 110.9/110.10, and a similar requirement is not found in 700.5. For the purposes of consistency, if nothing else, this sentence should be removed.
Alternatively, it could be added into 700.5. A similar proposal is being made to 701.6 for correlation.
Panel Meeting Action: Reject
Panel Statement: The same sentence appears in 700.5(A) and in 701.6. There are installers of generators and similar back up power that do not read the text in 110.9; therefore, providing mandatory text requiring maximum available fault rating for the equipment is re-emphasized in 702.5.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-247 Log #4315 NEC-P13 **Final Action: Reject**
(702.5)

Submitter: Chris Turner, Generac Power Systems
Recommendation: Revise text as follows:
702.5
(B) System Capacity. ~~The calculations of load on the standby source shall be made in accordance with Article 220 or by another approved method.~~ An optional standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. The user of the optional standby system shall be permitted to select the load connected to the system.
~~**(1) Manual Transfer Equipment.** Where manual transfer equipment is used, an optional standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. The user of the optional standby system shall be permitted to select the load connected to the system.~~
~~**(2) Automatic Transfer Equipment.** Where automatic transfer equipment is used, an optional standby system shall comply with (2)(a) or (2)(b).~~
~~(a) Full Load. The standby source shall be capable of supplying the full load that is transferred by the automatic transfer equipment.~~
~~(b) Load Management. Where a system is employed that will automatically manage the connected load, the standby source shall have a capacity sufficient to supply the maximum load that will be connected by the load management system.~~
(1) Automatic Transfer Systems. Where automatic transfer equipment is used, it is recommended that the optional standby system incorporate internal protective systems that monitor against overload conditions. These systems shall either automatically manage the load or shutdown the system. Systems that do not incorporate overload protections, must be sized per Article 220.
Substantiation: In a review of the ROPs submitted prior to the latest code change, 702.5 requirements became somewhat blurred. It is important to remember that this sectionrefers to optional standby systems.
The increase in generator installations, while are somewhat related to recent natural disasters, can mostly be attributed to the lowering of the cost of product and the ease of installation created by many manufacturers. As the quality and dependability of the utility is dropping the product category of optional standby systems is becoming more familiar to home owners. In attempts to maintain the quality of life expected by those home owners and their families more and more optional standby systems are being installed. Some users value high levels of system reliability and install redundant generators. Some users value the ability to support load growth and install upsized generators. And some users select generators to meet there most basic operational needs. It has been the long tradition of Article 702 to allow the user to best make this value decision relative to selecting the best sized generator to meet their unique operation needs.
Listed standby systems have been tested under overload conditions to ensure that component temperatures are the within limits of the standards being tested to and that the risk of fire is non existent.
In reviewing the ROPs that resulted in the changes to 702.5, we noticed that the primary focus was directed at the residential market. The residential market is driven by consumer choice that is significantly impacted by installed capital costs. The residential automatic standby market is dominated by air-cooled generators that cap-out at 20 Kw. The next step-up in power output moves customers into liquid cooled generators that are twice the cost. So even though the market freely offers larger generators, the market choice finds it generally unpalatable due to a significant reduction in the benefit/cost ratio. By requiring optional standby system customers to comply with utility sizing requirements as established in Article 220, the code is forcing the majority of the whole house, standby system market to transition across the 20 Kw barrier.
There is substantial data available that shows the average electrical load profile of a residential home is very low. See the table below which provides average max hourly power consumption for typical residences around the country. This shows even smaller optional standby systems are still sizable based on typical power consumption.

Typical Residence Location	Average Max Hourly Power Consumption Across 365 Days
Southern California – No Space Cooling	1.9 Kw
New Jersey – With Electric Space Heating	6.0 Kw
Baltimore – With Electric Space Heating	5.2 Kw
Source – Report prepared by NAHB Research Center, Inc., Titled Review of Electrical Residential Energy Use, dated July 16, 2001.	

The unintended consequences of this code change are that many customers may not be able to afford an inherently safe, pre-wired, automatically fueled backup system. They will instead choose to burn candles and attempt to safely use portable, gasoline powered generators. At Generac Power Systems we feel the decision as to the safest course of action, in the big picture, is to allow the market to select and size optional standby systems based on end-user operational needs.
If an optional standby system has overload protection systems built in what harm can come from the system being connected to a whole house application? What fire and/or electrical hazards present themselves if the system is overloaded but then shuts itself down?
Panel Meeting Action: Reject
Panel Statement: Deleting the requirements in 702.5(B) for proper sizing of the optional standby system feeder conductors and basing that deletion upon an automatic overload sensing device to shut the power down does not recognize the long history of safety provisions for feeders in Articles 215 and 240 and branch circuits in Articles 210 and 240, as well as the calculation requirements for sizing the system based on Article 220. Feeder circuits supplying panelboards and branch circuits supplying loads of all kinds must be calculated based on their anticipated usage based on Parts I and II of Article 220 (for branch circuits) and Parts I and III of Article 220 (for feeders) or the optional calculations based on Parts I and IV of Article 220. Section 90.3 requires compliance with Chapters 1 through 4 unless specifically modified by Chapter 7 (Article 702) in this case. Even if the existing first sentence was deleted as indicated in the proposed recommendation, feeders and branch circuits must still comply with Article 220 as the proposal text is written. Nowhere in the NEC is it permissible to intentionally overload a feeder or a branch circuit, and 240.4(B) intentionally requires the conductors to be protected at their ampacity with permission up to 800 amps to increase to the next size overcurrent protective device where the size of conductor doesn't correspond to a standard size device. The suggested change in proposed (B)(1) is already permissible based on the existing NEC as automatic load pickup and shedding systems with overload protection designed into the optional standby source.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-248 Log #3085 NEC-P13 **Final Action: Reject**
(702.5(B))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
702.5 Capacity and Rating.
(A) Text to remain unchanged.
(B) System Capacity. A load calculation shall not be required for optional standby systems.
~~(1) Manual Transfer Equipment. Where manual transfer equipment is used, an optional standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. The user of the optional standby system shall be permitted to select the load connected to the system.~~
~~(2) Automatic Transfer Equipment. Where automatic transfer equipment is used, an optional standby system shall comply with (2)(a) or (2)(b).~~
~~(a) Full Load. The standby source shall be capable of supplying the full load that is transferred by the automatic transfer equipment.~~
~~(b) Load Management. Where a system is employed that will automatically manage the connected load, the standby source shall have a capacity sufficient to supply the maximum load that will be connected by the load management system.~~

Substantiation: The functionality of an optional standby system should not be of concern in the code, as per the "practical safeguarding" intent of 90.1(A). If the optional standby system is inadequate, there is not a safety issue like there is for an emergency or legally required standby system.
Panel Meeting Action: Reject
Panel Statement: The code is an installation document, not a product design document. As a result, it is not possible to determine whether an automatic standby system has been designed safely enough to allow the standby source to be deliberately and repeatedly overloaded without resulting in some safety hazard. Therefore, the requirement to size the load properly or provide automatic "resizing" in the form of load management is appropriate.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-249 Log #1401 NEC-P13 **Final Action: Reject**
(702.6)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete "inadvertent".
Substantiation: Edit. The provision should apply whether interconnection is inadvertent (accidental) or deliberate.
Panel Meeting Action: Reject
Panel Statement: The use of the term "inadvertent" is necessary for this requirement. The deletion of this term does not improve clarity.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-250 Log #2354 NEC-P13 **Final Action: Reject**
(702.6 Exception)

Submitter: Timothy Croushore, Allegheny Power
Recommendation: Delete the Exception.
Substantiation: Deleting this exception removes the NEC permission to temporarily connect a generator to premises wiring without the use of a transfer switch. A home owner in Alabama has already killed a lineman by back feeding his home electrical wiring with a portable electrical generator without a transfer switch. Lets not continue this permission through the exception in the NEC. See the news article below.

Lineman Killed By Generator Back Feed - Victim Helping Restore Power in Alabama

Alabama, July 14, 2005 - Sumter Electric Cooperative (SECO) officials report that a South Carolina lineman helping to restore power in Alabama after the damage caused by Hurricane Dennis was killed late Tuesday, reportedly by an improperly installed customer generator.

According to SECO Director of Public Affairs Barry Bowman, the lineman was helping to restore power lost during Hurricane Dennis to customers in Alabama. The report Bowman received indicated the lineman was working on a power line that was supposed to be dead. It was not.

"Tragically, the line this technician was working on was not dead," said Bowman, "The line he was trying to repair had been re-energized by a customer who had improperly hooked up a generator and created a back feed of electricity from the generator into the supposedly dead line. The death of a lineman who was there to help the victims of Hurricane Dennis was the horrible result."

Bowman noted that the lineman's name was not immediately released, but he was from South Carolina and worked for Pike Electric, Inc. in North Carolina.

Alabama authorities are looking for the person responsible and indicate that charges are pending.

"This could happen to any lineman, anywhere, if generators are improperly used or hooked up during a power outage. That's why we caution homeowners and businesses about the proper use of generators. And, why we continually stress generator safety awareness with our SECO employees.I don't think anybody wants to be responsible for the death of another human being," said Bowman.

SECO's Director of Public Affairs noted that SECO also has 32 workers helping to restore power in the Panhandle and offered the following generator safety advice:

– Do not hook up (hard wire) a generator directly to your home or business electric panel. If you want to hard wire a generator to home or shop have a licensed electrician install a double-pole, double-throw transfer switch. This will assure that no back feed of electricity will travel out over a supposedly de-energized power line. The installation should meet the requirements of the National Electrical Code and local ordinances. Improper installation can result in serious injuries or deaths.

– One of the safest ways to use portable generators is to plug appliances, etc. directly into the generator itself rather than trying to hard wire the generator to the house. When plugging items into the generator make sure not to use undersized extension cords, keep animals and people away from the generator, and place the generator in a clean, dry, and very well ventilated area. This will avoid overheating and the potential for carbon monoxide poisoning. Installing carbon monoxide detectors in adjacent areas is a good additional safety precaution.

"We want our customers to know of the very serious consequences of improper generator use and the terrible death in Alabama underscores the importance of that type of awareness," concluded Bowman.

Panel Meeting Action: Reject
Panel Statement: Not having this exception in the NEC would not have affected the outcome of this tragic event since the homeowner did not follow the requirements in the exception and probably had no idea that the exception was even in the NEC. The exception permits "temporary connection of a portable generator without a transfer switch where conditions of maintenance and supervision ensure that only qualified persons service the installation and where the normal supply is physically isolated by a lockable disconnecting means or by disconnection of the normal supply conductors." The homeowner was probably not qualified and did not have the normal supply physically isolated from the generator source.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:

BROWN, J.: The back feed from portable generators into utility supply lines continues to be a significant hazard to lineman. Portable generators should only be connected to a premises wiring system with the use of transfer equipment that prevents the inadvertent connection between the utility supply lines and the premises wiring. Preferably, portable generators should be utilized with the loads plugged directly into the generator.

13-251 Log #3978 NEC-P13 **Final Action: Reject**
(702.8 (New))

Submitter: Michael A. Anthony, University of Michigan Business Operations
Recommendation: Add text to read as follows:

702.8 Illumination of Emergency Source Switchgear. The area around the service equipment and optional standby switchgear in non-dwelling unit occupancies 200 amperes and above shall be automatically illuminated upon loss of power. For a period of 90 minutes illumination levels shall be 1-footcandle on the egress path from the switchgear and 3-footcandles on the vertical surfaces of the service equipment.

Substantiation: The need for illumination during power outages should be intuitive. It provides illumination for a) the electrician who is working in the service equipment area without a flashlight, b) for the maintenance mechanic who may neither be an electrician nor familiar with the electric service equipment to work on it in the dark.

Electric service panels are not always installed along either the primary or secondary egress path required by the Life Safety Code and CMP-1 should not leave it to other standards to assert this requirement.

Other NFPA documents have been examined and a short summary of this examination appears below. [Underline emphasis has been added]

<u>NFPA 101</u>

There is no provision for any emergency illumination other than egress illumination for occupant safety in Section 7.8 of NFPA 101-2009. Egress safety for the occupants of an electrical room is not specifically addressed. In some cases, the cause of a building outage originates in the electrical service switchgear area. In any case, it is likely that there will be activity going to and from the electrical service equipment area during a power outage.

<u>NFPA 110</u>

An excerpt from this standard is copied below for your convenience:

7.3.1 The Level 1 or Level 2 EPS equipment location(s) shall be provided with battery-powered emergency lighting. This requirement shall not apply to units located outdoors in enclosures that do not include walk-in access.

7.3.2 The emergency lighting charging system and the normal service room lighting shall be supplied from the load side of the transfer switch.

<u>**7.3.3* The intensity of illumination in the separate building or room housing the EPS equipment for Level 1 shall be 32.3 lux (3.0 ft-candles), unless otherwise specified by a requirement recognized by the authority having jurisdiction.**</u>

Although this standard is seen four times in the NEC, all appearances are Fine Print Notes, and may be unenforceable at the local level, even if it is known to be applicable.

<u>NFPA 70E</u>

An excerpt is copied below for your convenience:

130.6 Other Precautions for Personnel Activities.

(B) Blind Reaching. Employees shall be instructed not to reach blindly into areas that might contain exposed energized electrical conductors or circuit parts where an electrical hazard exists.

(C) Illumination.

(1) General. *Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely.*

(2) Obstructed View of Work Area. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists…

Without this specific provision, emergency illumination "falls between the cracks" and remains a design option.

Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-154.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-252 Log #4682 NEC-P13 **Final Action: Reject**
(702.8(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows: "Where the removal of a main or system bonding jumper interrupts the continuity of the grounding connection to an alternate source grounded conductor, a permanent sign shall be installed on or at the equipment in which the bonding jumper is installed identifying all alternate sources having grounded conductors connected to ground through the main or system bonding jumper."
Substantiation: With changes in grounding terminology, the intent of this section is being lost. Some think this is about a connection between a grounding electrode and a grounding electrode conductor, for example. This requirement resulted from an actual case where the emergency source was supplying power, and during that period maintenance personnel disconnected the normal source grounded conductor for testing purposes. The personnel did not realize that they were also disconnecting the grounding connection for the emergency source at the same time, since the grounded system conductor was only connected to the grounding electrode conductor in the main switchboard. This rewrite makes the intent very clear.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-156.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
LITTLE, L.: See my Negative Vote on Proposal 13-221.

13-253 Log #737 NEC-P13 **Final Action: Reject**
(702.9)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Add text and a new Fine Print Note to read as follows:
702.9 Wiring, Optional Standby Systems.
The optional standby system wiring shall be permitted to occupy the same raceways, cables, boxes, and cabinets with other general wiring.
All boxes and enclosures (including transfer switches, generators, and power panels) for optional standby circuits shall not be permitted to be marked with the words "Emergency" or "Emergency Circuit" or "Emergency System", so that they will be readily distinguishable from those boxes and enclosures identified as a component of an emergency circuit or system, unless otherwise permitted in 700.9(B)(1) through 700.9(B)(5).
FPN: See 700.9(A) for identification of an emergency circuit or system.
Substantiation: Manufacturers of surface raceways, both metal (*NEC*® Article 386) and nonmetallic (*NEC*® Article 388), and of multi-outlet assemblies (*NEC*® Article 380) derived from surface raceways have had numerous inquiries from specifiers and installers for applications of surface raceways where used for Emergency Systems (*NEC*® Article 700) AND for either Legally Required Standby Systems (*NEC*® Article 701) or Optional Standby Systems (*NEC*® Article 702) AND for other general wiring (power, lighting, signaling) in the same installation. Despite the requirement of 900.9(B), these specifiers and installers are believed to be marking raceways with "EMERGENCY STANDBY", without distinction between "EMERGENCY" (*NEC*® Article 700 circuits) and "STANDBY" (*NEC*® Article 701 or Article 702 circuits), leading to confusion as to the identity of the circuit (*NEC*® Article 700 or Article 701 or Article 702) within the single-channel or multiple-channel surface raceway (or multi-outlet assembly) overall or within a specific channel of a multiple-channel surface raceway.
Editorial: Comma added in title, consistent with the similar title in Article 700.
Panel Meeting Action: Reject
Panel Statement: See the panel action and statement on Proposal 13-158.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-254 Log #3032 NEC-P13 **Final Action: Reject**
(702.10)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Delete the following text:
~~702.10 Portable Generator Grounding.~~
~~(A) Separately Derived System. Where a portable optional standby source is used as a separately derived system, it shall be grounded to a grounding electrode in accordance with 250.30.~~
~~(B) Nonseparately Derived System. Where a portable optional standby source is used as a nonseparately derived system, the equipment grounding conductor shall be bonded to the system grounding electrode.~~
Substantiation: This section is not needed, as compliance with Article 250 is not optional (90.3). Furthermore, there is no reason to require the connection of the equipment grounding conductor to an electrode for a nonseparately derived system, as this is accomplished automatically through the neutral in the transfer switch (otherwise it would be separately derived).
Panel Meeting Action: Reject
Panel Statement: There are installers of generators and similar back up power that do not read the text in 250.30 for separately derived systems and may not understand that portable generators not separately derived must have the equipment grounding conductor from the generator connected to the grounding electrode system; therefore, providing mandatory text references back to the information in Article 250 is re-emphasized in 702.10. The last statement in the substantiation is not necessarily correct for portable generators. The submitter should review Section 250.34.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-255 Log #4574 NEC-P13 **Final Action: Reject**
(702.10)

Submitter: Mike Flegel, Reliance Controls Corp.
Recommendation: III. Grounding and Bonding
(C) For portable generators with an output of 15 kilowatts or less and 250 volts or less used as a non-separately derived system, bonding of the grounded conductor to the equipment grounding conductors can occur in two places, at the generator and at the service entrance.
Substantiation: For small portable generators, this means the equipment grounding conductor will carry some of the unbalanced neutral current from the service entrance to the generator. Depending on the load, the voltage rise at the generator frame in minimal, 3 to 4 volts in most cases. There would be no voltage rise in the equipment grounding system in the premises wiring as the dual path exists only between the generator and the service entrance. Many people do not know to switch the neutral when using a bonded neutral generator to power their house and many have done this in the past without a problem. People realize this error when they try to use a portable generator with GFCI protection to power their house. The tendency then is to disconnect the equipment grounding conductor from the generator since most generator manufacturers do not have a means to unbond the generator in the field. This leads to the undesirable condition of a generator frame without any equipment ground.
Panel Meeting Action: Reject
Panel Statement: If the grounded conductor opened on the line side of the service disconnecting means, the equipment grounding conductor and all conductive parts connected to it would carry the neutral current, raising the potential to ground of exposed metal parts not intended to carry current. For this reason, the Code continues to prohibit the creation of parallel paths for normal neutral current to flow with very few exceptions, some of which only apply to existing installations. Improper installations are not sufficient justification for changing requirements intended to increase the safety of the installation.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-256 Log #4708 NEC-P13 **Final Action: Reject**
(702.11)

Submitter: Clyde V. Carl, North Carolina Dept. of Administration/State Construction Office
Recommendation: Delete text as follows:
~~The disconnecting means shall meet the requirements of 225.36.~~
Substantiation: The sentence that was added to 700.12(B)(6) is superfluous with consideration to the requirements of UL 869A and UL 2200. The physical requirements that determine a disconnecting means to be "suitable for use as service equipment" are not found in NEC®. Consequently, the mandate that equipment must be suitable for use a service equipment, without clear definition of how equipment may be suitable, may foster misunderstandings about how the requirement may be satisfied. This is the thesis by which the proposed fine print note should be added to 225.36 to mitigate a misapplication for the "suitable for service equipment" requirement of 700.12(B)(6) that was revised for the 2008 edition of the NEC®.
In UL 869A, *Reference Standard for Service Equipment,* fourth edition, one learns in Section 14.2, Insulated neutral, Paragraph 14.2.1, that, "Equipment having a neutral insulated from the enclosure, intended for use as service equipment, and that can accommodate not more than six main disconnecting means shall be marked "Suitable for use as service equipment." The NEC® definition for service equipment expands on UL 869A by stating, "The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or an otherwise designated area, and intended to constitute the main control and cutoff of the supply." The problem is that generator sets are, by the NEC® definition, separately derived systems. A separately derived system is, "A premises wiring system whose power is derived from a source of electrical energy or equipment other than a service. Such systems have no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system." A generator set is a separately derived system, therefore, there is no justification for 700.12(B)(6) to require the disconnecting means of a generator set to be suitable for service equipment. 700.12(B)(6) is ambiguous in another way.

In UL 2200, *Stationary Engine Generator Assemblies,* Section 25 discusses overcurrent protection, a requirement of equipment suitable for service equipment, and output circuit grounding. UL 2200 does not specifically call out a requirement for a neutral that is insulated from the generator set enclosure, but Section 14, Output Circuit Grounding, in paragraph 14.1.2 requires that "an output alternating current power circuit shall be grounded" when in sub-paragraph (a) "the circuit has no electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another wiring system." Conversely, the alternating current output power circuit must be insulated from ground at the generator if the circuit shares a neutral conductor ground reference with another system, or a service. If the grounded conductor is not to be shared with another system, or service, UL 2200 goes on in paragraph 14.1.4 to describe the application and sizing of a bonding jumper to ground conductors of output circuit configurations listed in paragraph 14.1.3. A bonding jumper would not be required if a generator output circuit was bonded to ground at the factory. If this were the case, the generator set output, though a separately derived system, could only be utilized in the manner of service entrance equipment, and if UL 2200 was similar to UL 869A, it would require the generator set to be labeled, "Suitable only for use as service equipment", unless its output enclosure can accommodate more than six disconnecting means, and then it would be required to be labeled. "Suitable only for use as service equipment. Install not more than six main disconnecting means."

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-181.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-257 Log #4767 NEC-P13 **Final Action: Reject**
(702.11)

Submitter: Brendan A. Foley, Eaton Corp.

Recommendation: Add new text to read as follows:

702.11 Outdoor Generator Sets

Where ~~an~~ a permanently -mounted outdoor housed generator set is equipped with a readily accessible disconnecting means located within sight of the building or structure supplied, an additional disconnecting means shall not be required where ungrounded conductors serve or pass through the building or structure. The disconnecting means shall meet the requirements of 225.36.

702.12 Provisions for Connection of Portable Generator Sets

Where provisions such as inlets, or connection cabinets are installed for the connection of a portable generator set, a disconnecting means shall be required at the point of connection. If the inlet device or receptacle is rated 100 amps or greater, the inlet receptacles shall either be rated as a disconnect, or shall be interlocked with the disconnecting means to prevent access to the connection inlets under load.

Substantiation: The existing requirement which permits omission of an additional disconnection means when the generator is within sight, should be restricted to permanently mounted generators only. Portable generators are capable of being connected in situations where they will not be within sight. Since there is no way of definitely knowing which situation might exist in the future because the portable generator and it's connections can easily change, the present allowance should be permitted only for permanently mounted generators.

Due to recent storms around the country and legislation in the state of Florida, there are more installations of provisions for the connection of a portable generator. Many of the devices that are being installed to allow the generator connection to the building electrical system that are being installed are unsafe and could result in catastrophic failure and loss of life.

This code change is to address the unsafe nature of these installations and to provide a means of personnel protection that is missing from the current NEC.

Additionally, many of these installations consist of readily accessible boxes — even boxes accessible to the general public. These boxes are supplied with accessible non-load break devices such as Cam-Loks as the inlet connection. There is no safeguard to prevent the disconnection of these cables under load. If the receptacle inlet is not a load break device, the receptacle inlets should be barriered or interlocked in such a way that they may not be disconnected from a closed circuit.

Panel Meeting Action: Reject

Panel Statement: A suitable disconnecting device is always available with a portable generator – the act of shutting it down. When the prime mover rolls to a stop, it is "off" more reliably than can be done with any other form of disconnect. Many plug and receptacle combinations are listed with horsepower ratings and are acceptable as disconnecting means for motors up to and including 60 amperes 3-phase at 120/208 volts. Pin and sleeve combination units are rated for much higher ampacities with at least one type that has an internal switch combination that switches the load off before the twist-lock cord cap can be removed. There are many different methods that can be utilized to disconnect the portable generator than the method suggested in the proposed recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-258 Log #4044 NEC-P13 **Final Action: Reject**
(702.12)

Submitter: Michael Kirchner, Generac Power Systems

Recommendation: 702.12 "New Section"

Ground-Fault Protection of Equipment

The alternate source of optional standby systems shall not be required to have ground-fault protection of equipment.

Substantiation: Generator cabling is defined as a feeder in Article 100. As a feeder, the generator disconnect is required to have ground fault protection when the conditions of 215.10 are met (1000 amps and greater than 150 volts to ground). The requirements for 215.10 are based upon the requirements of a service to have ground fault protection (230.95) which is directly referenced in 215.10.

The requirement for 1000 amp, 480 volt (greater than 150 volts to ground) services to have ground fault protection was added in 1971 because of the unusual number of fire incidences for services in this size range. It should be noted that 800 amp and below services don't have this requirement nor do 240 or 208 volt services. Given that the utility is the primary source of power, 99.9 percent of the time and the optional standby power system is powering the load 0.1 percent of the time, the risk of fire incidences from an 800 amp utility service must be at least 100 times greater than an optional standby power system feeding a 1000 amp feeder. The reasoning behind requiring ground fault protection on optional standby systems becomes illogical when comparing relative fire risks.

Optional standby systems play an incredibly important role in supporting our country's infrastructure and commerce. In many ways, optional standby systems utilized in data and telecommunication applications are as important as many legally required systems which don't require ground fault protection. Given the importance of continuity of power for many mission critical optional standby applications and the relatively low fire risks, removing the ground fault requirements seems prudent.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided to relax the requirement in 215.10 for providing ground fault protection on feeders that are 1000 amperes or greater at 277/480 volts for optional standby systems. The data provided in the recommendation was anecdotal and was without any scientific basis. Ground fault protection of these large circuits is as important with feeders from generators as feeders supplied from utility company power since higher voltages can cause continued arcing of a ground fault and subsequent fire and arcing damage to the equipment.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-259 Log #4472 NEC-P13 **Final Action: Reject**
(702.27 (New))

Submitter: Dustin Priemer, Priemer & Associates

Recommendation: In Article 702 add New Part V and Section 702.27 to read as follows:

V. Overcurrent Protection.

702.27 Selective Coordination. Optional standby system(s) overcurrent devices shall be selectively coordinated with all line side overcurrent devices that additionally supply emergency system(s) or legally required standby system(s).

Substantiation: It is recognized through the inclusion of selective coordination requirements in articles 700 & 701 that ensuring availability of power to these systems is vitally important. A loss of power to these loads can jeopardize life-safety, create hazards and hamper fire-fighting operations. For alternate power systems where emergency, legally required standby and optional standby systems are all supplied through a common overcurrent device, a fault on the optional standby system could potentially open this common overcurrent device resulting in a power outage to emergency system(s) and/or legally required standby system(s). This requirement prevents a fault on the optional standby system from causing unnecessary power outages on the emergency and legally required standby system(s).

Panel Meeting Action: Reject

Panel Statement: Optional standby power can be supplied by emergency or legally required standby power systems; however, 700.5(B) and 701.6(2) allow automatic load shedding of the optional standby system where connected to emergency or legally required standby systems. This will handle any possible overload for the systems. Overcurrent protective devices on the optional standby systems must be able to handle any short circuit or ground fault on the system without taking the emergency or legally required system off line. Section 240.12 provides selective coordination for these systems already, and no further selective coordination is necessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

DEGNAN, J.: The submitter has identified a circumstance that could compromise selective coordination, this issue and others would be addressed by my proposal 13-160.

ARTICLE 705 — INTERCONNECTED ELECTRIC POWER PRODUCTION SOURCES

4-264 Log #4683 NEC-P04 **Final Action: Reject**
(705.2)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this definition.
Substantiation: This definition is not used in Article 705.
Panel Meeting Action: Reject
Panel Statement: The submitter did not specify which of the three definitions in 705.2 is to be deleted. The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-265 Log #2514 NEC-P04 **Final Action: Reject**
(705.3)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the section as follows

705.3 Other Articles. Interconnected electrical power production sources shall comply with this article and also with applicable requirements of the other articles in Table 705.3.

Where the requirements pertaining to listed utility-interactive inverters in Article 705 differ from requirements elsewhere in this Code, the requirements of Article 705 shall apply.

Substantiation: Listed utility-interactive inverters have unique characteristics associate with their limited current output and there response to conditions on the output circuit and in the connected utility systems. These characteristics are addressed by the requirements established in Article 705. Applying contrary requirements from other articles in the Code may result in safety issues and hazardous conditions.
Panel Meeting Action: Reject
Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects. The information is covered in the requirements of Section 90.3.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-266 Log #3665 NEC-P04 **Final Action: Reject**
(705.6 (New))

Submitter: Keith W. Brand, Baton Rouge Area Electrical JATC
Recommendation: Add the following new text:

<u>705.6 System Installation. Installation of one or more electrical power production sources operating in parallel with a primary source(s) of electricity shall be installed by qualified persons with documented training and experience in the installation of such equipment. The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.</u>

Substantiation: Electrical power sources that operate in parallel to utility power sources, or operate alone, provide the same voltage thresholds that were previously determined to be within a cautious working environment. It follows that training and qualifications should be required before work is allowed on such systems. To prevent the unsafe conditions that have been exposed in the Photovoltaics industry and to be consistent within the area of parallel energy sources, the above proposed added text does provide a method to ensure increased adherence to the National Electrical Code. The Code Making Panel has the opportunity to help prevent unsafe conditions by being proactive within this emerging industry.

Additionally, The inclusion of the wording "qualified persons" does have precedence in the NEC.

See: 685.1 Scope.

This article covers integrated electrical systems, other than unit equipment, in which orderly shutdown is necessary to ensure safe operation. An integrated electrical system as used in this article is a unitized segment of an industrial wiring system where all of the following conditions are met:

(1) An orderly shutdown is required to minimize personnel hazard and equipment damage.

(2) The conditions of maintenance and supervision ensure that qualified persons service the system. **The name(s) of the qualified person(s) shall be kept in a permanent record at the office of the establishment in charge of the completed installation.**

A person designated as a qualified person shall possess the skills and knowledge related to the construction and operation of the electrical equipment and installation and shall have received documented safety training on the hazards involved. **Documentation of their qualifications shall be on file with the office of the establishment in charge of the completed installation.**

(3) Effective safeguards acceptable to the authority having jurisdiction are established and maintained.

Also:

215.2(B)(3) Supervised Installations. For supervised installations, feeder conductor sizing shall be permitted to be determined by qualified persons under engineering supervision. Supervised installations are defined as those portions of a facility where all of the following conditions are met:

(1) Conditions of design and installation are provided under engineering supervision.

(2) **Qualified persons with documented training and experience** in over 600-volt systems provide maintenance, monitoring, and servicing of the system. 215.2

Panel Meeting Action: Reject
Panel Statement: The panel supports installation of these systems by qualified persons. However, the NEC cannot contain requirements relative to the qualifications of installers for any electrical system. These requirements need to be handled by local or state qualification committees or licensing boards. See Annex H of the NEC for recommendations on establishing such bodies.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:

STAFFORD, T.: This Panel Member has determined that extensive training is required for emerging technologies. As there are no provisions outlined in the electrical safety standards, this is an opportunity to ensure safe, reliable growth of an emerging technology and prevent the failures of the past related to other parallel energy sources. The interaction(s) of utility interconnected Power Production Sources requires detailed knowledge into electrical fundamentals and experience gained through training and actual performance working on electrical systems. A large percentage of installers have no electrical background and/or training and there is no license requirement in place to mandate this requirement. The panel statement "The NEC cannot contain requirements relative to the qualifications of the installers for any electrical system, these requirements need to be handled by local state qualification committees or licensing boards" is ineffective for the following reasons.

First, the NEC does contain requirements for qualifications of installers and maintaining documentation thereof, see Article 685 and Article 215.2B)(3) and substantiation provided in the original proposal by submitter. Article 685 describes industrial wiring system and details the importance of necessary training for the personnel involved. The same concerns are present for parallel energy sources. Specifically, an orderly shutdown of the system is required upon certain conditions, service of equipment requires someone knowledgeable in the functions and electrical characteristic thereof, and effective safeguards should be in place acceptable to the AHJ. The original proposal attempts to provide the safeguards that are critically needed by a growing industry. The panel may decide that article 685 is not relevant when determining if like requirements should be in place for article 690, but the panel cannot claim the affects are as critical to personnel and equipment.

Second, local license boards are not addressing the issue at a pace to insure safety for the consumer/users of parallel energy sources and for the personnel involved.

TOOMER, R.: See Proposal 4-186.

Comment on Affirmative:

ROGERS, J.: I agree with the panel action on this proposal, however, the submitter is correct in his concern relative to requiring "qualified persons" to install these systems. This is extremely important for these systems to assure the safety or persons and property where these systems are utilized. Unfortunately the NEC is an installation document and not a qualification document. Any areas of the country that utilize any type of electrical licensing laws should be sure that their laws extend to these installations. Any areas of the country that do not have electrical licensing laws should refer to Annex H of the NEC and consider adopting it as a guide for qualified personnel performing electrical installations.

4-267 Log #2515 NEC-P04 **Final Action: Accept in Principle**
(705.12(A))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise Section 705.12(A) as follows:
(A) Supply Side. An electrical power production source shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6) <u>in accordance with 705.12(A)(1) through 705.12(A)(4)</u>
<u>(1) The sum of the ratings of all overcurrent devices connected to power production sources shall not exceed the rating of the service.</u>
<u>(2) The service conductor connection shall comply with the requirements established for services in Article 230.</u>
<u>(3) The Tap Rules of Section 240.21 shall not be applied.</u>
<u>(4) Where a main-lug-only main service panel is used, the sum of the ratings of all overcurrent devices in the panel connected to power production sources shall not exceed the rating of the service panel.</u>
Substantiation: Supply side connections of PV equipment are becoming more frequent as the size of these PV systems exceeds the allowances for load side connections. Requirements for these supply-side taps must be established which are not found elsewhere in the Code.

(1) Self explanatory.

(2) Self explanatory

(3) The Section 240.21 Tap Rules have been developed over many years with a carefully controlled system where there is only one source of current and that source is protected by an overcurrent device. With a service tap, and a PV utility-interactive inverter, there are two sources of current and one (the utility-source) is effectively not protected at anywhere near the ampacity of the conductors. Tap rules have not been developed for this type of system, and the allowances of Section 240.21 should not be applied.

(4) In some installations, a main-lug-only main service panel may be used that has one or more open breaker positions (of the allowed six) that can be used for the connection of utility-interactive inverter(s). This requirement limits the output of the added power production sources to the rating of the service panel. Without this requirement, installers may inadvertently connect two 60-amp utility-interactive inverters to a 100-amp panel.

Panel Meeting Action: Accept in Principle

Revise Section 705.12(A) as follows:

(A) Supply Side. An electrical power production source shall be permitted to be connected to the supply side of the service disconnecting means as permitted in 230.82(6). <u>The sum of the ratings of all overcurrent devices connected to power production sources shall not exceed the rating of the service.</u>

Panel Statement: Add a second sentence to 705.12(A) consisting of the language submitted in item (1) in the proposal. The remainder of the proposal is not required for the following reasons: item (2) is already covered by the requirements found in Article 230 and item (3) is not necessary as this installation would not be permitted with the existing tap rules located in 240.21, item (4) is not necessary as it is covered by the language extracted from item (1) of this proposal. In addition, Section 408.36 prohibits the use of MLO panelboards in this application.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Negative: 1

Explanation of Negative:

BOWER, W.: The proposal as submitted provides a better article. The panel statement that (2) is covered in the requirements of Article 230 could not be verified in my search. The prohibition of MLO panel boards is also not found in Article 408.36.

4-268 Log #4684 NEC-P04 **Final Action: Reject**
(705.12(C))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Insert a new (4) as follows:

(4) The interconnection point within the premises supplied shall comply with the requirements in 705.12(D)(1) through 705.12(D)(7). Where a utility-interactive inverter is specified, apply the rule as though an interconnected power production source were specified instead. In the warning label required in 705.12(D)(7), substitute “INTERCONNECTED ELECTRIC POWER PRODUCTION SOURCE CONNECTION” for “INVERTER OUTPUT CONNECTION”.

Substantiation: These rules result in many large cogeneration projects being connected downstream of the service. Remember this is any form of cogeneration, including internal combustion engines that turn large induction generators while creating hot water from their cooling systems that is used for other purposes. Such systems use electronic controls to synchronize their output to the utility network, in accordance with 705.14. These systems do not begin with the production of dc current, and therefore their connections do not involve a utility-interactive inverter.

This part has not been correlated with (D) with respect to the size limitation and the connection location limitations that apply where utility-interactive inverters connect to conventional panelboards. A connection under this paragraph is presently not limited in those ways, even though the potential current injection is far higher, which makes the problem potentially far worse. This proposal places these sources of current injection on the same footing as those from inverters.

Panel Meeting Action: Reject

Panel Statement: The wording does not fit or work with 705.12(C). This section is a list of items, all of which must be complied with, and there are variables in the proposal. Interconnection requirements for utility interactive inverters are based on UL 1741 listing for the inverters to meet IEEE 1547. The requirements in 705.12(D) are not applicable to other types of interconnected power systems.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-269 Log #2517 NEC-P04 **Final Action: Reject**
(705.12(D))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Revise 705.12(D) as follows:

(D) Utility-interactive Inverters. The output of a utility-interactive inverter shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment including switchboards and panelboards is fed simultaneously by a primary source(s) of electricity and one or more utility-interactive inverters, and where this distribution equipment is capable of supplying multiple branch circuits or feeders or both, the interconnecting provisions for the utility-interactive inverter(s) shall comply with (D)(1) through (D)(<u>6</u> ~~7~~).

(1) Dedicated Overcurrent and Disconnect. Each source interconnection shall be made at a dedicated circuit breaker or fusible disconnecting means.

(2) Bus or Conductor Ampere Rating. <u>The continuous current output of the inverter(s) shall not exceed the ampere rating of the busbar or conductor to which they are connected. In systems where panelboards are connected in series, the ampere rating of the first overcurrent device connected directly to the inverter(s) shall be used in the calculations for all busbars and conductors. The busbar or conductor shall be sized for the loads connected in accordance with Article 220. One of the methods in (a)-(e) shall be used to determine the ratings of busbars in panelboards or the ampacity of conductors:</u>

<u>(a) The sum of the ampere ratings of the overcurrent devices supplying power to the busbar or conductor shall not exceed the ampacity of the busbar or conductor.</u>

FPN: This general rule assumes no limitation in the number of the loads or sources applied to a busbar or their locations.

<u>(b) Where two sources are located at opposite ends of a conductor that contains no taps, the ampere rating of the largest overcurrent device supplying power to the conductor shall not exceed the rating of the conductor. Permanent warning labels shall be applied to conductor access points, and at 2.8m (10 ft) intervals along raceways, with the following or equivalent wording:</u>

<u>WARNING</u>
<u>THIS EQUIPMENT FED BY MULTIPLE SOURCES</u>
<u>DO NOT TAP CONDUCTOR.</u>

<u>(c) Where two sources, one utility and the other an inverter, are located at opposite ends of a busbar or conductor that contains loads, the sum of the ampere ratings of the overcurrent protection supplying power to the busbar or conductor shall not exceed 120% the ampacity of the busbar or conductor. A permanent warning label shall be applied to the distribution equipment with the following or equivalent wording:</u>

WARNING
INVERTER OUTPUT CONNECTION
DO NOT RELOCATE
THIS OVERCURRENT DEVICE

<u>*Exception: Panelboards with multiple ampacity buswork are not addressed by this provision.*</u>

<u>(d) The sum of the ampere ratings of all overcurrent devices on panelboards, both load and supply devices, excluding the main supply overcurrent device, shall not exceed the ampacity of the busbar. The ampere rating of the main supply overcurrent device shall not exceed the rating of the busbar. Permanent warning labels shall be applied to distribution equipment with the following or equivalent wording:</u>

<u>WARNING</u>
<u>THIS EQUIPMENT FED BY MULTIPLE SOURCES</u>
<u>TOTAL RATING OF ALL OVERCURRENT DEVICES, EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE, SHALL NOT EXCEED AMPACITY OF BUSBAR.</u>

<u>(e) Connections shall be permitted on feeders where designed under engineering supervision that includes, but is not limited to, fault studies and conductor damage curves.</u>

(3) Ground-Fault Protection. The interconnection point shall be on the line side of all ground-fault protection equipment.

Exception: Connection shall be permitted to be made to the load side of ground-fault protection, where~~, provided that there is ground-fault protection for equipment from all ground-fault current sources. Ground-fault protection devices used with supplies connected to the load-side terminals~~ those devices are identified and listed as suitable for backfeeding.

(4) Marking. Equipment containing overcurrent devices in circuits supplying power to a busbar or conductor supplied from multiple sources shall be marked to indicate the presence of all sources.

(5) Suitable for Backfeed. Circuit breakers, if backfed, shall be suitable for such operation.

FPN: Circuit breakers that are marked “Line” and “Load” have been evaluated only in the direction marked. Circuit breakers without “Line” and “Load” have been evaluated in both directions.

(6) Fastening. Listed plug-in-type circuit breakers backfed from utility-interactive inverters that are listed and identified as interactive shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.

~~**(7) Inverter Output Connection.** Unless the panelboard is rated not less than the sum of the ampere ratings of all overcurrent devices supplying it, a connection in a panelboard shall be positioned at the opposite (load) end from the input feeder location or main circuit location. The bus or conductor rating shall be sized for the loads connected in accordance with Article 220. In systems with panelboards connected in series, the rating of the first overcurrent device directly connected to the output of a utility-interactive inverter(s) shall be used in the calculations for all busbars and conductors. A permanent warning label shall be applied to the distribution equipment with the following or equivalent wording:~~

~~WARNING~~
~~INVERTER OUTPUT CONNECTION~~
~~DO NOT RELOCATE THIS~~
~~OVERCURRENT DEVICE~~

Substantiation: 705.12(D) was edited extensively during code making panel meetings and did not receive public review. Subparagraph (D)(7) is very difficult to read and understand. New, and safe methods or connecting utility-interactive inverters to conductors and panelboards have been identified and defined. This proposed revision addresses those items and others as noted.

(D) Introduction—No change except in the numbering of the paragraph that was changed from 7 to 6 because (7) has been included in (2).

(D)(1) No change

(D)(2) Substantial changes to allow additional safe and cost effective methods of connecting the output of utility-interactive inverters to a panelboard bus bar or a conductor.

The second sentence is extracted from 690.64(B)(2) in the *2008 NEC* that was omitted in error during the transition to 705. A separate proposal has been submitted to delete 690.64 since those requirements are now in 705.12 (D).

(a) This general rule as explained by the FPN ensures that any conductor or bus bar with multiple sources and multiple loads will be protected.

(b) With these restrictions on the location of sources at each end, it is not possible to overload a conductor through the connection of any load in any position.

(c) This is a revision of 705.12(D)(7) for clarity. It belongs under (D) as it is a method of determining bus rating and protection. The warning is self explanatory.

The exception is required because center tapped bus bars cannot be protected by this method.

(d) This new method protects the busbar or conductor by limiting the sum of the ratings of all (source and load) overcurrent devices, except the overcurrent device on the main (largest) source. For example: With a 100 amp bus, the method would allow 100 amps of supply breakers and no load breakers, 100 amps of load breakers and no supply breakers, or any combination of the two adding to 100 amps or less. The rating of the main breaker need not be counted in protecting the busbar except that its rating must also not exceed the bus bar rating.

(e). This new allowance lets engineering evaluations be made by qualified people in making taps where multiple sources of power are involved.

(3) The ground-fault requirement is modified to address the unique characteristics of utility-interactive inverters where the tripping of a ground-fault protected main breaker will turn off, not only the connected loads, but also the load-side connected utility-interactive inverter. This automatically provides protection from ground-fault currents from all sources

(4), (5), and (6) no change.

(7) is deleted, the requirements revised for clarity, and placed in (D)(2).

Panel Meeting Action: Reject

Panel Statement: The proposal has insufficient substantiation for the panel to accept.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 11 Abstain: 1

Explanation of Abstention:

BOWER, W.: The proposal was a significant change but did provide substantiation for safe and cost effective methods to connect the output of utility-interactive inverters and other substantiations were adequate in my opinion. I believe the public comment period will be an effective method to address the deficiency identified by the panel statement that in my opinion is deficient.

4-270 Log #2516 NEC-P04 **Final Action: Accept in Principle**
(705.12(D) Exception)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal pertaining to the use of the word "When" since "when" is a condition of time rather than a location or situation.

This action will be considered by the panel as a public comment.

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Add the following exception.

705.12(D)(2) Bus or Conductor Rating.

Exception: Where the photovoltaic system has an energy storage device to allow stand-alone operation of loads, 125% of the rated utility-interactive current from the inverter shall be permitted to be used in the calculation of bus rating or conductor ampacity instead of the rating of the overcurrent device between the inverter and the bus or conductor. In no case shall the bus or conductor have a rating less than the connected loads.

Substantiation: In many systems, these multi-mode inverters (utility-interactive inverters/stand-alone inverters/battery chargers) can process power from the utility to the batteries and to the connected output loads in *excess* of their ability to backfeed current to the utility grid. For example, several popular inverters can take 60 amps from the grid for battery charging and supplying battery-backed up loads, but can only supply 30 amps in the utility-interactive mode to the grid. For the load circuit, a circuit breaker of 80 amps (1.25 x 60 plus round up to next standard breaker) must be used in the panel supplying the system to meet *NEC* requirements. If 705.12(D)(2) is used as currently written, then the impact of this 80-amp breaker on sizing the panel is severe. Since the inverter is capable of supplying only 30 amps of utility-interactive current to the panel and to the utility grid, it is safe to allow 125% of the continuous inverter backfeed current (37.5 amps) to be used in the 705.12(D)(2) calculation rather than the rating of the required load breaker (80 amps).

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

Exception: When ~~Where~~ the photovoltaic system has an energy storage device to allow stand-alone operation of loads, the value used in the calculation of bus or conductor loading shall be 125% of the rated utility-interactive current from the inverter instead of the rating of the overcurrent device between the inverter and the bus or conductor ~~shall be permitted to be used in the calculation of bus rating or conductor ampacity instead of the rating of the overcurrent device between the inverter and the bus or conductor. In no case shall the bus or conductor have a rating less than the connected loads.~~

Panel Statement: Exception reworded for readability. Last sentence omitted since it is not relevant to the exception and is not substantiated.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-271 Log #3281 NEC-P04 **Final Action: Reject**
(705.22)

Submitter: Dan Leaf, Seneca, SC

Recommendation: Delete text and substitute:

The disconnecting means for ungrounded conductors shall consist of an identified manually externally operable enclosed switch(es) or circuit breaker(s) in accordance with the following:

(1) Located where readily accessible

(2) Externally operable

(3) If power operable of a type that can be manually opened

(4) Plainly and durably marked to indicate the open (off) and Closed (on) position

(5) Have ratings not less than the calculated load and the available fault current. Disconnecting means that can be energized from load terminals shall be provided with a durable and permanent sign on the exterior with the words "Warning Load terminals may be energized from a different source."

Substantiation: Edit. Disconnecting means should be manually operable whether or not power operable. A readily accessible location is not a feature of disconnecting means but an installation requirement. The on and off positions should be marked; up and down positions may be deemed "indicating". "Externally operable" is defined in Article 100 and should apply without reference to power failure. "Both sides" is not specific.

Panel Meeting Action: Reject

Panel Statement: The proposal does not meet the requirements of 4.3.3(b) of the Regulations Governing Committee Projects.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-272 Log #2518 NEC-P04 **Final Action: Accept**
(705.22(4), FPN No. 2 to (4))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum

Recommendation: Delete 705.22(4) FPN No. 2 to (4).

705.22 Disconnect Device.

The disconnecting means for ungrounded conductors shall consist of a manually or power operable switch(es) or circuit breaker(s) with the following features:

(1) Located where readily accessible

(2) Externally operable without exposing the operator to contact with live parts and, if power operable, of a type that could be opened by hand in the event of a power-supply failure

(3) Plainly indicating whether in the open (off) or closed (on) position

(4) Having ratings not less than the load to be carried and the fault current to be interrupted. For disconnect equipment energized from both sides, a marking shall be provided to indicate that all contacts of the disconnect equipment might be energized.

FPN No. 1 to (4): In parallel generation systems, some equipment, including knife blade switches and fuses, is likely to be energized from both directions. See 240.40.

~~FPN No. 2 to (4): Interconnection to an off-premises primary source could require a visibly verifiable disconnecting device.~~

(5) Simultaneous disconnect of all ungrounded conductors of the circuit

(6) Capable of being locked in the open (off) position

Substantiation: This FPN is related to utility requirements and should not be addressed, even as information, in the *NEC*. Many utilities in areas of highest PV system penetration are no longer requiring a visibly verifiable disconnecting means because of the inherent safety systems built into the listed/certified utility-interactive inverters.

Panel Meeting Action: Accept

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

4-273 Log #2520 NEC-P04 **Final Action: Reject**
(705.22(6))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Delete 705.22(6).

705.22 Disconnect Device.

The disconnecting means for ungrounded conductors shall consist of a manually or power operable switch(es) or circuit breaker(s) with the following features:

(1) Located where readily accessible

(2) Externally operable without exposing the operator to contact with live parts and, if power operable, of a type that could be opened by hand in the event of a power-supply failure

(3) Plainly indicating whether in the open (off) or closed (on) position

(4) Having ratings not less than the load to be carried and the fault current to be interrupted. For disconnect equipment energized from both sides, a marking shall be provided to indicate that all contacts of the disconnect equipment might be energized.

FPN No. 1 to (4): In parallel generation systems, some equipment, including knife blade switches and fuses, is likely to be energized from both directions. See 240.40.

FPN No. 2 to (4): Interconnection to an off-premises primary source could require a visibly verifiable disconnecting device.

(5) Simultaneous disconnect of all ungrounded conductors of the circuit

~~(6) Capable of being locked in the open (off) position~~

Substantiation: The lockable disconnect requirement is a utility requirement imposed by some, but not all utilities. There is no safety reason that would require a lockable disconnect requirement in the *NEC*.
Panel Meeting Action: Reject
Panel Statement: The submitter has not submitted any technical data to support the removal of this enhanced safety requirement. There is a difference between a utility company requiring these devices to be locked to prevent access to internal parts and the ability to lock the disconnect in the off position.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12
Comment on Affirmative:

MCDANIEL, R.: Disagree with submitter's substantiation. Many utilities will still require a visually verifiable disconnect. There is no guarantee that a backfeed will not occur.

4-274 Log #3941 NEC-P04 **Final Action: Accept**
(705.32)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal pertaining to the use of "When" since "when" is a condition of time rather than a location or situation.

This action will be considered by the panel as a public comment.
Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:

705.32 Ground-Fault Protection.

~~here~~ When ground-fault protection is used, the output of an interactive system shall be connected to the supply side of the ground-fault protection.
Substantiation: Editorial change of the first word "[W]here" to be "When" according to the 2003 National Electrical Code Style Manual amended January 15, 2003 (in 3.3.4 Word Clarity) example of word use that shall not be permitted. "*Where* (in the sense of *when* or *if* - use *when* or *if*) instead."

The comment is based on the printed version that is missing the first letter "W" though the electronic version available to subscribers of the NFPA Codes has the "W".
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-275 Log #4685 NEC-P04 **Final Action: Accept**
(705.60(B))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete the title of (1), so as to close up the first sentence (in 705.60) about currents being classified as continuous with the what will be the second sentence of (B), namely, the 125 percent rule in (1) followed by the last sentence regarding 240.4(B) and 240.4(C).
Substantiation: The Style Manual does not allow for a single, orphaned numbered paragraph below a lettered paragraph, and there is not paragraph (2) in this section. This proposal corrects this editorial problem.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-276 Log #4686 NEC-P04 **Final Action: Accept**
(705.65)

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete paragraphs (C) and (E).
Substantiation: This is section is 690.9 verbatim except that "Photovoltaic" has been replaced by "Inverter" in the title of (C). Some of this information is highly questionable in a section supposedly designed for generic applicability. In particular, the one-ampere fuse increment rule in (C) and the express use of the word "modules" in (E) are specific to photovoltaic systems and highly questionable in a section covering generic requirements. In addition, (C) allows the use of supplementary overcurrent protective devices by right; many cogenerating sources have far higher current and available fault currents than photovoltaic panels, and a more robust branch-circuit overcurrent device would probably be required. The approach in this section needs to be thoroughly reconsidered.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-277 Log #2521 NEC-P04 **Final Action: Accept in Principle**
(705.65(B) Exception)

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Revise the Exception as shown:
705.65(B) Power Transformers.
Exception: A power transformer with a current rating on the side connected toward the ~~PV power source~~ utility-interactive inverter output, not less than the ~~short-circuit~~ rated continuous output current of the inverter, shall be permitted without overcurrent protection from that source.
Substantiation: Under short-circuit conditions, the anti-islanding circuits required by UL Standard 1741 in all utility-interactive inverters, sense the near zero voltage and cause the inverters to immediately shut down. These inverters cannot operate when connected a short circuit. Transformer protection is more properly afforded by comparing the transformer rating to the continuous rated output of the inverter.
Panel Meeting Action: Accept in Principle

Revise the recommendation to read as follows:

Exception: A power transformer with a current rating on the side connected toward the utility-interactive inverter output that is not less than the rated continuous output current of the inverter shall be permitted without overcurrent protection from that source.
Panel Statement: This rewording improves clarity of sentence.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-278 Log #2522 NEC-P04 **Final Action: Accept**
(705.65(C))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Delete section 705.65(C)
~~**(C) Inverter Source Circuits.** Branch-circuit or supplementary-type overcurrent devices shall be permitted to provide overcurrent protection in inverter source circuits. The overcurrent devices shall be accessible but shall not be required to be readily accessible. Standard values of supplementary overcurrent devices allowed by this section shall be in one ampere size increments, starting at 1 ampere up to and including 15 amperes. Higher standard values above 15 amperes for supplementary overcurrent devices shall be based on the standard sizes provided in 240.6(A).~~
Substantiation: This section was inadvertently copied from Article 690 during the *2008 NEC* code making cycle and does not belong in a section on utility-interactive inverters. The input circuits to utility-interactive inverters are direct current outputs of the PV or other dc power system. Those requirements are addressed in Article 690 or in other articles dealing with the inputs to utility-interactive inverters.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-279 Log #2523 NEC-P04 **Final Action: Accept**
(705.65(D))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Delete Section 705.65(D).
~~**(D) Direct-Current Rating**. Overcurrent devices, either fuses or circuit breakers, used in any dc portion of a utility interactive inverter power system shall be listed for use in dc circuits and shall have the appropriate voltage, current, and interrupt ratings.~~
Substantiation: The section does not apply to the parallel connection of ac power production sources. It is related to the dc input for such devices. The requirement is addressed in other articles relating to the direct-current input of utility-interactive inverters.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-280 Log #2524 NEC-P04 **Final Action: Accept**
(705.65(E))

Submitter: John Wiles, Southwest Technology Development Inst/New Mexico State Univ. / Rep. PV Industry Forum
Recommendation: Delete 705.65(E)
~~**(E) Series Overcurrent Protection.** In series-connected strings of two or more modules, a single overcurrent protection device shall be permitted.~~
Substantiation: This section is not applicable to utility-interactive inverters. It applies to PV systems and is addressed in Article 690.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

4-281 Log #2291 NEC-P04 **Final Action: Reject**
(705.70)

Submitter: James W. Beutler, Laclede, ID
Recommendation: These installations shall comply with (1) through ~~(4)~~ (5):
(5) An inverter installed on a rooftop, where conductors or cables are installed in conduits exposed to direct sunlight, shall be installed in accordance with 310.15 (B)(2)(c).
Substantiation: This addition is inserted, because 705.70 allows for the installation of an inverter on a roof, which introduces safety factors associated with proper conductor sizing. Some installations, depending on the location on the rooftop, may require the installation of conduits to, and from the inverter for the protection of conductors or cabling from damage such as wind, debris, snow load, and person/persons climbing/scaling on the rooftop. This would require additional adjustments made to the ampacity of the conductors, because of temperature adjustments for conduits above rooftops in direct sunlight, as per 310.15(B)(2)(c). This addition would address such situations, making those installations safer.
Panel Meeting Action: Reject
Panel Statement: This proposal restates existing code language unnecessarily. The necessity to comply with this requirement is inherent in the code.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

ARTICLE 708 — CRITICAL OPERATIONS POWER SYSTEMS (COPS)

13-260 Log #3553 NEC-P13 **Final Action: Reject**
(708.1)

Submitter: Stephen McCluer, APC by Schneider Electric
Recommendation: Revise text to read as follows:
708.1 Scope
The provisions of this article shall apply to new construction and shall apply to the installation, operation, monitoring, control, and maintenance of the portions of the premises wiring system intended to supply, distribute, and control electricity to designated critical operations areas (DCOA) in the event of disruption to elements of the normal system.
Substantiation: The second paragraph of the Scope suggests (implicitly, not explicitly) that any “municipal, state, federal, or other code by any governmental agency having jurisdiction” can declare (perhaps arbitrarily) that a facility is a DCOA and therefore must meet the provisions of Article 708. It would be unusual for such designation to find its authorization in the Electrical Code. The Scope implies that such designation could (and probably would?) be applied to an existing facility. Some sites might be able to meet Article 708 requirements, but the great majority probably would not be able to do so without some level of renovation. In many cases (perhaps most?), the work required to come into compliance with 708 could be prohibitively expensive, disruptive, and /or impossible. For example, you can’t move your building to a different floodplain. The Code should clearly state that Article 708 should not be applied retroactively.
Panel Meeting Action: Reject
Panel Statement: The National Electrical Code (Article 708 included) is an installation code and applies only when an electrical installation is initially installed, is upgraded or is renovated. Article 708 applies only where mandated by other entities as is clearly conveyed 708.1 It is not within the scope of the NEC or Article 708 to prevent, for example, the federal government from requiring an existing installation meet the requirements of Article 708. Many existing facilities house systems with objectives vital to public safety. Annex F under Improving Availability states “The appropriate methods to use for improving availability depend on whether the facility is being designed or is already in use.” The annex offers three methods for improving availability for existing facilities where the current level of availability is unacceptable. Therefore, existing sites unable to meet Article 708 requirements in their entirety are offered alternatives and can still meet the objective of improving availability.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-261 Log #1117 NEC-P13 **Final Action: Reject**
(708.1 FPN No. 2 (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Insert the following FPN No. 2:
FPN No. 2: The provisions of Chapter 8, *Communications Systems*, cover communications circuits and equipment not deemed to serve designated critical operations areas (DCOA).
Renumber existing FPNs 2 through 8 as FPNs 3 through 9.
Substantiation: NEC users, including AHJs, may misinterpret new Article 708 as applying to communications circuits and equipment that, in their view, are critical. They should be reminded that the first place to look for communications criteria is in Chapter 8. To avoid misapplication of Article 708, the user needs to be fully aware of the distinction between the “normal” communications provisions of Chapter 8 and the more stringent, specialized provisions of 708. The proposed FPN helps to reinforce that distinction.
Panel Meeting Action: Reject
Panel Statement: The COPS systems and circuits are determined by municipal, state, federal, or other codes by any governmental agency having jurisdiction or by facility engineering documentation as stated in the scope. In addition, 90.3 states that Chapter 8 is not subject to the requirements of Chapters 1 through 7, except where the requirements are specifically referenced in Chapter 8, and since Article 708 is not referenced in Chapter 8, the requirements in Article 708 need not apply. The new fine print note is not needed.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-262 Log #3946 NEC-P13 **Final Action: Accept**
(708.1, FPN No. 8 and No. 9)

Submitter: James Kelley, Sargent & Lundy
Recommendation: Add new text as follows:
FPN No. 8: See Annex ~~G~~ F for information on ~~Supervisory Control and Data Acquisition~~ Availability and Reliability for Critical Operations Power Systems; and Development and Implementation of Functional Performance Tests (FPTs) for Critical Operations Power Systems.
FPN No. 9: See Annex G for information on Supervisory Control and Data Acquisition.
Substantiation: Insert a Fine Print Note (FPN) to refer to Annex F. Insertion is preferred instead of adding at the end to provide orderly arrangement of the references to the alphabetically arranged annexes.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-263 Log #1263 NEC-P13 **Final Action: Reject**
(708.2.Category I, Category II, Category III, and Category IV)

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.
Recommendation: Add new text as follows:
Category I – Systems that have been designated to remain operational for emergency services to function.
Category II – Systems that have been designated to significantly contribute to the delivery of emergency services or are essential for disaster recovery.
Category III – Systems that have significant impact on the protection of life and property, but are not immediately essential for providing emergency services. Category III systems are typically restorable to operation within 24 hours.
Category IV – Critical systems that have significant impact on the protection of life and property, but are not immediately essential, as there are multiple facilities providing the same function. Category IV systems are typically restorable to operation within 24 hours of the time utility power, water and sewage disposal are available to the facility.

Substantiation: Having categories of critical systems provides a method to align the importance of the COPS to the protection of life and property. The definitions are needed for several companion proposals that provide a gradient scale of requirements.

The classifying governmental agency having jurisdiction would benefit from a gradient level of criticality, which provides a means to ensure the most critical systems have the resources allocated to them so that they are available when needed to deliver emergency services and provide for disaster recovery. Without a gradient scale, fewer systems can be addressed because they would all require the most extensive amount of resources.

Panel Meeting Action: Reject

Panel Statement: Article 708 provides minimum electrical installation requirements for electrical systems designated by another entity as being critical. It is not within the scope of Article 708 to determine and or specify categories of installations with respect to their being critical. Section 708.4(A) provides the necessary provisions for conducting risk assessments, and the submitter has identified one method of conducting risk assessment, and it is not the intent of this article to restrict the risk assessment to a single method.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-264 Log #140 NEC-P13 **Final Action: Accept**
(708.2.Supervisory Control and Data Acquisition)

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

Supervisory Control and Data Acquisition (SCADA). An electronic system that provides monitoring and controls for the operation of the critical operations power system. This can include the fire alarm system, security system, control of the HVAC, the start/stop/monitoring of the power supplies and electrical distribution system, annunciation and communication<u>s</u> equipment to emergency personnel, facility occupants, and remote operators.

Substantiation: Article 100 has a definition for communications equipment, not communication equipment.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-265 Log #2816 NEC-P13 **Final Action: Accept**
(708.3)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Delete this section and associated text

~~708.3 Application of Other Article~~.

~~Except as modified by this article, all applicable articles of this Code shall apply.~~

Substantiation: NEC 90.3 indicates Chapters 1 - 4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 522.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-266 Log #4290 NEC-P13 **Final Action: Accept**
(708.3)

Submitter: Donald R. Cook, Shelby County Development Services

Recommendation: Delete this section.

~~708.3 Application of Other Articles.~~

~~Except as modified by this article, all applicable articles of this Code shall apply.~~

Substantiation: NEC 90.3 indicates Chapters 1-4 apply generally and Chapters 5, 6, and 7 supplement or modify the general requirements. The text in 708.3 repeats the requirement previously expressed in 90.3 and serves no additional purpose. It should also be noted that other "Special" articles do not include a similar requirement. Inconsistent application of the text could also lead to confusion.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-267 Log #1118 NEC-P13 **Final Action: Reject**
(708.3, FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)

Recommendation: Insert the proposed FPN following 708.3:

<u>FPN: See Chapter 8 for non-DCOA communications applications.</u>

Substantiation: NEC users, including AHJs, should be reminded that the first place to look for communications criteria is in Chapter 8. To avoid misapplication of Article 708, the user needs to be fully aware of the distinction between the "normal" communications provisions of Chapter 8 and the more stringent, specialized provisions of 708. The proposed FPN helps to reinforce that distinction.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-261.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-268 Log #1265 NEC-P13 **Final Action: Reject**
(708.4(A))

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.

Recommendation: Add new text to read as follows:

In critical operations power systems, risk assessment shall be performed to identify hazards, the likelihood of their occurrence, and the vulnerability of the electrical system to those hazards. <u>The thoroughness of the risk assessment shall be appropriate to the Category of the systems as follows:</u>

<u>(1) Category I risk assessment shall include probabilistic modeling, such as fault tree or reliability block diagram (RBD) for the electrical power to the Category I systems to verify an availability of 0.9999 and a mean time to repair of less than 1.0 hours. The probabilistic modeling shall also include naturally occurring hazards, such as earthquakes, floods, hurricanes and snow/ice storms to the extent that weather data is available. For hazards listed in 708.4 (B) for which there is no data available, such as human-caused events, the risk assessment shall include a systematic method analysis, such as a fault tree. The analysis shall include what types of human-caused events are most likely to cause the COPS to be taken out of service with a mitigation strategy to minimize the probability of it occurring.</u>

<u>(2) Category II risk assessment shall include probabilistic modeling, such as fault tree or reliability block diagram (RBD) for the electrical power to the Category I systems to verify an availability of 0.9995 and a mean time to repair of 4.0 hours or less. The probabilistic modeling shall also include naturally occurring hazards, such as earthquakes, floods, hurricanes and snow/ice storms to the extent that weather data is available. For hazards listed in 708.4 (B) for which there is no data available, such as human-caused events, the risk assessment shall include a systematic method analysis, such as a fault tree. The analysis shall include what types of human-caused events are most likely to cause the COPS to be taken out of service with a mitigation strategy to minimize the probability of it occurring.</u>

<u>(3) Category III risk assessment shall include probabilistic modeling, such as fault tree or reliability block diagram (RBD) for the electrical power to the Category I systems to verify an availability of 0.9973 and a mean time to repair of 24.0 hours or less. For hazards listed in 708.4 (B) the analysis shall include what types of events are most likely to cause the COPS to be taken out of service with a mitigation strategy to minimize the probability of it occurring.</u>

<u>(4) Category IV risk assessment shall include what types of events are most likely to cause the COPS to be taken out of service with a mitigation strategy to minimize the probability of it occurring. Probabilistic modeling is not required.</u>

Substantiation: The requirement for the various types of critical systems needs to align with the importance of the system to the protection of life and property. A set of specific requirements for the various levels of criticality needs to be included in the article to provide design criteria and for consistent application.

A gradient level of risk assessment with probabilistic modeling provides a quantitative method to ensure the most critical systems have designed sufficiently robust so that they are available when needed to deliver emergency services and provide for disaster recovery.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-263.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-269 Log #1262 NEC-P13 **Final Action: Reject**
(708.8(A))

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.

Recommendation: Add new text to read as follows:

A commissioning plan shall be developed, documented and <u>align with the criticality of the COPS as follows:</u>

<u>(1) Category I shall include the performance and documentation of electrical acceptance testing of the components in the critical electrical distribution system, startup and functional testing of the major subsystems such as generators, automatic transfer switches, UPS systems and the mechanical equipment for the cooling system of the critical load. An Integrated Systems Test shall also be performed in which load banks are connected to the critical distribution panels and the operation of the electrical and mechanical systems are verified under critical electrical design load conditions.</u>

<u>(2) Category II shall include the performance and documentation of electrical acceptance testing of the components in the critical electrical distribution system, startup and functional testing of the major subsystems such as generators, automatic transfer switches, UPS systems and the mechanical equipment for the cooling system of the critical load.</u>

(3) Category III shall include the performance and documentation of startup and functional testing of the major subsystems such as generators, automatic transfer switches, UPS systems and the mechanical equipment for the cooling system of the critical load.

(4) Category IV shall include the performance and documentation of startup and functional testing of the major components in the critical electrical distribution system and the mechanical equipment for the cooling system of the critical load.

Substantiation: The requirement for the various types of COPS should align with the importance of the critical systems to the protection of life and property. A set of specific requirements for the various levels of criticality provides a means for consistent application.

The classifying governmental agency having jurisdiction would benefit from a gradient level of criticality, which provides a means to ensure the most critical systems have the resources allocated to them so that they are available when needed to deliver emergency services and provide for disaster recovery. Without a gradient scale, fewer systems can be addressed because they would all require the most extensive amount of resources.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-263.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-270 Log #3742 NEC-P13 **Final Action: Accept in Principle**
(708.10)

Submitter: Michael A. Anthony, University of Michigan / Rep. Assn. of Education Facility Executives - APPA.ORG

Recommendation: REVISE TEXT AS SHOWN BELOW:

II. Circuit Wiring and Equipment

708.10 Feeder and Branch Circuit Wiring.

(A) Identification.

(1) Boxes and Enclosures. All boxes and enclosures (including transfer switches, generators, and power panels) for critical operations power system circuits shall be permanently marked so they will be readily identified as a component of the system. **(2) Receptacle Identification.** **In a building in which COPS are present with other types of power systems described in other articles of this chapter**, the cover plates for the electrical receptacles or the electrical receptacles themselves supplied from the COPS shall have a distinctive color or marking so as to be readily identifiable. **Where the COPS supplies power to a DCOA that is a stand-alone building, distinctive marking shall not be required.**

Substantiation: Requiring special outlet marking for COPS outlets in a building that is entirely a DCOA is costly and does not contribute to the safety objectives of this section.

Panel Meeting Action: Accept in Principle

Revise the recommendation of 708.10(2) to read:

(2) Receptacle Identification. In a building in which COPS are present with other types of power systems described in other sections in this article, the cover plates for the receptacles or the receptacles themselves supplied from the COPS shall have a distinctive color or marking so as to be readily identifiable.

Exception: If the COPS supplies power to a DCOA that is a stand-alone building, receptacle cover plates or the receptacles themselves shall not be required to have distinctive marking.

Panel Statement: The panel action clarifies the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-271 Log #4821 NEC-P13 **Final Action: Reject**
(708.10(C)(1)(1))

Submitter: Robert Konnik, South Windsor, CT

Recommendation: Add text to read as follows:

708.10(C)(1)(1) Rigid metal conduit, intermediate metal conduit, Type MC cable that employs a continuous, gas/vaportight metal sheath and is listed as an electrical circuit protective system or Type MI cable.

Substantiation: In just about all areas of the code, MC cable is allowed to be used where MI cable is used. The exception is in hospitals some areas of hospitals. 517.61(B)(1) allows MC cable with that employs a continuous, gas/vapor-tight metal sheath to be used. Fire rated MC cable is used in hospitals where allowed by the AHJ. This proposal only allows a small subset of MC cable that has additional positive benefits, that is ability to survive in a fire.

Panel Meeting Action: Reject

Panel Statement: Section 330.12(1) does not permit MC cable to be installed where subject to physical damage; therefore, inserting this wiring method into 708.10(C)(1) is inappropriate.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-272 Log #3606 NEC-P13 **Final Action: Reject**
(708.10(C)(1)(3)(d) (New))

Submitter: Stephen McCluer, APC by Schneider Electric

Recommendation: Add a new (d) as follows:

708.10(C)(1)(3) Where provisions must be made for flexibility at equipment connection, one or more of the following shall also be permitted:

(a) Flexible metal fittings

(b) Flexible metal conduit with listed fittings

(c) Liquidtight flexible metal conduit with listed fittings

(d) Wiring methods in accordance with article 645 when a critical operations data system is within the DCOA.

Substantiation: Information Technology Equipment Rooms are addressed in Article 645 (and in NFPA 75). IT spaces already incorporate methods and procedures to assure the highest levels of continuous operation and serve as a model for COPS. Because ITE rooms are characterized by the need for frequent and rapid expansion and relocation, the requirements for conduit beyond what is already stipulated in Article 645 would impose onerous conditions on a system that has already proven to work well. The term “critical operations data system” has already been proposed and defined in a separate proposal for Article 645.

Panel Meeting Action: Reject

Panel Statement: The recommendation does not provide specific wiring methods from Article 645 that may provide physical protection; therefore, the recommended text would not be enforceable.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-273 Log #2919 NEC-P13 **Final Action: Accept in Principle in Part**
(708.10(C)(2))

Submitter: Thomas Guida, TJG Services, Inc.

Recommendation: Revise Text as follows:

708.10(C)(2) **Fire Protection for Feeders.** Feeders shall meet one of the following conditions:

(1) Be a listed electrical circuit protective system with a minimum 2~~1~~-hour fire rating when installed in accordance with the listing requirement

(2) Be protected by a fire-rated assembly listed to achieve a minimum fire rating of 2~~1~~ hour

(3) Be embedded in ~~not less than 50 mm (2 in.) of~~ concrete **with a sufficient thickness to achieve a minimum 2 hour fire rating**

~~(4) Be a cable listed to maintain circuit integrity for not less than 1 hour when installed in accordance with the listing requirement.~~

Substantiation: This proposal increases the time from 1 hour to 2 hours as was done last code cycle in 695.6(B). The extended time is to allow occupants to exit the building as well as give fire fighters additional time to operate the fire fighting equipment once people exit the building by extending the time the emergency circuits operate.

Method (3) has deleted the 2 inches because in various applications e.g. slabs versus columns or with different concrete, e.g. lightweight, siliceous, or carbonate; different concrete thickness may be required to meet the rating.

Method (4) is encompassed by method (1). A “cable listed to maintain circuit integrity” is covered as a listed electrical circuit protective system for power. All UL FHJR fire resistive cables are listed as an electrical circuit protective system (FHIT).

The cautionary note about the listing requirements from method (4) was moved to method (1).

Panel Meeting Action: Accept in Principle in Part

Revise text to read as follows:

708.10(C)(2) Fire Protection for Feeders. Feeders shall meet one of the following conditions:

(1) Be a listed electrical circuit protective system with a minimum 2-hour fire rating.

FPN: UL guide information for electrical circuit protection systems (FHIT) contains information on proper installation requirements to maintain the fire rating

(2) Be protected by a listed fire-rated assembly that has a minimum fire rating of 2 hours

(3) Be embedded in not less than 50 mm (2 in.) of concrete.

Panel Statement: The 2 in. of concrete has provided the industry with a prescriptive benchmark that has served the industry well. The substantiation does not demonstrate that use of 2 in. of concrete has compromised the integrity of the circuit. The recommendation does not provide an alternative prescriptive requirement that can be easily applied. The recommendation was revised for consistency with similar requirements in section 700.9(D) and for clarity. The inclusion of the fine print note provides desirable information on electrical circuit protective systems.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-274 Log #3568 NEC-P13 **Final Action: Reject**
(708.10(C)(2))

TCC Action: The Technical Correlating Committee understands that the reference to the "1-hour fire rating" in the panel statement should refer to a "2-hour fire rating".
Submitter: James R. Steed, Malcolm Pirnie, Inc.
Recommendation: Add text as follows:
Exception: Horizontal runs through interior areas that are entirely of non-combustible construction and do not contain combustible materials shall be permitted to be installed using only the wiring methods in 708.10(C)(1) and 708.10(C)(3).
Substantiation: In many types of installations feeders are distributed through areas where the threat of fire and propagating the fire is minimal. For example, in water and wastewater treatment plants the buildings are commonly of concrete construction and the contents are equipment and piping. In these types of installations it is not uncommon for the buildings to be linked by underground utility tunnels hundreds of feet long that carry only piping. Frequently, electrical feeders are also routed through these tunnels. Requiring fire protection for feeders in areas where there is minimal threat to the feeders results a minimal safety improvement at a large expense.
Panel Meeting Action: Reject
Panel Statement: Section 708.10(C)(2) involves fire protection for feeders. These feeders must meet the requirements for special protection with a minimum 1-hour fire rating or be imbedded in at least 2 in. of concrete for survivability. No technical substantiation was provided to relax these requirements.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-275 Log #2025 NEC-P13 **Final Action: Reject**
(708.10(C)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: Where COPS ~~feeders~~ insulated conductors are installed below the level of the 100 year floodplain, the conductors shall be listed for use in wet locations and be installed in a wiring method that is ~~permitted~~ identified for the use.
Substantiation: Edit. All conductors should be included such as branch circuits and equipment grounding and bonding conductors (if insulated). "Permitted" may be at the discretion of the AHJ; "identified" is more specific and covers all conditions not just wet locations.
Panel Meeting Action: Reject
Panel Statement: The intent of the submitter is met in the present text of the NEC. All branch circuit and feeder conductors are covered by the present requirement. Branch circuits are already included per 708.10(D)(a).
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

(Note: Sequence 13-276 moved to follow 13-279 on page 981)

13-277 Log #2915 NEC-P13 **Final Action: Accept**
(708.14)

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise Text as Follows:
708.14 Wiring of HVAC, Fire Alarm, Security, Emergency Communications, and Signaling Systems. All conductors or cables shall be installed using any of the metal wiring methods permitted by 708.10(C)(1) and in addition shall comply with 708.14(1) through 708.14(8) as applicable.
(1) All cables for fire alarm, security, s~~S~~ignal systems and emergency communications ~~wires~~ shall be ~~use~~ shielded twisted pair~~s~~ cables.
(2) Shields of cables for fire alarm, security, signal systems and emergency communications ~~signal and communication wires~~ shall be continuous.
(3) Fiber optic cables shall be used for connections between two or more buildings on the property and under single management.
(4) Listed secondary protectors shall be provided at the terminals of the communication circuits.
(5) Conductors for all control circuits rated above 50V shall be ~~installed with wire~~ rated not less than 600V.
(6) Communications, fire alarm, and signaling circuits shall use relays with contact ratings that exceed circuit voltage and current ratings in the controlled circuit.
(7) ~~Riser~~ All cables for fire alarm, security, signal systems and emergency communications ~~communication cables~~ shall be riser- rated and shall be ~~2-hour fire resistive cable or~~ a listed 2-hour electrical circuit protective system.
(8) Control, monitoring, and power wiring to HVAC systems shall be ~~2-hour fire-resistive cable or~~ a listed 2-hour electrical circuit protective system.
Substantiation: To clarify which cable types require shielded twisted pairs, and which require riser rating.
Two hour fire resistive cable in conduit as required by 708.10(C) (1) is an electrical circuit protective system.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-278 Log #3993 NEC-P13 **Final Action: Reject**
(708.14)

TCC Action: The Technical Correlating Committee understands that the panel meeting action was entered inadvertently.
Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise text as follows:
708.14 Wiring of HVAC, Fire Alarm, Security, Emergency Communications, and Signaling Systems.
All conductors or cables shall be installed using any of the metal wiring methods permitted by 708.10(C)(1) and in addition shall comply with 708.14(1) through 708.14(8) as applicable.
~~(1) Signal and communication wires shall use shielded twisted pairs.~~
(2) Shields of signal and communication wires shall be continuous.
(3) Fiber optic cables shall be used for connections between two or more buildings on the property and under single management.
(4) Listed secondary protectors shall be provided at the terminals of the communication circuits.
(5) Conductors for all control circuits rated above ~~50V~~ 70V shall be installed with wire rated not less than ~~600V~~ 300V.
(6) Communications, fire alarm, and signaling circuits shall use relays with contact ratings that exceed circuit voltage and current ratings in the controlled circuit.
(7) Riser communication cables shall be 2-hour fire-resistive cable or a listed 2-hour electrical circuit protective system.
(8) Control, monitoring, and power wiring to HVAC systems shall be 2-hour fire-resistive cable or a listed 2-hour electrical circuit protective system.
Substantiation: Not all systems can use shielded twisted pair wires. Many systems today have been designed not to use shielding to allow a various types of wiring designs. Section 708.14 (1) should be deleted and the subsequent () be renumbered.
Panel Meeting Action: Reject
The panel accept the recommendation for 708.14(1) and rejects the recommendation in (5). There was no technical substantiation provided to change the voltage rating of the above 70-volt conductors from 600-volts to 300-volts.
Panel Statement: The recommendation does not provide sufficient technical substantiation to support relaxation of the current requirements in 708.14(1) and (5). The shielding requirement in (1) was discussed significantly during the 2008 NEC cycle, and it was the opinion of the committee that the shielding provided a higher level of protection against interference on control circuits for critical equipment. If there is equipment or systems that are incompatible with the use of shielded cables the panel would request such information be put forth in a comment.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14
Comment on Affirmative:
MOUTON, C.: To eliminate confusion, the statement provided below the Panel Meeting Action to Reject the Proposal should be eliminated, since it implies that the Proposal was Accepted in Principle in Part.

13-279 Log #4318 NEC-P13 **Final Action: Reject**
(708.14)

Submitter: Sanford E. Egesdal, Egesdal Associates PLC
Recommendation: Revise 708.14
708.14 Wiring of HVAC, Fire Alarm, Security, Emergency Communications, and Signaling Systems.
All conductors or cables shall be installed using any of the metal wiring methods permitted by 708.10(C)(1) and in addition shall comply with 708.14(1) through 708.14(8) as applicable.
~~(1) Signal and communication wires shall use shielded twisted pairs.~~
(2) Where used, s~~S~~hields of signal and emergency communication wires shall be continuous.
(3) Fiber optic cables shall be used for connections between two or more buildings on the property and under single management. This requirement shall become effective July 2014.
(4) Listed secondary protectors shall be provided at the terminals of the communication circuits, unless the circuits are installed in optical fiber cable.
(5) Conductors for all control circuits rated above 50V shall be installed ~~with wire rated not less than 600V.~~ in compliance with the requirements of Parts I and Part III of Article 725 or Article 760.
(6) Emergency c~~C~~ommunications, fire alarm, and signaling circuits shall use relays with contact ratings that exceed circuit voltage and current ratings in the controlled circuit.
(7) Riser emergency communication cables shall be 2-hour fire-resistive cable or a listed 2-hour electrical circuit protective system. This requirement shall become effective July 2014.
(8) Control, monitoring, and power wiring to HVAC systems shall be 2-hour fire-resistive cable or a listed 2-hour electrical circuit protective system. This requirement shall become effective July 2014.
Substantiation: The recommended changes are an attempt to better align the requirements with available products. Some of the present requirements would inhibit installation of some products, or products may not be available.

(1) This requirement is deleted because some products would have significant installation limitations due to the increased inter-wiring capacitance caused by a shield. Also, some temperature control systems use twisted triplets (conductors in conduit, or cable).

(2) Shields may not be appropriate for some cables.

(2), (6), & (7) Where "communication" appears change to "emergency communication" to avoid confusion with "communications" covered by Article 800.

(3) Adding an effective date for this requirement provides time for manufacturers to develop product to meet the requirement.

(4) Optical fiber cables do not need secondary protectors.

(5) Control circuits for HVAC systems and fire alarm systems may have voltage greater than 50 volts, but are powered by a power source not greater than 100VA.

(7) & (8) A 2-hour fire-resistive cable or a listed 2-hour electrical circuit protective system must be installed in accordance with the product listing. The product listing may not match the requirement set forth in 708.10(C)(1), which reads as follows: "Protection Against Physical Damage. The wiring of the COPS system shall be protected against physical damage. Wiring methods shall be permitted to be installed in accordance with the following: (1) Rigid metal conduit, intermediate metal conduit, or Type MI cable. Adding an effective date for this requirement provides time for manufacturers to develop product to meet the requirement.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-278. There was no technical substantiation provided to indicate that manufacturers don't have these products available and, in fact electrical circuit protective circuits are available so the effective dates are not necessary. The proposed changes in (5) were rejected since 725.31(A) require Class 2 or 3 circuits involving life safety issues to comply with the requirements for Class 1 circuits and 725.49(B) requires 600-volt insulation. Emergency was not added to (7) and (8) since the circuits are covered in Chapter 8 and are not labeled as "emergency" in any of the articles.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-276 Log #141 NEC-P13 **Final Action: Accept in Principle**
(708.14(1) and (2))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(1) Signal and communication<u>s cables</u> ~~wires~~ shall use shielded twisted pairs.

(2) Shields of signal and communication<u>s cables</u> ~~wires~~ shall be continuous.

Substantiation: Article 800 has definitions for communications cable and communications wire. This section apparently deals with cables, not wires. See 800.2.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel action on Proposal 13-277 meets the intent of the recommendation.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-280 Log #2023 NEC-P13 **Final Action: Reject**
(708.14(2))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise (2): Shields of signal and communication wires shall be continuous <u>(unbroken) between equipment(s)</u>.

Substantiation: Edit. Proposal clarifies that "continuous" does not include splicing.

Panel Meeting Action: Reject

Panel Statement: The recommendation creates redundant language rather than promoting clarity as Webster's defines "continuous" as "unbroken."

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-281 Log #142 NEC-P13 **Final Action: Accept**
(708.14(3))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(3) ~~Fiber optic~~ <u>Optical fiber</u> cables shall be used for connections between two or more buildings on the property and under single management.

Substantiation: Article 770 uses the term "optical fiber cables," not "fiber optic cables". NEC terminology should be consistent.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-282 Log #143 NEC-P13 **Final Action: Accept**
(708.14(4))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(4) <u>A listed primary protector shall be provided on all communications circuits.</u> Listed secondary protectors shall be provided at the terminals of the communication<u>s</u> circuits.

Substantiation: The fine print note in section 800.90(D) warns that secondary protectors are not intended to be used without primary protectors.

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-283 Log #1119 NEC-P13 **Final Action: Accept in Principle in Part**
(708.14(4))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)

Recommendation: Add text as follows:

(4) Listed secondary protectors shall be provided at the terminals of the communications circuits. <u>Where a communications circuit is exposed to accidental contact with electric light or power conductors operating at over 300 volts to ground, or there exists a lightning exposure, a listed primary protector shall be utilized with each listed secondary protector.</u>

<u>FPN No. 1: Secondary protectors on communications circuits exposed to accidental contact with electric light or power conductors operating at greater than 300 volts to ground are not intended for use without primary protectors.</u>

<u>FPN No. 2: See 800.2 for the definition of 'exposed to accidental contact'.</u>

<u>FPN No. 3: See 800.90(A) FPN No. 2 for information on lightning exposure.</u>

Substantiation: Secondary protectors are not intended for use without primary protectors where there is an exposure to accidental contact with electric light or power conductors operating at over 300 volts to ground (see 800.90 (D) FPN). The present text is incomplete and may lead to the misapplication of secondary protectors beyond their listing criteria. The added text and FPN No. 1 correlates with 800.90 (D) and the listing criteria for secondary protectors. Additional FPN Nos. 2 and 3 will help the reader to better understand exposure to power and to lightning.

Panel Meeting Action: Accept in Principle in Part

The panel accepts in principle the revision to 708.14(4) and rejects the inclusion of the new fine print notes.

Panel Statement: The panel action on Proposal 13-282 meets the intent of the recommendation in regard to the use of a primary protector with secondary protectors. Article 708 requirements transcend the minimum requirements in other code articles. Those minimum requirements already apply, so the fine print notes are not needed.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-284 Log #144 NEC-P13 **Final Action: Reject**
(708.14(7))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

(7) Riser communication cables shall <u>Type CMR-CI</u> ~~be 2-hour fire-resistive cable~~ or a listed 2-hour electrical circuit protective system.

Substantiation: A riser communications cable with a 2-hour fire-resistive rating is a Type CMR-CI. See 800.179(G) for the listing requirements for circuit integrity (CI) communications cables.

Panel Meeting Action: Reject

Panel Statement: It is not necessary to provide the level of specificity that the recommendation proposes. Cables that meet the requirements of this section are covered in Chapters 7 and 8.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-285 Log #3745 NEC-P13 **Final Action: Accept in Principle**
(708.20)

Submitter: Michael A. Anthony, University of Michigan / Rep. Assn. of Education Facility Executives - APPA.ORG
Recommendation: MOVE A CHUNK OF TEXT REGARDING VENTILATION FROM 708.22 AND RE-INSERT IT IN 708.20 AS SHOWN BELOW:
708.22 Capacity of Power Sources.
(A) Capacity and Rating. A COPS shall have capacity and rating for all loads to be operated simultaneously for continuous operation with variable load for an unlimited number of hours, except for required maintenance of the power source. A portable, temporary, or redundant alternate power source shall be available for use whenever the COPS power source is out of service for maintenance or repair.
(B) Selective Load Pickup, Load Shedding, and Peak Load Sharing. The alternate power source shall be permitted to supply COPS emergency, legally required standby and optional loads where the source has adequate capacity or where automatic selective load pickup and load shedding is provided as needed to ensure adequate power to (1) the COPS and emergency circuits, (2) the legally required standby circuits, and (3) the optional standby circuits, in that order of priority. The alternate power source shall be permitted to be used for peak load shaving, provided these conditions are met.
Peak load-shaving operation shall be permitted for satisfying the test requirement of 708.6(B), provided all other conditions of 708.6 are met.
(C) Duration of COPS Operation. The alternate power source shall be capable of operating the COPS for a minimum of 72 hours at full load of DCOA with a steady-state voltage within ±10 percent of nominal utilization voltage.
~~**(D) Ventilation. Adequate ventilation shall be provided for the alternate power source for continued operation under maximum anticipated ambient temperatures.**~~
~~**FPN:**~~ **NFPA 110**~~**-2005,** ***Standard for Emergency and Standby Power Systems,*** **and**~~ **NFPA 111**~~**-2005,** ***Standard for Stored Energy Emergency and Standby Power Systems,*** **include additional information on ventilation air for combustion and cooling.**~~
DELETE FROM 708.22 (D) ABOVE AND RE-INSERT IN 708.20 AS SHOWN BELOW:
III. Power Sources and Connection
708.20 Sources of Power.
(A) General Requirements. Current supply shall be such that, in the event of failure of the normal supply to the DCOA, critical operations power shall be available within the time required for the application. The supply system for critical operations power, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 708.20(D) through (H).
FPN: Assignment of degree of reliability of the recognized critical operations power system depends on the careful evaluation in accordance with the risk assessment.
(B) Fire Protection. Where located within a building, equipment for sources of power as described in 708.20(D) through (H) shall be installed either in spaces fully protected by approved automatic fire suppression systems (sprinklers, carbon dioxide systems, and so forth) or in spaces with a 1-hour fire rating.
(C) Grounding. All sources of power shall be grounded as a separately derived source in accordance with 250.30.
Exception: Where the equipment containing the main bonding jumper or system bonding jumper for the normal source and the feeder wiring to the transfer equipment are installed in accordance with 708.10(C) and 708.11(B).
(D) Surge Protection Devices. Surge protection devices shall be provided at all facility distribution voltage levels.
(E) Storage Battery. An automatic battery charging means shall be provided. Batteries shall be compatible with the charger for that particular installation. For a sealed battery, the container shall not be required to be transparent. However, for the lead acid battery that requires water additions, transparent or translucent jars shall be furnished. Automotive-type batteries shall not be used.
(F) Ventilation. Adequate ventilation shall be provided for the alternate power source for continued operation under maximum anticipated ambient temperatures.
FPN: NFPA 110-2005, *Standard for Emergency and Standby Power Systems,* and NFPA 111-2005, *Standard for Stored Energy Emergency and Standby Power Systems*, include additional information on ventilation air for combustion and cooling.
Substantiation: CLEARER GROUPING OF REQUIREMENTS IS POSSIBLE WITH A REVISION THAT RELOCATES THE 708.22 REQUIREMENTS FOR VENTILATION WITH OTHER GENERAL REQUIREMENTS FOR POWER SOURCES IN 708.20.
Panel Meeting Action: Accept in Principle
The panel accepts the recommendation in principle and relocates the text and associated fine print note as a new Section 708.21.
Panel Statement: The panel agrees with the recommendation but more clarity is achieved by locating this provision as a separate requirement.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
BOREK, S.: 708.22(D) should not be relocated to 708.20(D) since it is not a power source, it is a requirement to make sure that there is adequate ventilation for the alternate power source. The load for that ventilation requirement has to be included in the sizing of the alternate power source and that it is capable of maintaining that load continuously while the alternate power source is in operation.

13-286 Log #3947 NEC-P13 **Final Action: Accept**
(708.20(A))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:
(A) General Requirements. Current supply shall be such that, in the event of failure of the normal supply to the DCOA, critical operations power shall be available within the time required for the application. The supply system for critical operations power, in addition to the normal services to the building and meeting the general requirements of this section, shall be one or more of the types of systems described in 708.20(~~D~~E) through (H).
Substantiation: The change is to correct the reference to the types of systems beginning with (E) Storage Battery because (D) Surge Protection Devices are not a type of power supply system.
Panel Meeting Action: Accept
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-287 Log #3949 NEC-P13 **Final Action: Accept in Principle**
(708.20(B))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:
(**B) Fire Protection.** Where located within a building, equipment for sources of power as described in 708.20(~~D~~E) through (H) shall be installed either in spaces fully protected by approved automatic fire suppression systems (sprinklers, carbon dioxide systems, and so forth) or in spaces with a 1 hour fire rating.
Substantiation: The change is to correct the reference to the types of systems beginning with (E) Storage Battery because (D) Surge Protection Devices are not a type of power supply system.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(**B) Fire Protection.** Where located within a building, equipment for sources of power as described in 708.20(E) through (H) shall be installed either in spaces fully protected by approved automatic fire suppression systems (sprinklers, carbon dioxide systems, and so forth) or in spaces with a ~~1~~ 2-hour fire rating.
Panel Statement: The panel agrees with the recommendation and in addition has revised “1-hour” to “2-hour” to correlate with similar actions taken on Section 708.10.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-288 Log #3944 NEC-P13 **Final Action: Reject**
(708.20(F)(3))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:
(3) Dual Fuel Supplies. Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or municipal water supply for their cooling systems. Means shall be provided for automatically transferring from one fuel supply to another where dual fuel supplies are used.
Substantiation: Editorial change for the insertion of “Fuel” in the title of 708.20(F)(3) because it is the adjective of the subject and this would be consistent with the title of a parallel topic in 701.11(B)(3).
Panel Meeting Action: Reject
Panel Statement: The requirement covers other than fuel supplies.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 14

13-289 Log #4501 NEC-P13 **Final Action: Reject**
(708.20(F)(8) (New))

Submitter: Michael A. Anthony, University of Michigan Business Operations / Rep. APPA Higher Education Fac. Executives
Recommendation: Add new (8) as follows:
F) Generator Set.
(1) Prime Mover-Driven. Generator sets driven by a prime mover shall be provided with means for automatically starting the prime mover on failure of the normal service. A time-delay feature permitting a minimum 15-minute setting shall be provided to avoid retransfer in case of short-time reestablishment of the normal source.
(2) Power for fuel transfer pumps. Where power is needed for the operation of the fuel transfer pumps to deliver fuel to a generator set day tank, this pump shall be connected to the COPS.

(3) Dual Supplies. Prime movers shall not be solely dependent on a public utility gas system for their fuel supply or municipal water supply for their cooling systems. Means shall be provided for automatically transferring from one fuel supply to another where dual fuel supplies are used.

(4) Battery Power and Dampers. Where a storage battery is used for control or signal power or as the means of starting the prime mover, it shall be suitable for the purpose and shall be equipped with an automatic charging means independent of the generator set. Where the battery charger is required for the operation of the generator set, it shall be connected to the COPS. Where power is required for the operation of dampers used to ventilate the generator set, the dampers shall be connected to the COPS.

(5) Outdoor Generator Sets. Where an outdoor housed generator set is equipped with a readily accessible disconnecting means located within sight of the building or structure supplied, an additional disconnecting means shall not be required where ungrounded conductors serve or pass through the building or structure.

(6) Mean for Connecting Portable or Vehicle-Mounted Generator. Where the COPS is supplied by a single generator, a means to connect a portable or vehicle-mounted generator shall be provided.

(7) On-Site Fuel Supply. Where internal combustion engines are used as the prime mover, an on-site fuel supply shall be provided. The on-site fuel supply shall be secured and protected in accordance with the risk assessment.

<u>(8) Cogeneration. Where a combined heat and power system is used as the COPS prime mover, a dual source of make-up water for the thermal network shall be available.</u>

Substantiation: Cogeneration systems require water for cooling the gen set but also for condensate makeup associated with the heating and/or cooling loads.

Panel Meeting Action: Reject

Panel Statement: The recommendation is better accomplished through the risk assessment process specified in Section 708.4.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-290 Log #4698 NEC-P13 **Final Action: Reject**
(708.20(H) (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies

Recommendation: Revise text to read as follows:

<u>**(H) Microturbines.** Microturbines used as the sole source of power for COPS shall comply with all applicable industry standards and conform to all other performance requirements in this Article.</u>

Substantiation: These machines are gaining increasing acceptance and the NEC should recognize their prospect for accomplishing the goals of this Article.

Panel Meeting Action: Reject

Panel Statement: The equipment described is a type of generator and the use of such equipment is not prohibited provided it meets all of the operational requirements of this article.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-291 Log #1264 NEC-P13 **Final Action: Reject**
(708.22)

Submitter: Robert Schuerger, EYP Mission Critical Facilities, Inc.

Recommendation: Revise text to read as follows:

(C) Duration of COPS Operation. The alternate power source shall be capable of operating the COPS ~~for a minimum of 72 hours~~ at full load of DCOA with a steady-state voltage within ±10 percent of nominal utilization voltage as follows:.

<u>(1) Category I is required to remain operational throughout the disaster or immediately restorable to service at the end of the event; any equipment that shuts off during the disaster can be restarted without requiring equipment repair. On-site generation capable of supporting the DCOA for 72 hours with only refueling and minor servicing (no loss of power to the DCOA while servicing) is required.</u>

<u>(2) Category II is required to survive the disaster or be restored to operation with on-site parts within 4 hours. On-site generation would normally be required, unless the utility infrastructure was sufficiently robust that utility power would be restored in 4 hours.</u>

<u>(3) Category III is required to be restorable to operation within 24 hours. Temporary or on-site generation would be required if utility power could not be restored in 24 hours.</u>

<u>(4) Category IV is required to be restorable to operation within 24 hours of the time utility power, water and sewage disposal are available to the facility. Temporary or on-site generation would not be required.</u>

Substantiation: The requirement for the various types of critical systems needs to align with the importance of the system to the protection of life and property. A set of specific requirements for the various levels of criticality needs to be included in the article to provide design criteria and for consistent application.

The classifying governmental agency having jurisdiction would benefit from guidelines to use in determining which systems in their jurisdiction should be included as COPS. A gradient level of criticality provides a method to ensure the most critical systems have the resources allocated to them so that they are available when needed to deliver emergency services and provide for disaster recovery.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 13-263.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-292 Log #1486 NEC-P13 **Final Action: Reject**
(708.22(A))

Submitter: Marcelo C. Algrain, Caterpillar, Inc.

Recommendation: Delete text as follows:

708.22 Capacity of Power Sources

(A) Capacity and Rating. A COPS shall have capacity and rating for all loads to be operated simultaneously for continuous operation with variable load ~~for an unlimited number of hours, except for maintenance of the power source~~. A portable, temporary, or redundant alternate power source shall be available for use whenever the COPS power source is out of service for maintenance or repair.

Substantiation: The requirement for operating power sources for an unlimited number of hours is not enforceable. All power sources have finite service life. In the case of engine driven generator sets, the predicted service life depends on the type of rating selected for the application, i.e., standby, prime, or continuous. This selection should be made based on load factors and durations for the given application. If operation for an unlimited number of hours (unattainable figure) were to be required, it would force the selection of prime rated power sources over standby ones. This will have a significant negative economic impact on COPS facilities that would not require prime ratings otherwise. Furthermore, the duration of COPS operation is already covered in section 708.22(C), “minimum of 72 hours at full load”, making it unnecessary and inconsistent to be specified in section 708.22(A) as an unlimited amount of time. Finally, the intent of this article is to cover disruptions to elements of the normal systems, arisen from emergency and disaster situations, which are not to occur on a regular basis. Hence, the proposal to remove the language “for an unlimited number of hours, except for maintenance of the power source” is respectfully submitted.

Panel Meeting Action: Reject

Panel Statement: The code does not indicate the extent of maintenance of the power source. The intent of Article 708.22 (A) is to assure that the entire system is not subject to life expectancy issues, and that the power source is repairable and has no unintended availability issues, as might be the case with solar, wind, or hydroelectric power sources.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-293 Log #3942 NEC-P13 **Final Action: Accept**
(708.22(B))

Submitter: James Kelley, Sargent & Lundy

Recommendation: Revise text to read as follows:

(B) Selective Load Pickup, Load Shedding, and Peak Load ~~Sharing~~ <u>Shaving</u>. The alternate power source shall be permitted to supply COPS emergency, legally required standby and optional loads where the source has adequate capacity or where automatic selective load pickup and load shedding is provided as needed to ensure adequate power to (1) the COPS and emergency circuits, (2) the legally required standby circuits, and (3) the optional standby circuits, in that order of priority. The alternate power source shall be permitted to be used for peak load shaving, provided these conditions are met.

Peak load-shaving operation shall be permitted for satisfying the test requirement of 708.6(B), provided all other conditions of 708.6 are met.

Substantiation: Editorial correction of spelling that resulted in the word “Sharing” instead of “Shaving”

Panel Meeting Action: Accept

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-294 Log #4172 NEC-P13 **Final Action: Reject**
(708.52)

Submitter: Timothy Crnko, Cooper Bussmann

Recommendation: Delete Section 708.52 Ground-Fault Protection of Equipment.

Substantiation: The selective coordination requirement in 708.54 includes ground faults and therefore 708.52 is unnecessary and too prescriptive. There are design circumstances where selective coordination for all types of overcurrents can be achieved between a feeder overcurrent protective device and a ground fault relay on the service without a ground fault relay on the feeder. For these circumstances it should not be required to install another level of ground fault relay protection.

Panel Meeting Action: Reject

Panel Statement: The recommendation to delete all of the requirements of this section would then require compliance with only the requirements of 215.10 and 230.95, which do not require additional levels of ground-fault protection. Because this equipment is critical to the operation of COPS systems, a more appropriate approach might be to apply the provisions of 700.7(D) and 700.26 by prohibiting automatic opening of the circuit and requiring signal indication of the ground fault.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
DEGNAN, J.: The submitter has identified an area where there is extreme difficulty, approaching an impossibility, for design engineers to comply with selective coordination and two levels of ground fault. A modification is needed to 708.52 or 708.54 to make Article 708 reasonable.

13-295 Log #3694 NEC-P13 **Final Action: Reject**
(708.54)

Submitter: Christopher G. Walker, Eaton Corp.
Recommendation: Add new text to read as follows:
Overcurrent devices shall be selected by a qualified person to optimize selective coordination and arc flash protection (NFPA 70E).
Substantiation: Designing electrical systems with overcurrent protective devices that are to be selectively coordinated involves using data from the device manufacturers, and conducting analyses of the various conditions that the electrical system may experience. The choice of overcurrent protective devices involves the study and analysis of both phase and ground fault currents, and cover currents that ranges from low level overloads up to high short circuit fault current levels.
In addition, there are applications that are justified per NFPA 70E-2004 that allow installation and maintenance personnel to perform work close to energized conductors. For these applications where personnel are working in close contact with energized conductors, design studies are to be conducted to determine the possible levels of arc flash energy that personnel may be exposed to, and the subsequent levels of protective equipment that should be in place.
It should be evident that the correct selection of protective devices is very important to minimize damage to equipment, minimize the loss of power in key electrical systems, and minimize the arc flash energy exposure to personnel whenever electrical fault conditions occur. The correct selection of the protective devices that will satisfy these conditions must be done by persons that are qualified to perform the appropriate types of analysis and studies. A thorough analysis is needed to ensure optimal selection of protective devices, otherwise, it may result in excessive equipment damage and/or personnel injury.
The current National Electric Code specifies the types of systems that require selective coordination. The Code does not identify who is responsible for ensuring that the electrical systems meet the selective coordination requirements.
Therefore, this proposal simply adds verbiage to clarify who is responsible for ensuring that the electrical systems meet the current selective coordination requirements, while also addressing equipment protection and personnel safety.
Panel Meeting Action: Reject
Panel Statement: In Section 215.5, an authority having jurisdiction (AHJ) can require a diagram showing feeder details prior to the installation of the feeders and then can require a certain level of expertise for the design of these feeders. Section 240.12 already permits selective coordination for orderly shutdown of the system as a permissive rule.
Section 110.16 requires a sign be posted at the distribution equipment, panelboards, switchboards, and similar equipment warning qualified personnel of the potential electric arc flash hazard. The NEC covers the installation of the electrical system, and NFPA 70E provides coverage once the system has been energized. There may be many reasons a designer provides a particular type of overcurrent protective device for a certain system, with arc flash as one of the many considerations and selective coordination as another.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 11 Negative: 3
Explanation of Negative:
CARON, D.: See my comments to Proposal 13-195.
DEGNAN, J.: See My Explanation of Negative on 13-194.
MOUTON, C.: I'm voting against the panel action. The panel action should have been to accept in principle in part. The proposal should not have been rejected since it properly indicates that selective device coordination should be an optimization. See my additional comments for Proposal 13-194 that relate to this proposal also.

13-296 Log #4324 NEC-P13 **Final Action: Reject**
(708.54)

Submitter: Malcolm Allison, Ferraz Shawmut
Recommendation: Amend 708.54 as follows:
708.54 Coordination.
(A) Normal System. Normal system overcurrent protective devices on the supply side of the critical operations power system overcurrent protective devices shall not be required to be selectively coordinated with other supply side, normal system overcurrent protective devices.
(B) Critical Operations Power System. Critical operations power system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices unless one of the following conditions in (1) through (5) are met.
(1) Transformer Overcurrent Protective Devices. Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exists on the transformer secondary.
(2) Overcurrent Protective Devices of the Same Size. Between overcurrent protective devices of the same size (ampere rating) installed in series.
(3) Expansion of an Existing Critical Operations Power System - Existing Overcurrent Protective Devices. Between existing critical operations power system overcurrent protective devices and any existing supply side overcurrent protective devices, where the critical operations power system is expanded.
(4) Expansion of an Existing Critical Operations Power System - New Overcurrent Protective Devices. Between new critical operations power system overcurrent protective devices and any existing supply side overcurrent protective devices, where the critical operations power system is expanded.
(5) Designed Under Engineering Supervision. Where a licensed professional engineer, engaged primarily in the design of electrical installations, provides stamped documentation showing the specific circuit that cannot be selectively coordinated, and substantiation of the design alternatives that were analyzed in the failed attempt to achieve selective coordination. This documentation shall be available to those authorized to design, install, inspect, maintain, and operate the system.
FPN: These are several techniques that help to selectively coordinate an electrical distribution system
(a) Where transfer switches are utilized, utilizing several smaller transfer switches rather than one larger transfer switch, and moving the transfer switches down in the system, closer to the loads.
(b) Utilizing short-time delay
(c) Utilizing devices with an adjustable instantaneous trip
(d) Utilizing smaller downstream devices
(e) Utilizing several smaller downstream devices rather than one larger downstream device
(f) Utilizing upstream devices with larger frame sizes
(g) Utilizing fuse manufacturers' ratio charts
(h) Utilizing circuit breaker manufacturers' selective coordination charts
(i) Utilizing differential relays
(j) Utilizing isolation transformers
(k) Minimizing the number of levels in a distribution system
(I) Utilizing a greater number of smaller feeders, rather than a smaller number of larger feeders
(m) Utilizing impedance grounded systems
(n) Utilizing high-instantaneous trip circuit breakers
Selective Coordination Requirements
1. Must selectively coordinate with 2,3,4,5,6
2. Must selectively coordinate with 3,4,5,6
3. Must selectively coordinate with 4
4. Does not have to selectively coordinate with 6

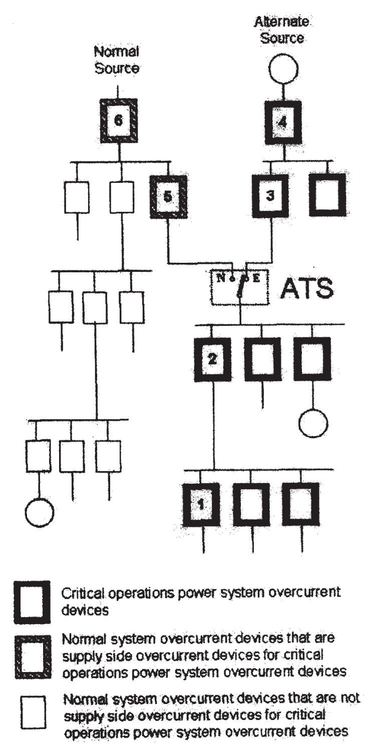

Figure 708.54 Clarification of Selective Coordination Requirements

Substantiation: This proposal is an attempt to clarify the confusion concerning selective coordination requirements.

(1) Figure 708.54 has been added to clarify which devices are critical operations power system side devices, and which are normal side devices. This figure should be included in the NEC® text. Figure 708.54 was based upon a figure from an necdigest® article, Keep the Power On For Vital Loads, by Evangelos Stoyas, December 2007 Copyright© 2007, National Fire Protection Association, Quincy, MA.

(2)"(A) Normal System" was added because there have been questions about the need for selective coordination of the overcurrent devices on the normal side, on the line side of the transfer switch. Since Devices 5 and 6 are not really part of the critical operations power system, 708.54 does not apply, and therefore 5 and 6 do not need to selectively coordinate with each other.

(3)"(B) (1)" and "(B)(2)" are added to correlate with existing 700.27 and 701.18.

(4) "(B)(3)" was added because there have been questions about the need for existing devices to selectively coordinate when a critical operations power system is expanded or modified. This proposal clarifies that existing devices do not have to be replaced if they do not already selectively coordinate.

(5) "(B)(4)" was added because there have been questions about the need for new devices to selectively coordinate with existing devices when a critical operations power system is expanded or remodeled. This clearly states that new devices do not have to selectively coordinate with the existing devices.

(6) "(B)(5)" was added for those few cases where selective coordination is simply not possible. It is not meant to be a "blank check" to allow designers to avoid their responsibility to provide a selectively coordinated system. The requirements are very similar to those found in 240.86 and are meant to ensure that all reasonable attempts have been made to achieve the objective. Once all attempts have been exhausted, the engineer simply documents the circuit in question and shows the techniques that were attempted.

(7) The FPN was added to provide some of the common methods that experienced engineers utilize to obtain selective coordination. It is not all-inclusive, and has been carefully worded so as not to include any requirements.

Panel Meeting Action: Reject

Panel Statement: The proposal for "(A) Normal System" covers devices in the normal source that are outside the scope of Article 700. While the concept is correct, the additional text is unnecessary. The proposed figure is also unnecessary.

While the concepts in (B), (B)(1), and (B)(2) are basically unchanged from the 2008 NEC, the change is not needed because all other portions of this proposal are also rejected.

(B)(3) is rejected because 700.27 is not retroactive for existing systems.

(B)(4) is rejected because no technical substantiation was provided to justify the reduced continuity of service that would result from the elimination of the requirement of new devices to selectively coordinate with upstream existing devices.

(B)(5) is rejected because no technical justification was provided as to why selective coordination cannot be achieved in all situations. In addition, no information was provided as to which or how many design alternatives the consulting engineer needs to analyze and submit in the required documentation.

The FPN is rejected because technical substantiation was not provided for any of the 14 listed techniques.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

13-297 Log #4340 NEC-P13 **Final Action: Reject**

(708.54)

Submitter: Dan Giblin, National Electric Fuse Assn. (NEFA)

Recommendation: Revise text as follows:

708.54 Coordination.

(Keep present text and add the following at the end)

Selective coordination is required for the full range of overcurrents up to the highest available short-circuit current available at the lineside of each overcurrent protective device. The consideration shall include evaluation for the available short-circuit current from the normal supply and alternate supply as well as the transfer switch type.

Substantiation: The purpose of this addition is to clarify that selective coordination is for the full range of available overcurrents. Some people in the industry have contended that the present requirement is not clear on the range of overcurrent that must be considered. When 700.27 was voted as a requirement during the 2005 NEC cycle and then reaffirmed during the 2008 cycle, Code Making Panel 13 substantiated that this requirement is for the full range of overcurrents. For instance, Comment 20-13 in part "…*Selective coordination increases the reliability of the emergency system. The current wording of the NEC® is adequate.* ***The instantaneous portion of the time-current curve is no less important than the long time portion***."

The available short-circuit current must be considered for the worst case from the normal source, alternate source, or both for a closed transition transfer switch. If a fault occurs on an COPS load being supplied by the normal source and both the COPS branch circuit overcurrent protective device and COPS feeder overcurrent protective device open, then when the power is transferred to the alternate source, loads supplied by the affected feeder will unnecessarily be interrupted.

There is no simple alternative to use other than for the full range of available short-circuit currents. Some in the industry are advocating changing the selective coordination requirement to only times greater than 0.1 second. The paragraphs below illustrate why this is not viable.

Permitting the selective coordination requirement to be for times only greater than 0.1 second will allow non-coordinated operation of multiple levels of overcurrent protective devices (cascading) under short-circuit current (fault) conditions, which reduces the reliability of the system to deliver power to vital loads. Requiring selective coordination for times only greater than 0.1 second provides coordination for only overloads and does not provide assurance that typical ground faults and arcing faults will not cascade multiple levels of overcurrent protective devices, thereby unnecessarily losing power to critical loads. While both overloads and short-circuits occur on branch circuits, the predominance of overcurrent interruptions on feeder and service circuits are short-circuits (of all types). Graphs A and B depict the time-current curves of the same 30A, 200A, and 800A system. Graph A shows the portion of the circuit breaker time-current curves that would be analyzed for selective coordination for times only down to 0.1 seconds. Graph B depicts the circuit breaker curves showing the crossover of the circuit breakers in their instantaneous trip region. The cross over is a lack of selective coordination for overcurrents at that level and greater. Graph B shows a lack of coordination between the 30A and 200A circuit breakers for ground, arcing, and any combination of phase faults as low as 800A. Any type of fault as low as 2200A can take out the 800A circuit breaker as well. These are low available fault currents, easily achieved in almost every essential electrical system via a line-ground fault, line-line fault or three phase fault.

All circuit breakers with an instantaneous trip will open in less than 0.1 seconds when fault current is above the instantaneous trip setting. Requiring selective coordination for times only greater than 0.1 second will permit the design of vital electrical systems without regard to proper engineering attention being given to the instantaneous trip region.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The existing text of 708.54 already requires selective coordination for the full range of overcurrents, from overloads through the available short-circuit current, with all upstream devices. Specific additional text is not necessary. Substantiation was not provided for the reference to the transfer switch type.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Comment on Affirmative:

MOUTON, C.: I'm voting in the affirmative for the panel action, but would like to make the following comments regarding the proposal, which need to be added into the panel statement in whole or in part, to correctly address incorrect statements made in the proposal substantiation by the submitter. See my comments for Proposal 13-198 that relate to this proposal also.

13-298 Log #4381 NEC-P13 **Final Action: Reject**

(708.54)

Submitter: Alan Manche, Square D Company/Schneider Electric

Recommendation: Add a new sentence to the end of the main paragraph of 708.54:

Critical operations power system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices. <u>A means to intentionally defeat selectivity shall not be permitted.</u>

Substantiation: Establishing selectively coordinated systems can increase the arc-flash hazard when maintenance is performed on the system depending upon the design of the system. The concern of increased arc-flash hazard was presented to the panel in past cycles and the panel accepted those risks in favor of the benefit of selectivity on these systems. Some system designers are now including a means to defeat selectivity by installing systems that can turn the selectivity off by temporarily changing breaker settings via a switch or sensor in order to protect the electrical worker. There is no prohibition established in the NEC to restrict defeating selectivity, or the life safety aspect for which it was installed, in order to protect the electrical worker.

Unfortunately the enhanced protection for the electrical worker can be a trade-off by defeating the life safety function of the selectively coordinated system in the critical operations electrical system. The most likely time for an incident to happen that would require the system to be selective is when a working is doing maintenance on the system. If the selectivity is defeated, an arc event small or large could initiate a fire hazard or take down lighting, ventilation, or critical circuits leaving a system inoperable which can place the life safety of others in a dangerous position.

There are solutions available to support the reduction of arc-flash in selectively coordinated system without intentionally defeating selectivity to enhance worker safety.

Panel Meeting Action: Reject

Panel Statement: The panel supports the use of energy reduction means for the protection of personnel during periods of maintenance of energized equipment. Use of these types of devices should be left to the discretion of the facility operator. The panel recognizes that the selective coordination is not available in the system at the time the energy reduction means is operational.

Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Abstain: 1
Explanation of Abstention:
DEGNAN, J.: See My Abstention on 13-199.

13-299 Log #4421 NEC-P13 **Final Action: Reject**
(708.54)

Submitter: Darrel Miller, LSW Engineers Arizona, Inc.
Recommendation: Revise text to read as follows:
708.54 Coordination. Critical Operations Power System(s) overcurrent devices shall be ~~selectively~~ coordinated with ~~all~~ supply side overcurrent protective devices. Selectivity shall meet the requirements of (A), (B), or (C).
(A) Selectivity shall be established, in the form of an engineering study, by a licensed professional engineer engaged regularly in the design or maintenance of coordinated electrical systems. The study shall be stamped by a licensed professional engineer and at a minimum include overcurrent device settings, supporting documentation, and a summary of limitations. This study shall be available to those authorized to design, install, inspect, maintain, and operate the system.
(B) Selectivity shall be established under engineering supervision by use of the selected overcurrent device manufactures tables and charts derived from tested combinations of devices. Applicability for each table and chart utilized shall be rigidly adhered to. All tables and charts shall be from the same manufacturer as the installed overcurrent devices.
(C) Selectivity shall be established under engineering supervision in existing installations. The engineer shall determine the extent of selectivity achievable based on review of the existing conditions. Use of methods (A), (B), or combination of each shall be permitted. A summary of limitations and recommendations shall be stamped by a licensed professional engineer and submitted to the authority having jurisdiction prior to the start of construction. Once accepted, the recommendations will establish the extent of retrofit required.
Exception: Selective coordination shall not be required in the following:
(1) Between transformer primary and secondary overcurrent protective devices, where only one overcurrent protective device or set of overcurrent protective devices exist on the transformer secondary.
(2) Between overcurrent protective devices or set of overcurrent protective devices of the same ampere rating in series. in series on opposite ends of the same feeder.
FPN: Overcurrent protective devices used for Critical Operations Power circuit protection, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system. A similar increase in overall reliability can be experienced on the normal power system side.
Substantiation:
Present text restricts the design professional from making appropriate judgments and technical decisions necessary to effectively coordinate the overcurrent protective devices. Historically, the design professional has had the responsibility of evaluating and selecting the appropriate equipment based on the individual project circumstances, refer to the ANSI/IEEE color series of recommended practice manuals. The modifications proposed loosen the prescriptive mandate which is creating compliance difficulties. It will also restore the design professionals' freedom to select the appropriate overcurrent devices for use within the emergency, legally required standby, and critical operations power systems. As you will see in the following discussions, coordination has never been expected to be 100% selective. There are often circumstances that are just "best case" even in the most highly coordinated systems. The ANSI/IEEE repeatedly uses language which conveys this understanding.
Many jurisdictions have considered and adopted codification of a 0.1 second fault duration time to establish a reasonable coordination point. In fact, until published Time-Current Curves (TCC's) are available from the majority of manufactures starting at a time line less than the 1st half cycle, 0.0083 seconds, this approach would provide a design basis that is universally workable.
We understand the argument that this is an arbitrary point at which to start coordination. Accordingly, we have taken a different approach. The text presented was modeled after NEC 240.86. This article establishes a method for the design professional to make judgment for existing systems. We have provide options in stead of a one size fits all mentality, which is know to have issues; as evidenced by the large number of proposals surrounding this issue. The real concern is with the existing NEC text. It puts the engineer in a position that is contrary to other equally important recommended practices, of which we are also held accountable. The professional engineer does want to follow and is concerned with compliance with all applicable codes. In Arizona, as with other states, Rules of Professional Conduct have been established for the professional registrant. He/she is charged with protecting the public safety, much like the inspections departments are. By the nature of granting a license to practice engineering, the grantor (State) is agreeing that the professional registrant is competent to make such decisions.
In the proposed change, the issue of existing conditions and implementation has been addressed.
The design professional is responsible to assess the needs of the client and make a professional judgment as to the type of system best suited for the application, including system coordination. Professional Registration process has been set up by States, recognized by the Federal Government, to establish the minimum standards for persons competent to engage in the practice of protecting the public from engineering hazards. The professional engineer has been deemed competent to make these type judgments. This has long been the role of the design professional. The following is a list of concerns, quotes, and comments from multiple recognized standards, NFPA, ANSI/IEEE, etc.

1. The NEC definition of selective "coordination is defined in Article 100, as the localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the choice of overcurrent protective devices and their ratings or settings." Article 700.27 (701.18 similar) interjects emphasis on any question of how far the design engineer is to carry the out rule, stating "… with all supply side overcurrent protective devices".

   Based on a strict interpretation of this definition, the only overcurrent protection device allowed to operate is the ***one immediately upstream from the fault or overcurrent.*** Depending on the fault level, L-L, L-G, 3Ø bolted fault, this requirement is very difficult to meet using circuit breakers and is possible using fuses. Generally, for overcurrent conditions circuit breakers or fuses can be selected to coordinate. The use of a totally fused distribution system is not recommended, especially at the branch circuit level. Only recently have fused branch circuit panelboards returned to the market. Although this equipment is a current design, there are numerous disadvantages to using fuses in lieu of circuit breakers, listed below:

   a. Replacement fuses are not always readily available of the same class and rating of the blown fuse.

   b. There is a tendency to replace a blown fuse with a fuse of a different class and/or rating in order to restore power immediately, which would have serious consequences in providing future protection. In order to maintain selective coordination, the exact replacement fuse must be used.

   c. Even with available fuses, the amount of time to restore power would be longer.

   d. The replacement of the fuse(s) would require PPE where the supply side was not de-energized.

   e. When only one fuse blows in a three phase circuit, the resultant downstream panels would experience single phasing which would be detrimental to certain three phase loads.

   f. Fuse replacement normally requires disconnecting the power to the affected panel as a safety precaution and therefore counteracting the benefits of selective coordination.

   g. The majority of emergency, standby, and essential systems currently do not employ solely fuse overcurrent devices. Modifications of an existing facility to provide compliance to these NEC articles will most certainly result in existing distribution system equipment and downstream panel replacement. The replacement equipment in most cases will require more physical space. The result will be architectural remodeling to accommodate the larger equipment. These modifications will result in significant added construction costs and disruption of owner operations.

2. Arguments during the previous code cycle have thrown out any consideration of initial cost for the systems necessary to comply with the present NEC articles. The following quotes highlight statements within the recognized standards which have always considered system initial cost as a factor of design consideration. The use of circuit breakers on emergency, legally required standby, and critical operation power systems are preferred. However, compliance with the present NEC requirements using circuit breakers is very costly. A typical molded case circuit breaker can only be used at the branch circuit level. Upstream devised at the distribution level, in most cases must be capable of defeating the instantaneous setting. This feature is presently available on insulated case circuit breakers and occasionally on electronic trip molded case circuit breakers. The cost for this type of equipment is 2-3x the cost of a similar electronic trip molded case unit. Additionally, enclosure to house these breaker types will go up in class, panelboard to switchboard, switchboard to compartmentalized switchboard, etc. The larger class equipment footprint is most often double the depth, subsequently creating other issues for the architectural designer.

   a. "It is important that the various overcurrent devices be coordinated***, as far as practicable***, to isolate faulted circuits and to protect against cascading operation on short circuit faults***. In many systems, however, full coordination is not practicable without using equipment that could be prohibitively costly or undesirable for other reasons.***"

[12]. This NFPA article recognizes there is a balance between cost and protection. For reference, Webster defines "practicable" as: 1) possible to practice or perform: feasible. 2) capable of being used: usable.

b. "Safety. Safety of Life and preservation of property are two of the most important"[13] things required of system coordination. ANSI/IEEE goes on to say of reliability (continuity of service) …the system should be designed to isolate faults ***with minimum disturbance to the system*** and should have features to give the maximum dependability consistent with the plant requirements ***and justifiable cost***." This ANSI/IEEE std recognizes the balance between cost and protection.

c. "***Safety has priority*** over service continuity, equipment damage, or economics."[14] The term "safety" here is relating to the prevention of human injury from the electrical system. This includes the persons, maintenance staff or otherwise, that will be resetting the breakers and/or replacing the fuses. This should not be interchanged with "service continuity", which is a separate concern. There has been a scare tactic employed by some to associate "Life Safety" with the term "safety". In an electrical system as discussed in the ANSI/IEEE standards, the safety they are concerned with is 1) electricians or other trained operating personnel, and 2) protecting the public from inadvertent contact with electrical system components. The term "Life Safety" systems is used in the building codes relative to protecting those within the building from smoke or fire to allow safe egress during an event and only occurs in NEC 517.32 to describe a branch of the essential electrical system, similar to that of NEC Article 700. When reviewing the function of the Article 700 system, we see there are several methods of compliance, unit equipment, generator, and other reliable source. The reader must assume that unit equipment can provide the same reliability as the generation system, otherwise it could not be considered for this application. How often have we seen emergency lights out of service? Often. These units require regular testing and eventually maintenance. The batteries tend to fail prematurely in our climate, 3-5 years. These small point-of-use emergency sources do not appear to be nearly as reliable as generator systems, yet they are considered equivalent.

a. "Economic Considerations***. The cost of system protection can never be ignored***, and will determine the degree of system protection that can be feasibly designed into a system. ***Many features can be added*** that will improve performance, reliability, and flexibility***, but will increase initial cost***."[15] This ANSI/IEEE std recognizes that cost is a consideration in the selection of a protection system.

b. "First Cost. ***While first costs are important***, safety, reliability, voltage regulation, maintenance, and the potential for expansion must be considered in selecting the best [overcurrent system] from alternate plans."[16] This ANSI/IEEE std recognizes that cost is a consideration in the selection of a protection system.

3. Interpretation of the Time Current Curves. The industry standard published time current curves (TCC) start the time element at 0.01 seconds. The peak current in a faulted electrical system occurs in the first ½ cycle, or 0.0083 seconds. Therefore the engineer can not design with the traditional tools (TCC) used to coordinate the protective devices within this critical range, below 0.01 seconds. These traditional TTC's are tools which enabled the selection and specification of devices with confidence multiple manufacturers can provide similar units. Comparison between the coordination curves was direct and reliable. To assist with the 2005 selective coordination rules, many of the manufacturers have created tables which list breaker types and classes which selectively coordinate. Each set of tables is unique to each manufacturer. In table form. Because the tables contain only lists of product models, the design engineer is now forced to select a single manufactures equipment to design around. Without the data in the critical region of the TCC, less than 0.01 seconds, design engineers can not evaluate the cross over between manufacturer products. Therefore, the design engineer has no choice but to require a selective coordination study be submitted by the successful bidding manufacturer to confirm their equipment will selectively coordinate. The result of this study, if not of the same manufacture as the basis of design, will require system changes; dimensional modifications, devices frame size and overcurrent device trip changes, related feeder size changes, transformer upsizing, and similar. At the time of bid, these conditions will create a problem. Fair and equitable bidding will be severely hampered. Not to mention legal issues with proprietary specifications for governmental projects. How will the permitting agencies handle these type of changes after there is a permit issued? Certainly a follow-up review will be necessary.

Nationally, there are many jurisdictions wrestling with the level of enforcing they can handle for this issue. The following States have implemented changes to the text of Articles 700.27, 701.18, and/or 708.54 to give working parameters for these code articles.

a. Tucson, Arizona, deleted the article.

b. California Office Of Statewide Health Planning And Development (OSHPD), deleted the article for hospital occupancies.

c. State of Florida Agency for Health Care Administration (AHCA), amended to 0.1 second and above for coordination.

d. State of Massachusetts, 527 CMR 12 Massachusetts Electrical Code, amended to 0.1 second and above for coordination.

e. City of New York, Interpretation only considers overload selectivity.

f. State of Wisconsin (recent vote, outcome unknown), amended to 0.1 second and above for coordination.

g. NFPA 99 Proposal 99-73 Log #CP308 HEA-ELS, amending the extent of selective coordination in part to "…selectively coordinated down to 0.1 seconds." Final Action: Accept.

4. Arguments from an equipment manufacturer (fuse) allege the mere fact that something could happen warrants a solution, ie; since a bolted fault can occur, the protection system must be able to isolate such an occurrence without affecting any other systems components. ANSI/IEEE makes the following statements regarding this issue in their discussions of coordination:

a. "Practical Limits of Protection…However, ***some fault possibilities may be legitimately considered as too improbable to justify the cost of specific protection.*** Before accepting the risk in this basis alone, the magnitude of the probable damage should also be seriously considered."[17] Here the ANSI/IEEE recognizes there are some cases where the improbability of an occurrence negates the need for elimination, rather, an evaluation and recognition of the risks is prudent action.

b. "Nature of the Problem…Operating records show ***that the majority of electric circuit faults originate as a line-to-ground failure***."[18] Here the ANSI/IEEE states the most common faults are not bolted 3-phase (the most difficult to coordinate). If this is true, why does the NEC only require Ground Fault Protection on systems operating at 277V to ground greater than 1200 amps? It seems it would be more prudent to prescriptively require GFP at lower voltages.

c. "A choice of the most suitable current and time settings is made for the device to provide the best possible protection and safety to personnel and electrical equipment and also to function selectively with other protective devices to disconnect the faulted equipment ***with as little disturbance as possible to the rest of the system.***"[19] Here the ANSI/IEEE recognizes there can be disturbance in other portions of the system and advises that the design engineer work to minimize it.

d. "The bolted fault value of short-circuit current results when the fault offers no impedance to the flow of the short-circuit current and the magnitude of current is limited only by the impedance of the circuit elements. This condition results on the maximum short-circuit current. ***Bolted short-circuits are very rare***, however, and the fault usually involves arcing and burning. Under these conditions ***fault currents may be very much lower than bolted-fault values*** and may ***present special problems of detection and isolation***"[20]

e. "The major objectives of the electrical power system designer is to design a system such that faults will be removed in the shortest period of time possible, while maintaining a high degree of service continuity. ***The area of the outage should be restricted as far as practical.*** The goals of maximum protection and maximum service continuity can most nearly be realized by proper selection and adjustment of high-speed protective devices."[21]

12 NFPA 110 Annex A, 2005 edition, A.6.5.1.
13 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 2.2.
14 ANSI/IEEE Std 242-1986 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, 1.1.1.
15 ANSI/IEEE Std 242-1986 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, 1.1.3.
16 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 2.2.7.
17 ANSI/IEEE Std 242-1986 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, 4.2.5.
18 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 4.2.1.
19 ANSI/IEEE Std 141-1976 Recommended Practice for Electric Power Distribution in Industrial Plants, 4.7.1.
20 ANSI/IEEE Std 241-1983 Recommended Practice for Electric Power Systems in Commercial Buildings, 9.1.
21 ANSI/IEEE Std 241-1983 Recommended Practice for Electric Power Systems in Commercial Buildings, 9.7.

The proposed changes will provide a condition no worse than the existing historical situations while setting a standard for going forward in a way that can be readily achieved.

5. Existing Conditions. The NEC has not provided any suggestions as to implementation of these sections within existing system proposed to be modified, whether through remodel of additions. It is not assumed these circumstances would precipitate total replacement of existing equipment. Is there a time period that should be considered for implementation? Is there a point at which the existing system must be replaced? Washington State has implemented regulations that address this issue in emergency and similarly in legally required standby systems. I extend these changes as applicable to Critical Operations Power System(s) as well.

a. "The requirements for selective coordination described in NEC 700.27 are not required where the emergency system was ***installed prior to June 1, 2006***. For ***new emergency systems that are supplied from an existing emergency system installed prior to June 1, 2006***, ***the new portion of the emergency system must comply*** with NEC 700.27."[22] Here the state has resolved the conflict with new and existing systems.

The proposed change would resolve the above issues.

6. Mixing Overcurrent Protective Devices (OCPD's) from different manufacturers or mixing fuses and circuit breakers requires using time current curves (TCC) only. As previously mentioned the TCC curves do not address the region between 0 & 0.01 seconds. As a result, the system will need to be all circuit breakers or all fuses made by the same manufacturer, **for the life of the system**. Also, Fuse ratio or circuit breaker tables cannot be used. Short circuit selective coordination cannot be assured.

The proposed change would resolve the above issue.

7. Bid and Design Complications. Traditionally, the equipment manufacturer would not be selected until the bid is awarded. At this point in the design, construction documents would be completed and signed for permit submission. However, with the new requirements, before a project can go to bid, at least a preliminary selective coordination study must be conducted as it may affect the system design. This sounds simple, but the fact is that the industry conducts business does not accommodate these new requirements**. Somehow the manufacturer of the electrical equipment must be known prior to the completion of Design Development drawings.** It would appear that an Owner would have to engage a manufacturer so they could evaluate the proposed systems selectivity, based solely on their product. This must occur at the Design Development stage because at it's completion the overall building design is set, including the electrical room sizes and placement. Change after this point, other than minor coordination adjustments would be out of sequence work (as defined by the AIA) and contractually chargeable by the design team.

The suggestion has been made that electrical equipment manufacturers could be required to provide the coordination study needed as part of the bid. Also suggested has been specification language such as "vendor shall provide fully selective equipment" has been offered. The problem with this is, in order to bid the project each prospective equipment vendor (and there are at least four major ones), would have to perform a selective coordination study in order to bid. This does not take into account the real possibility of changes to the building to accommodate larger equipment at minimum. The cost of bidding just went up substantially. **Delegation of the coordination elements of design to the vendor via specification language is not practical or effective.**

Potential design changes consist of:

a. Upstream circuit breakers and fuses will need to increase in size, hence equipment sizes and costs may increase.

b. This may necessitate increasing the size of panelboards and feeder conductors.

c. Very high levels of short circuit selective coordination may be achieved by using high amp frame electronic trip circuit breakers with low amp sensors and/or lower ampere rating adjustments (but equipment may need to be larger).

d. Voltages may need to be reduced. If the desired level of selective coordination cannot be achieved using a 480Y/277Vac panelboard, feeding a 208Y/120Vac panelboard through a transformer may need to be considered.

e. Loads may need to be split up (multiple smaller transformers).

f. Impedance may need to be inserted – longer run of wire, 1:1 or higher impedance transformer or reactors.

The proposed change would resolve the above issues.

8. Arc Flash Concerns. Selective coordination impact on arc flash PPE levels should be considered. Typically, for the lowest PPE level, the smallest and fastest possible OCPDs will be needed upstream. But for the best levels of selective coordination, upstream devices will typically need to be larger and slower reacting. These are in opposition to each other. Arguments from an equipment manufacturer (fuse) allege these are separate issues. However, from an engineering perspective, Arch Flash is a competing directly against Selective Coordination. See discussion in 2nd and 3rd paragraphs at the beginning of this Substantiation.

Panel Meeting Action: Reject

Panel Statement: Proposed (B) contains unenforceable language, such as "rigidly adhered to" and "selectively shall be established." The text in (C) is outside the normal application of the NEC since the authority having jurisdiction, the municipality, and the licensing board for engineers have control over the issues covered within this proposed text, such as what is necessary to be done before the start of construction. The designer, engineer, AHJ, electrical contractor, and owner may often be involved in the decisions related to selective coordination. The submitter states in his substantiation that the professional engineer has the mandate to select the appropriate overcurrent device and thus would be the sole decision-maker on the selective coordination. Again, this procedure is under the jurisdiction of the AHJ, the municipality, and the licensing board. The recommended FPN does not provide any additional information and is unnecessary.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 12 Negative: 2

Explanation of Negative:

CARON, D.: See my comments to Proposal 13-195.

DEGNAN, J.: See My Explanation of Negative on 13-200.

13-300 Log #3720 NEC-P13 **Final Action: Reject**
(708.54, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Add a fine print note to read as follows:

<u>FPN: Selective coordination includes coordination between standard overcurrent devices and ground fault devices.</u>

Substantiation: Fault and over current conditions may result from a variety of conditions that range from the rare and difficult to achieve bolted three phase fault to the more probable arcing single phase ground fault. Nevertheless it is a common oversight to consider phase protection selectivity and ground fault protection selectivity separately. A phase protective device considers all current over threshold to be an overload whereas ground fault devices are able to separate a ground current from other current.. Because of this, in the case of the more probable ground faults, both devices may operate simultaneously or with either device ahead of the other if ground fault selectivity between the two devices is not planned. Hence, a well-coordinated system must consider ground fault protection and standard phase overcurrent protection simultaneously.

Panel Meeting Action: Reject

Panel Statement: Automatic opening of overcurrent protective devices under a ground-fault condition is not required by Article 708.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 13 Negative: 1

Explanation of Negative:

CZARNECKI, N.: The proposal should be accepted. The panel action and statement does not address the concerns expressed in this proposal. The requirements in 708.54 do not prohibit the installation of ground fault protection of equipment for emergency systems. Selective coordination for phase to ground, phase to phase, and three phase short circuits is insufficient where ground fault protection of equipment is installed. The ground fault protective device used for equipment protection must be included for a selectively coordinated system.

13-301 Log #1165 NEC-P13 **Final Action: Reject**
(708.54 Exception)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Add a new exception as shown.

708.54 Coordination.

Critical operations power system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices.

<u>Exception: Unless specifically required elsewhere in the Code, selective coordination shall not be required in between the overcurrent protective devices in the critical operations power system circuit(s) and the overcurrent protective devices in the normal supply on the supply side of the automatic transfer switch.</u>

22 WAC 296-46B-700 Emergency systems. WAC 296-46B-701 Legally required standby systems..

Substantiation: In the CMP-20 Panel Statement to Comment 20-13 in the 2008 ROC the CMP stated: "The overriding theme of Article 585 is to keep the power on for vital loads. Selective coordination is obviously essential for the continuity of service required in critical operations power systems. Selective coordination increases the reliability of the COPS system."

This panel statement supports the Scope of Article 708 which reads: "The provisions of this article apply to the installation, operation, monitoring, control, and maintenance of the portions of the premises wiring system intended to supply, distribute, and control electricity to designated critical operations areas (DCOA) in the event of disruption to elements of the normal system."

The Scope and the panel statement clearly state that the intent of this Article is to ensure continuity of service for those circuits required for critical circuits. The purpose of requiring selective coordination is to ensure that these critical circuits operate if the normal supply is disrupted. Selective coordination up to the alternate source of supply ensures that there is no service disruption to these critical circuits regardless of what happens to the normal supply. Requiring selective coordination of the critical circuits back through the normal source is of little value in this regard and adds nothing to the level of reliability which is only ensured through the alternate supply.

It should also be noted that incorrect interpretations which extend the application of this requirements to non-critical circuits in the normal supply are beyond the Scope of Article 708.

Panel Meeting Action: Reject

Panel Statement: Reliable operation of the critical operations circuits is necessary regardless of the source of power for the circuits. The panel is not aware of other requirements in the NEC that would be subject to the recommended exception.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-302 Log #4687 NEC-P13 **Final Action: Reject**
(708.54 Exception and FPN (New))

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc. / Rep. Mass. Electrical Code Advisory Committee

Recommendation: Add the following exception and fine print note:

Exception: Where the critical operations power system design is under the control of a licensed professional engineer engaged in the design or maintenance of electrical installations, the selection of overcurrent protective devices shall be permitted to coordinate to the extent practicable. The design shall be documented, stamped by the professional engineer, and made available for review by the authority having jurisdiction.

FPN: Overcurrent protective devices used for critical operations power systems, where coordinated to optimize selective operation of the circuit overcurrent protective devices when a short circuit or ground fault occurs, increase overall reliability of the system.

Substantiation: The current NEC rule is being improperly used to drive the market share of a particular species of overcurrent protective device, often frustrating legitimate design objectives of the engineering community, and without any documented loss experience to justify such a consequence. We have received compelling testimony from engineers that have been subjected to extraordinary hardship resulting from the lack of flexibility in the current NEC provisions. This proposal is consistent with NFPA 110 (which language underlies the fine print note) and provides the necessary flexibility to allow competent engineering work that maintains selective coordination as an important element in the electrical design process, but not to the exclusion of all other issues.

Panel Meeting Action: Accept in Principle in Part

Revise Section 708.54 to read:

708.54 Coordination. Critical operations power system(s) overcurrent devices shall be selectively coordinated with all supply side overcurrent protective devices. The selectively coordinated devices shall be selected by a licensed professional engineer engaged primarily in the design or maintenance of electrical installations. The selection shall be documented and stamped by the professional engineer. This documentation shall be available to those authorized to design, install, inspect, maintain, and operate the system.

Panel Statement: The panel action rejects the wording "where practicable," as this is not defined and subjective. The recommendation on the qualifications for those who design the system has been revised to use the text from 240.86, as this provides a more definitive description of those who can design these systems.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 9 Negative: 5

Explanation of Negative:

CZARNECKI, N.: See NEMA statement for Proposal 13-203.

DEGNAN, J.: See My Explanation of Negative on 13-203.

LITTLE, L.: We agree with the negative comment as written by Mr. Ode.

MOUTON, C.: I'm voting against the panel action. The panel action should have been to reject the proposal, even though it does have some merit, and the submitter properly characterizes the current environment in the industry resulting from the current selective device coordination language in Articles 700.27, 701.18, and 708.54. The proposal should have been rejected in preference of Proposal 13-194, which should have been accepted in principle in part (see my comments to Proposal 13-194). See my additional comments for Proposal 13-203 that relate to this proposal also.

ODE, M.: The substantiation in the proposal and the panel statement for the Panel Action provided absolutely no technical substantiation to require selectively coordinated device installation design in an emergency, a legally required standby system, or a critical operations power system to be selected, documented, and stamped by a licensed professional engineer. The requirement for a licensed professional engineer to design and stamp drawings for these systems is overly restrictive, adds unnecessary cost to the installation, and negates a very viable resource in the use of manufacturers who provide this service on a regular basis. The owner, the electrical equipment manufacturer, the plant engineer, the electrical contractor, the AHJ, the utility company, as well as the design engineer are often involved in determining the requirements for initial design of new systems and to the extent that older systems must comply with selective coordination. In addition, 90.1(C) of the National Electrical Code states that the NEC is not intended as a design specification and, yet, the proposed text requiring a licensed professional engineer adds design requirements into the selective coordination process.

Comment on Affirmative:

CARON, D.: See my comments to Proposal 13-203.

13-303 Log #3744 NEC-P13 **Final Action: Reject**
(708.65 (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Assn. of Education Facility Executives - APPA.ORG

Recommendation: Add text to read as follows:

V. System Performance and Analysis

708.64 Emergency Operations Plan.

A facility with a COPS shall have documented an emergency operations plan. The plan shall consider emergency operations and response, recovery, and continuity of operations.

FPN: NFPA 1600-2007, *Standard on Disaster/Emergency Management and Business Continuity Programs*, Section 5.7, provides guidance for the development and implementation of emergency plans.

708.65 Security Considerations (NEW)

Buildings, or sections of buildings, containing elements of critical operations power systems that, in the opinion of the authority having jurisdiction, may be vulnerable to human-made damages if the technical characteristics were known to the general public, shall be permitted to restrict access to information regarding such characteristics of the critical operations power system.

Substantiation: A great deal of homeland security and local emergency management information is available to the general public that may compromise the security of DCOA's. Adoption of this proposal will permit the AHJ to make a determination how much information should be available.

A recent change to 230.205 regarding circumspect placement of disconnecting means on private property is a move in the right direction as far as power source security is concerned. Information about the specifics of prime mover fuel supply, for example, should also be managed carefully.

Panel Meeting Action: Reject

Panel Statement: The recommended text is addressed by the general risk assessment provisions in Section 708.5. It is not necessary to enumerate all of the different risk exposures that may threaten a facility.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

ARTICLE 720 — CIRCUITS AND EQUIPMENT OPERATING AT LESS THAN 50 VOLTS

3-144 Log #2971 NEC-P03 **Final Action: Reject**
(720)

Submitter: Sean Browne, Armstrong World Industries, Inc.

Recommendation: Add the following new text:

Part I. General.

720.1 Scope.

This article covers installations involving wiring for circuits and equipment operating at less than 50 volts, direct current or alternating current.

720.3 Other Articles.

Direct-current or alternating-current installations operating at less than 50 volts, as covered in 411.1 through 411.7; Part VI of Article 517; Part II of Article 551; Parts II and III and 552.60(B) of Article 552; 650.1 through 650.8; 669.1 through 669.9; Parts I and VIII of Article 690; Parts I and III of Article 725; or Parts I and III of Article 760 shall be permitted but not required to comply with this article.

Part II. Installation of Low Voltage Systems For Dwelling Unit Wiring

720.6 Conductors.

Conductors shall not be smaller than 12 AWG copper or equivalent. Conductors for appliance branch circuits supplying more than one appliance or appliance receptacle shall not be smaller than 10 AWG copper or equivalent.

Exception: Class 2 circuit conductors of sizes 18 AWG and 16 AWG or larger shall be permitted to be used, provided the conductors supply loads that do not exceed the ampacities given in 402.5 and are supplied by a listed wiring method.

720.5 Lampholders and Luminaires.
Standard lampholders and luminaires that have a rating of not less than 660 watts shall be used.

720.6 Receptacle Rating.
Receptacles shall have a rating of not less than 15 amperes.

720.7 Receptacles Required.
Receptacles of not less than 20-ampere rating shall be provided in kitchens, laundries, and other locations where portable appliances are likely to be used.

720.8 Batteries.
Installations of storage batteries shall comply with 480.1 through 480.4 and 480.8 through 480.10.

720.9 Mechanical Execution of Work.
Circuits operating at less than 50 volts shall be installed in a neat and workmanlike manner. Cables shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use.

Part III. Installation Requirements for Suspended Ceiling Power Distribution Systems.

720.41 Scope. Suspended ceiling power distribution systems shall be permanently connected in an indoor, dry location in a commercial installation. The maximum output voltage shall not exceed 30 volts ac (42.4 volts peak) supplied by a listed Class 2 power supply.

720.42(A) Uses Permitted. Suspended ceiling power distribution systems shall provide power to low voltage, electrically
operated utilization equipment, such as luminaires.

(B) Uses Not Permitted. Suspended ceiling power distribution systems shall not cover low voltage lighting systems intended for use in hazardous (classified) locations, low voltage lighting systems for use in general or critical patient care areas, or low voltage lighting systems for emergency systems.

Suspended ceiling power distribution systems shall not be permitted in other spaces used for environmental air in accordance with 300.22(C), unless listed for use in an air handling space, having adequate fire-resistant, low-smoke-producing characteristics, and is suitable for the ambient temperature.

720.43. Definitions

Bus Bar - A non insulated conductor electrically connected to the source of supply and physically supported on an insulator. The bus bar provides a power rail for connection for utilization equipment, such as a luminaire assembly.

Bus Bar Support – An insulator that runs the length of a section of suspended ceiling bus rail and serves to support the bus bars and to isolate them from the suspended grid rail.

Grid Bus Rail – A combination of the bus bar, bus bar support and the structural suspended ceiling grid system.

Connector – A term used to refer to an electro-mechanical fitting:

Connector, Load - An electro-mechanical connector used for power from the bus bar to the utilization equipment.

Connector, Pendant - An electro-mechanical or mechanical connector used to suspend a luminaire or utilization equipment below the grid rail and for power from the bus bar to the utilization equipment.

Connector, Power Feed- An electro-mechanical connector used to connect either the power supply to a power distribution cable, or directly to the bus bar, or from the power distribution cable to the bus bar.

Connector, Rail to Rail – An electro-mechanical connector used to interconnect bus bars from one ceiling grid rail to another.

Power Supply - a separate unit connected between the branch circuit power distribution system and the bus bar low voltage suspended ceiling power distribution system and is typically one of the following: a switching power supply, linear power supply, or isolating transformer.

Protection, Inverse Polarity (Backfeed Protection) - a system that prevents two interconnected power supplies connected positive to negative from passing current from one power source into a second power source.

Rail – The structural support for the suspended ceiling system typically forming the ceiling grid supporting the ceiling tile and luminaires.

Suspended Ceiling Power Distribution System – A system which serves as a support for a finished ceiling surface. It also includes a bus bar and bus bar support system to distribute power to utilization equipment, such as luminaires.

Suspended Ceiling Grid – A system which serves as a support for a finished ceiling surface. It may also support other utilization equipment such as cables, luminaires, speakers, and similar equipment.

720.45 Overcurrent and Inverse Polarity (Back Feed) Protection.

(A) Overcurrent Protection. The Class 2 power supply shall be protected at not greater than 20 amperes.

(B) Inverse Polarity (Back Feed) Protection. Class 2 or Class 3 power sources shall not have the output connections paralleled or otherwise interconnected, unless listed for such interconnection. A suspended ceiling low voltage lighting system shall be provided with inverse polarity (back feed) protection as one of the following:

(1) If the power supply is provided as part of the system, the power supply shall be provided with inverse polarity (back feed) protection; or

(2) If the power supply is not provided as part of the system, inverse polarity or back feed protection shall be provided as part of the grid rail bus bar or as a part of the power feed connector.

720.49. Sizes and Types of Conductors.

(A) Load-Side Utilization Conductor Size. Current-carrying conductors for load-side utilization equipment shall be copper, a copper alloy, or aluminum and shall be 18 AWG (0.82 mm2) minimum.

Exception – Conductors of a size smaller than 18 AWG (0.82 mm2) but not smaller than 24 AWG, shall be permitted to be used for Class 2 circuits where these conductors are completely enclosed and not subject to movement or strain.

(B) Power Feed Bus Rail Conductor Size. The power feed bus rail shall be 16 AWG (1.3 mm2) minimum or equivalent. For a bus bar with a circular cross section the diameter shall be 0.051 in. (1.29 mm) minimum, and, for other than circular bus bars, the area shall be 0.002 in2 (1.32 mm2) minimum.

720.51 Securing and Supporting.

(A) Attached to Building Structure. A suspended ceiling low voltage lighting system shall be secured to the mounting surface of the building structure by hanging wires, screws, or bolts in accordance with the installation and operation instructions. Mounting hardware, such as screws or bolts, shall either be packaged with the suspended ceiling low voltage lighting system or the installation instructions shall specify the types of mounting fasteners to be used.

(B) Attachment of Power Grid Rails. The individual power grid rails shall be mechanically secured to each other for interconnection to distribute power.

720.55 Connection Devices. A soldered connection shall be made mechanically secure before being soldered. Other means of securing leads, such as push-on terminals and spade-type connectors, shall provide a secure mechanical connection.

FPN: For quick-connect terminals, see UL 310, Standard for Electrical Quick-Connect and for mechanical splicing devices, see UL 486A and 486B, Standard for Wire Connectors.

720.57. Splices. A splice shall be provided with insulation and mechanical protection equivalent to that of the conductors involved.

720.61 Grounding and Bonding. The Class 2 low voltage supply circuit shall not be grounded.

Substantiation: Article 720, covering circuits and electrical equipment operating at less than 50 volts, was introduced into the NEC to deal with wiring for rural farms, remote location buildings, and sites not served by a utility company. Until the advent of the REA (the Rural Electrification Association) wind, water-driven, gasoline, or diesel generators were the only available power sources for these remote locations. Batteries were charged using these generators then wired to farm buildings and electrical equipment in accordance with the requirements found within the *National Electrical Code*. As rural areas and farms progressively gained access to higher voltages and more reliable power, the relevance of Article 720 began to decline.

With the current interest in alternative energy sources (e.g. photovoltaics, wind turbines, batteries, fuel cells, etc.) and the proliferation of low voltage devices (sensors, LV lighting, IT equipment, AV equipment, etc.), there is a significant need for adequate language supporting the practical safeguarding of circuits and electrical equipment operating at less than 50 volts. Therefore, the optimization of Article 720 needs to occur in order to satisfy the industry safety requirements and ensure the article's functional safety mission.

Panel Meeting Action: Reject

Panel Statement: This proposal needs technical substantiation for the panel to accept the concept of suspended ceiling power distribution systems, the primary purpose of which seems to supply low voltage lighting systems from a power grid system.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

KAHN, S.: The panel action and statement are correct and substantial additional information is required. Any further proposed revisions, however, should be such that the Article is rewritten in conformity with the Style Manual with respect to the sequence of sections.

ARTICLE 725 — CLASS 1, CLASS 2, AND CLASS 3 REMOTE-CONTROL, SIGNALING, AND POWER-LIMITED CIRCUITS

3-145 Log #2194 NEC-P03 **Final Action: Accept**
(725.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

725.1 Scope.

This article covers remote-control, signaling, and power-limited circuits that are not an integral part of a device or appliance.

FPN: The circuits described herein are characterized by usage and electrical power limitations that differentiate them from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given with regard to minimum wire sizes, ampacity adjustment and correction ~~derating~~ factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Substantiation: The terms "ampacity adjustment factors" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-146 Log #3034 NEC-P03 **Final Action: Accept**
(725.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
725.1 Scope.
This article covers remote-control, signaling, and power-limited circuits that are not an integral part of a device or appliance.
FPN: The circuits described herein are characterized by usage and electrical power limitations that differentiate them from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given with regard to minimum wire sizes, ampacity adjustment and correction ~~derating~~ factors, overcurrent protection, insulation requirements, and wiring methods and materials.
Substantiation: The terms "adjustment factor" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.
Panel Meeting Action: Accept
Panel Statement:
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-147 Log #743 NEC-P03 **Final Action: Reject**
(725.2.Abandoned Class 2, Class 3, and PLTC Cable)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Delete text to read as follows:
725.2 Definitions.
~~**Abandoned Class 2, Class 3, and PLTC Cable.** Installed Class 2, Class 3, and PLTC cable that is not terminated at equipment and not identified for future use with a tag.~~
[remainder of 725.2 unchanged by this Proposal]
Substantiation: Companion proposals have been made to add a single generalized definition in Article 100 and to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
NEC® Manual of Style 2.2.2.1. Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2. Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discreet definitions can be broadly consolidated into a single definition in Article 100.
The specific method by which identification for future use is achieved ("… with a tag") was conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 violates *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …") and is omitted in the generalized definition for "Abandoned" being added in Article 100. This identification-with-a-tag requirement in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 is redundant to the actual requirement statements in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Also, words regarding the possibility of ceasing connection to an electric supply have been added in the generalized definition for "Abandoned" to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).
Panel Meeting Action: Reject
Panel Statement: To allow one single definition for "abandoned cable" would not be appropriate.
Each article has different requirements for what constitutes an abandoned cable. Some applications require that a connector be installed along with an identification tag on the cable, whereas others, such as the one for Article 725 require only that the cable not be terminated at equipment and an identification tag be installed for it to not be considered to be abandoned.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-148 Log #811 NEC-P03 **Final Action: Reject**
(725.2.Abandoned Class 2, Class 3, and PLTC Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Class 2, Class 3, and PLTC Cable. Installed Class 2, Class 3, and PLTC cable that is not terminated at equipment other than a connector and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-147.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-149 Log #3948 NEC-P03 **Final Action: Accept**
(725.2.Class 1 Circuit)

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:
Class 1 Circuit. The portion of the wiring system between the load side of the overcurrent device or power-limited supply and the connected equipment.
FPN: See ~~725.21~~ 725.41 for voltage and power limitations of Class 1 circuits.
Substantiation: Editorial correction of the reference to "725.21" instead to be "725.41".
The comment is based on the printed version that has the word "725.21" though the electronic version available to subscribers of the NFPA Codes has the word "725.41 ".
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-150 Log #203 NEC-P03 **Final Action: Reject**
(725.2.Concealed Space)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
Concealed Space. That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, attics, and in whose size might normally range from 44.45 mm (1 3/4 in.) stud spaces to 2.44 m (8 ft) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting. [NFPA 96:3.3.42.1]
Nonconcealed space. That portion of a building that is not a concealed space.
Substantiation: Section 725.154(E)(3) has application requirements for class 2 and class 2 cables in nonconcealed spaces. A definition of a concealed space is needed in order to define and understand what a nonconcealed space is. I have also submitted a proposal to clarify that the definition of "concealed" in Article 100 applies only to wiring methods.
Panel Meeting Action: Reject
Panel Statement: The panel contends that the proposed definitions are not appropriate in the NEC as the use of the terms "concealed space" and "nonconcealed space" in the NEC have a significantly different meaning than the preferred NFPA definition.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:
EGESDAL, S.: The NEC definition of "concealed" refers to wiring. A "concealed space" may or may not contain wiring. Wiring installed in a "concealed space" may or may not be "concealed", by the NEC definition.
If the NEC is going to use the term "concealed space" or nonconcealed space", descriptive definitions should be in the NEC.
KAHN, S.: There is merit in the proposer's substantiation. I believe the NEC definition of "concealed" refers to wiring only. There should be consistency in the definition of terms used in various NFPA documents.
SEPULVEDA, M.: The NEC definition of "concealed" refers to wiring. A "concealed space" may or may not contain wiring. Wiring installed in a "concealed space" may or may not be "concealed", by the NEC definition.
If the NEC is going to use the term "concealed space" or nonconcealed space", descriptive definitions should be in the NEC.
Comment on Affirmative:
STENE, S.: The submitter has not provided any technical substantiation to link a cooking ventilation standard and its definitions to the requirements in Article 725 for remote control, power limited and signaling circuits. The submitter also points out that "non-concealed space" is used in 725.154(E)(3), however, the phrase is used to describe installations of CL2X cable as an exposed wiring method, rather than the concealed wiring method as defined in Article 100. Adding an additional definition for "concealed" would be confusing for the user of the NEC since there are many other places in the NEC, such as in 250.52(A)(1), Exception where the term "exposed" permits the grounding electrode conductor to be installed in a suspended ceiling with removable ceiling tiles. Based on the proposed definition, this grounding electrode conductor would be a violation since above a suspended ceiling would be considered to be a concealed space.

3-151 Log #3593 NEC-P03 **Final Action: Reject**
(725.2.Optical Fiber/Communications Cable Routing Assembly)

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Add new text to read as follows:
Optical fiber /communications cable routing assembly. A flame retardant, nonmetallic assembly of pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings used to support and protect optical fiber, communications and data cables in applications with a high density of cabling such a information technology (computer) rooms, broadcast stations and telecommunications offices. Parts of the assembly may have hinged or removable covers. The assembly is designed for cables be laid or set in place after the enclosures have been installed as a complete system.
Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, Optical Fiber and Communication Cable Raceway. UL lists optical fiber /communications cable routing assemblies to UL2024a, Outline of Investigation for Optical Fiber Cable Routing Assemblies. Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)
For further information see the attached application guide from one of the manufacturers or got to http://www.storage-expo.com/ExhibitorLibrary/302/FiberRunner_6.pdf on the web.
The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
Since users of the code may not be familiar with optical fiber / communications cable routing assemblies we are submitting this proposal to define them. We have submitted companion proposals to provide for a change of the scope of Article 770 to include optical fiber /communications cable routing assemblies and to provide listing and application for requirements for them. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Panel Meeting Action: Reject
Panel Statement: Optical fiber/communications cables are not covered in Article 725.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
EGESDAL, S.: Panel 16 changed the name of the assembly to "cable routing assembly." As this assembly can be use for cables in a number of NEC Articles, perhaps the definition should be in Article 100.
SEPULVEDA, M.: Panel 16 changed the name of the assembly to "cable routing assembly." As this assembly can be use for cables in a number of NEC Articles, perhaps the definition should be in Article 100.

3-152 Log #4898 NEC-P03 **Final Action: Accept**
(725.2, FPN)

Submitter: Leo F. Martin, Jr., Martin Electrical & Technical Training Services
Recommendation: Revise text as follows:
FPN: See 725.~~21~~ 41 for voltage and power limitations of Class 1 circuits.
Substantiation: The current reference to 725.21 is incorrect. The voltage and power limitations for Class 1 circuits are listed in 725.41.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-153 Log #2407 NEC-P03 **Final Action: Reject**
(725.3(l))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Add text to read as follows:
(I) Underground Installations. Minimum cover requirements shall comply with Table 300.5.
Substantiation: Article 725 does not indicate any burial depths for conductors. Table 300.5 is for all installations ranging from 0 to 600 volts. Remote-controlled signaling systems do fall into that category. I understand the electrical shock hazard is not there but the possible damage to conductors that are buried correctly is a concern.
Panel Meeting Action: Reject
Panel Statement: The current 725.46 addresses the submitter's concern for Class 1 circuits. The section requires Class 1 wiring methods to follow Part 1 of Article 300, which includes meeting burial depth requirements within Table 300.5.
All other Class 2 or Class 3 circuits that involve no direct fire or life hazard do not have burial depth requirements.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-154 Log #3660 NEC-P03 **Final Action: Reject**
(725.3)

Submitter: Donald A. Ganiere, Ottawa, IL
Recommendation: Revise text to read as follows:
Circuits and equipment shall only be required to comply with the articles or sections listed in 725.3(A) through (G). Only those sections of Article 300 referenced in this article shall apply to Class 1, Class 2, and Class 3 circuits.
Substantiation: It appears that the intent of 725.3 is to exempt the installations made under this Article from most of the rules in Chapters 1 through 4, however the current wording does not specifically do that. The additional wording will make it clear that only the articles and sections listed or referenced in Article 725 apply to Article 725 installations.
Panel Meeting Action: Reject
Panel Statement: 90.3 provides the clarification requested in the proposal.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-155 Log #2281 NEC-P03 **Final Action: Reject**
(725.3, 725.154, 725.156 and 725.179)

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise the indicated Sections in Article 725 to read as follows:
725.3 Other Articles. Circuits and equipment shall comply with the articles or sections listed in 725.3(A) through (G). Only those sections of Article 300 referenced in this article shall apply to Class 1, Class 2, and Class 3 circuits. Nonmetallic Signaling Raceways shall be selected and installed per Article 862.
(A) Number and Size of Conductors in Raceway. Section 300.17.
(B) Spread of Fire or Products of Combustion. Installation of Class 1, Class 2, and Class 3 circuits shall comply with 300.21.
(C) Ducts, Plenums, and Other Air-Handling Spaces. Class 1, Class 2, and Class 3 circuits installed in ducts, plenums, or other space used for environmental air shall comply with 300.22.
Exception: Type CL2P or CL3P cables and plenum signaling raceways shall be permitted for Class 2 and Class 3 circuits installed in other spaces used for environmental air in accordance with 725.154(A) and 862.10(E).
(D) Hazardous (Classified) Locations. Articles 500 through 516 and Article 517, Part IV, where installed in hazardous (classified) locations.
(E) Cable Trays. Article 392, where installed in cable tray.
(F) Motor Control Circuits. Article 430, Part VI, where tapped from the load side of the motor branch-circuit protective device(s) as specified in 430.72(A).
(G) Instrumentation Tray Cable. See Article 727.
725.154 Applications of Listed Class 2, Class 3, and PLTC Cables. Class 2, Class 3, and PLTC cables shall comply with any of the requirements described in 725.154(A) through (H).
(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum signaling raceways shall be permitted to be installed in other spaces used for environmental air as described in ~~300.22(C)~~ 862.10(E). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.
(B) Riser. Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3):
(1) Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CL2R or CL3R. Floor penetrations requiring Type CL2R or CL3R shall contain only cables suitable for riser or plenum use. Listed riser signaling raceways and listed plenum signaling raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor as described in 862.10(F). Only Type CL2R, CL3R, CL2P, or CL3P cables shall be permitted to be installed in these raceways.
(2) Other cables as covered in Table 725.154(G) and other listed wiring methods as covered in Chapter 3 shall be installed in metal raceways, or located in a fireproof shaft having firestops at each floor.
(3) Type CL2, CL3, CL2X, and CL3X cables shall be permitted in one- and two-family dwellings. Listed general-purpose signaling raceways shall be permitted for use as described in 862.10(G) with Type CL2, CL3, CL2X, and CL3X cables.
FPN: See 300.21 for firestop requirements for floor penetrations.
725.156 Applications of Nonmetallic Signaling Raceways (OFCR).
Nonmetallic Signaling Raceways (OFCR) shall be selected and installed per Article 862.
725.179 Listing and Marking of Class 2, Class 3, ~~and~~ Type PLTC Cables, and Nonmetallic Signaling Raceways (OFCR). Class 2, Class 3, and Type PLTC cables ~~and nonmetallic signaling raceways~~ installed as wiring methods within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 725.179(A) through ~~(K)~~ (H) and shall be marked in accordance with 725.179~~(L)~~ (I).
(A) Types CL2P and CL3P. Types CL2P and CL3P plenum cable shall be listed as being suitable for use in ducts, plenums, and other space for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.

FPN: One method of defining low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.

(B) Types CL2R and CL3R. Types CL2R and CL3R riser cables shall be marked as Type CL2R or CL3R, respectively, and be listed as suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.

(C) Types CL2 and CL3. Types CL2 and CL3 cables shall be marked as Type CL2 or CL3, respectively, and be listed as suitable for general-purpose use, with the exception of risers, ducts, plenums, and other space used for environmental air, and shall also be listed as being resistant to the spread of fire.

FPN: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

(D) Types CL2X and CL3X. Types CL2X and CL3X limited-use cables shall be marked as Type CL2X or CL3X respectively, and be listed as being suitable for use in dwellings and for use in raceway and shall also be listed as being resistant to flame spread.

FPN: One method of determining that cable is resistant to flame spread is by testing the cable to the VW-1 (vertical wire) flame test in ANSI/UL 1581-2001, Reference Standard for Electrical Wires, Cables and Flexible Cords.

(E) Type PLTC. Type PLTC nonmetallic-sheathed, power-limited tray cable shall be listed as being suitable for cable trays and shall consist of a factory assembly of two or more insulated conductors under a nonmetallic jacket. The insulated conductors shall be 22 AWG through 12 AWG. The conductor material shall be copper (solid or stranded). Insulation on conductors shall be rated for 300 volts. The cable core shall be either (1) two or more parallel conductors, (2) one or more group assemblies of twisted or parallel conductors, or (3) a combination thereof. A metallic shield or a metallized foil shield with drain wire(s) shall be permitted to be applied either over the cable core, over groups of conductors, or both. The cable shall be listed as being resistant to the spread of fire. The outer jacket shall be a sunlight- and moisture-resistant nonmetallic material. Type PLTC cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.

Exception No. 1: Where a smooth metallic sheath, continuous corrugated metallic sheath, or interlocking tape armor is applied over the nonmetallic jacket, an overall nonmetallic jacket shall not be required. On metallic-sheathed cable without an overall nonmetallic jacket, the information required in 310.11 shall be located on the nonmetallic jacket under the sheath.

Exception No. 2: Conductors in PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.

FPN: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

(F) Circuit Integrity (CI) Cable or Electrical Circuit Protective System. Cables used for survivability of critical circuits shall be listed as circuit integrity (CI) cable. Cables specified in 725.154(A), (B), (D)(1), and (E), and used for circuit integrity, shall have the additional classification using the suffix “-CI”. Cables that are part of a listed electrical circuit protective system shall be considered to meet the requirements of survivability.

FPN: One method of defining circuit integrity is by establishing a minimum 2-hour fire resistance rating when tested in accordance with UL 2196-2002, Standard for Tests of Fire Resistive Cables.

(G) Class 2 and Class 3 Cable Voltage Ratings. Class 2 cables shall have a voltage rating of not less than 150 volts. Class 3 cables shall have a voltage rating of not less than 300 volts.

(H) Class 3 Single Conductors. Class 3 single conductors used as other wiring within buildings shall not be smaller than 18 AWG and shall be Type CL3. Conductor types described in 725.49(B) that are also listed as Type CL3 shall be permitted.

FPN: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

~~**(I) Plenum Signaling Raceways.** Plenum signaling raceways shall be listed as having adequate fire-resistant and low smoke-producing characteristics.~~

~~**(J) Riser Signaling Raceways.** Riser signaling raceways shall be listed as having adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.~~

~~FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the Test for Flame Propagation (Riser) in UL 2024, Standard for Optical Fiber Cable Raceway.~~

~~**(K) General-Purpose Signaling Raceways.** General-purpose signaling raceways shall be listed as being resistant to the spread of fire.~~

~~FPN: One method of defining resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General use) in UL 2024, Standard for Optical Fiber Cable Raceway.~~

~~(L)~~ (I) Marking. Cables shall be marked in accordance with 310.11(A)(2), (A)(3), (A)(4), and (A)(5) and Table 725.179. Voltage ratings shall not be marked on the cables.

FPN: Voltage markings on cables may be misinterpreted to suggest that the cables may be suitable for Class 1 electric light and power applications.

Exception: Voltage markings shall be permitted where the cable has multiple listings and a voltage marking is required for one or more of the listings.

Table 725.179 Cable Marking(not submitted)

(J) Nonmetallic Signaling Raceways (OFCR). Nonmetallic Signaling Raceways (OFCR) shall be listed in accordance with 862.6.

Substantiation: This is a companion proposal to correlate with the proposal for a new optical fiber/communication raceway article. The new optical fiber/communication raceway article was proposed to Panel 16 as Article 862.

Optical fiber/communication raceways (Type OFCR) are currently listed raceways for use in plenums, risers or general purpose applications for the management of signaling, optical fiber, communication and CATV cables. This new Article and the companion proposals will clarify the selection, and installation optical fiber/communication raceways including the construction specifications. It is not the intent of the submitter to revise or change any of the currently permitted uses by this proposal, but only to enhance the usability of the Code.

Panel Meeting Action: Reject

Panel Statement: Until proposed new Article 862 has been acted upon, the panel is unable to consider the proposed changes to Article 725.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-156 Log #4361 NEC-P03 **Final Action: Reject**
(725.3(A))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Delete 725.3(A) and renumber remaining subsections.

~~(A) Number and Size of Conductors in Raceway. Section 300.17.~~

Substantiation: This proposal is editorial and removes an unnecessary reference.

The reference to 300.17 is already covered in 725.51 for Class 1 circuits. Additionally, 725.51 applies where Class 2 or Class 3 circuits are installed using Class 1 methods and materials.

Panel Meeting Action: Reject

Panel Statement: 725.3 establishes the other articles and sections allowed to be enforced in Article 725.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

EGESDAL, S.: Section 90.3 permits Chapters 5-7 to supplement or modify Chapters 1-4. Article 300 does not apply to Article 725, unless referenced. The reference to 300.17 is found in 725.51, making 725.3(A) redundant. There are references to sections in Chapters 1-4 throughout Article 725 that are not duplicated in 725.3 (e.g. references to 110.3(B), 300.7, 300.22, 300.17, 310.15(B)(2), 392.11, and others).

In addition, 760.3 does not have a requirement pointing to 300.17, because the reference to 300.17 is in 760.51.

KAHN, S.: I agree with the proposer’s substantiation and the proposal should have been approved. This is an editorial change.

SEPULVEDA, M.: Section 90.3 permits Chapters 5-7 to supplement or modify Chapters 1-4. Article 300 does not apply to Article 725, unless referenced. The reference to 300.17 is found in 725.51, making 725.3(A) redundant. There are references to sections in Chapters 1-4 throughout Article 725 that are not duplicated in 725.3 (e.g. references to 110.3(B), 300.7, 300.22, 300.17, 310.15(B)(2), 392.11, and others).

In addition, 760.3 does not have a requirement pointing to 300.17, because the reference to 300.17 is in 760.51.

3-157 Log #4362 NEC-P03 **Final Action: Reject**
(725.3(C))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Delete 725.3(C) and renumber remaining sections
~~(C) Ducts, Plenums, and Other Air-Handling Spaces. Class 1, Class 2, and Class 3 circuits installed in ducts, plenums, or other space used for environmental air shall comply with 300.22.~~
~~Exception: Type CL2P or CL3P cables and plenum signaling raceways shall be permitted for Class 2 and Class 3 circuits installed in other spaces used for environmental air in accordance with 725.154(A)~~
Substantiation: Section 725.3(C) is redundant. Section 725.154(A) permits installation of Type CL2P and CL3P cables and plenum signaling raceways in ducts, plenums, and other spaces used for environmental air, and permits circuits to be installed in accordance with 300.22.
Panel Meeting Action: Reject
Panel Statement: Sections within Article 300 apply to Article 725 only if referenced.

Deletion of 725.3(C) would infer that 300.22 only applies to the wiring methods for Class 2 and Class 3 cables specifically mentioned in 725.154.

To not apply 300.22 for CI cable, signaling raceways, Class 1 and the other remote control and signaling wiring methods would not be appropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:

AYER, L.: This proposal should have been accepted in principle. The present wording in 725.3(C) is confusing. The exception to allow CL2P or CL3P cables in plenum signaling raceways in other spaces used for environmental air is already covered in 725.154(A). The additional wording is not necessary. By deleting the extraneous words, the exception would look similar to 770.3 and 760.3.

(C) Ducts, Plenums, and Other Air-Handling Spaces.
Class 1, Class 2, and Class 3 circuits installed in ducts, ~~plenums,~~ or other space used for environmental air
shall comply with 300.22.
Exception: **As permitted in**~~Type CL2P or CL3P cables and plenum signaling raceways shall be permitted~~
~~for Class 2 and Class 3 circuits installed in other spaces used for environmental air in accordance with~~
725.154(A).

EGESDAL, S.: The reference to 300.22 is adequately covered in 725.154(A), so is redundant in 725.3. There are references to sections in Chapters 1-4 throughout Article 725 that are not duplicated in 760.3 (e.g., references to 110.3(B), 300.7, 300.22, 300.17, 310.15(B)(2), 392.11, and others).

SEPULVEDA, M.: The reference to 300.22 is adequately covered in 725.154(A), so is redundant in 725.3. There are references to sections in Chapters 1-4 throughout Article 725 that are not duplicated in 760.3 (e.g., references to 110.3(B), 300.7, 300.22, 300.17, 310.15(B)(2), 392.11, and others).

3-158 Log #1173 NEC-P03 **Final Action: Accept**
(725.3(H))

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 725.3(H) to read as follows:

"(H) Raceways Exposed to Different Temperatures. Installations shall comply with 300.7(A)".
Substantiation: Condensation often forms in conduit exposed to non-conditioned and conditioned space. This change is proposed to bring the requirements of 300.7(A) into Article 725. This is a companion to a proposal submitted to 760.3(H).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:

STENE, S.: The title in proposed 725.3(H) should be changed by adding "Cables, Raceways, or Sleeves" to read as follows: Cables, Raceways, or Sleeves Exposed to Different Temperatures."
The text in proposed (H) should be changed to read as follows: "Where portions of cables, raceways, or sleeves are exposed to different temperatures and condensation is known to be a problem, Class 1, Class 2, and Class 3 installations shall comply with 300.7(A)." This proposed text would provide specific information for the user with installation applications pertaining to the specific use of 300.7(A).

3-159 Log #2906 NEC-P03 **Final Action: Accept in Principle**
(725.3(H) (New))

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Add new section as follows :

725.3(H) Vertical Support For Fire Rated Cable. Installation of circuit integrity (CI) and Electrical Protective Systems shall be in accordance with 300.19(B).
Substantiation: Support requirements for fire- rated cable are critical and contained in 300.19(B). The strength of copper decreases with heat. Cables may break if not properly supported in a fire situation.
Panel Meeting Action: Accept in Principle
Revise the wording in the proposal as follows:

725.3(H) "Vertical Support for Fire Rated Cables and Conductors. Vertical installations of circuit integrity (CI) cables and conductors or cables of electrical circuit protective systems shall be in accordance with 300.19(B)."
Panel Statement: The text in the proposal was changed in the title and the section to cover both cables and conductors since circuit integrity cables and electrical circuit protective systems could be either cables or conductors.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:

EGESDAL, S.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type CL2-CI), but applies to an electrical circuit protective system. Circuit integrity is not an electrical circuit protective system. While a circuit integrity (CI) cable and an electrical circuit protective system are tested using UL 2196, the tests are not identical. Note: Section 725.154(F) title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."

SEPULVEDA, M.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type CL2-CI), but applies to an electrical circuit protective system. Circuit integrity is not an electrical circuit protective system. While a circuit integrity (CI) cable and an electrical circuit protective system are tested using UL 2196, the tests are not identical. Note: Section 725.154(F) title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."

3-160 Log #4346 NEC-P03 **Final Action: Reject**
(725.3(H) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.3(H)
(H) Conductors and Cables in Dry, Damp, or Wet Locations.
(1) Conductors. Conductors shall comply with the appropriate requirements of 310.8(A), (B), or (C).
(2) Cables. Class 2 or Class 3 cables shall comply with the appropriate requirements of 725.154.
Substantiation: The goal of this proposal is to develop listing and marking requirements for Class 2, and Class 3 cables installed in dry, damp, and wet locations that are equivalent to the requirements for conductors

Article 725 circuit conductors must comply with 310(A), (B), or (C). However, there are no listing and marking requirements for Class 2, or Class 3 cables installed in dry, damp, or wet locations.

There are system problems where an inappropriate cable is installed in a damp or wet location.

This proposed change has a companion proposal to establish a new 725.179(M).
Panel Meeting Action: Reject
Panel Statement: Class 1 conductors and any Class 2 or 3 conductors permitted in 725.130(A) as Class 1 wiring methods are covered by the requirements in Article 310 and specifically by 310.8(A) for dry locations, (B) for damp locations, and (C) for wet locations; therefore, a reference back to 310.8 is not necessary.

Proposed (2) is unnecessary since compliance with 725.154 is already a requirement in Part III of Article 725.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:

EGESDAL, S.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.

SEPULVEDA, M.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-161 Log #1174 NEC-P03 **Final Action: Reject**
(725.3(I))

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 725.3(I) to read as follows:
"(I) Number and Size of Cables and Conductors in Raceway. Installations shall comply with 300.17".
Substantiation: The FPN following 300.17 already references Article 725, but no reference exists in Article 725. This proposal seeks to impose the fill requirements to prevent abrasions and other problems associated with overfull conduit. Although conductor heating is not an issue, the reference will clarify the intent to allow installation and withdrawal of conductors without inflicting damage. This is a companion to a proposal on 760.3(I).
Panel Meeting Action: Reject
Panel Statement: The proposed text is already in the existing text of 725.3(A).
The substantiation is incorrect in that the text exists and that conductor heating can be assumed to be a non-issue.
Class 1, Class 2, and Class 3 circuits can, indeed, develop currents that could generate heating of the conductors up to the capacity of the circuit protective device.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:
EGESDAL, S.: The panel statement is misleading. If derating of a Class 1 circuit is necessary, the requirement is covered in 725.51(A): where continuous load is greater than 10% of conductor ampacity. Derating does not apply to Class 2 and Class 3 circuits [See 725.130(A) Exception No. 1].
As stated in the Egesdal negative comment to 3-156, the reference to 300.17 already exists in 725.51, so would is redundant in 725.3.
SEPULVEDA, M.: The panel statement is misleading. If derating of a Class 1 circuit is necessary, the requirement is covered in 725.51(A): where continuous load is greater than 10% of conductor ampacity. Derating does not apply to Class 2 and Class 3 circuits [See 725.130(A) Exception No. 1].
As stated in the Egesdal negative comment to 3-156, the reference to 300.17 already exists in 725.51, so would is redundant in 725.3.

3-162 Log #4349 NEC-P03 **Final Action: Reject**
(725.3(I))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.3(I)
(I) Conductors and Cables Exposed to Direct Sunlight.
(1) Conductors. Conductors shall comply with 310.8(D).
(2) Cables. Class 2 and Class 3 cables shall comply with the appropriate requirements of 725.154.
Substantiation: Article 725 circuits have to comply with 310(D). However, there is marking no marking or listing requirement for Class 2 and Class 3 cables installed exposed to direct sunlight.
System problems may occur where an inappropriate cable is installed exposed to direct sunlight.
There are companion proposals to add listing requirements to 725.179 to support this proposal and to 725.154 for application requirements.
Panel Meeting Action: Reject
Panel Statement: Class 1 conductors and any Class 2 or 3 conductors permitted in 725.130(A) as Class 1 wiring methods are covered by the requirements in Article 310 and specifically by 310.8 (D) for conductors exposed to sunlight, therefore, a reference back to 310.8(D) is not necessary.
Proposed (2) is unnecessary since compliance with 725.154 is already a requirement in Part III of Article 725.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.
SEPULVEDA, M.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-163 Log #1175 NEC-P03 **Final Action: Reject**
(725.3(J))

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 725.3(J) to read as follows:
"(J) Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies. Installations shall comply with 314.16".
Substantiation: Overfilled boxes often result in shorts and overheating (non power-limited) on certain circuits. Overfilled boxes are also much more difficult to service, and could result in low system reliability. This proposal seeks to impose the fill requirements to prevent short circuits, and other problems associated with overfilled boxes. This is a companion proposal to a proposed new 760.3(J).
Panel Meeting Action: Reject
Panel Statement: 90.3 states that Chapters 1 through 4 apply, except as amended by Chapters 5, 6, and 7 for the particular conditions.
725.3 only exempts compliance with certain parts of Article 300, not all parts of the NEC.
The addition of the requirement to comply with 314.16 is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-164 Log #4351 NEC-P03 **Final Action: Reject**
(725.3(J))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.3(J)
(J) Temperature Limitations of Conductors and Cables.
(1) Conductors. Conductors installed using Class 1 methods and materials shall comply with 310.10 or 402.3.
(2) Cables. Class 2, Class 3, and PLTC cables shall comply with the appropriate requirements of 725.154.
Substantiation: All Article 725 circuits using Class 1 methods and materials must meet the temperature requirements of 310.10 or 402.3. These tables provide temperature rating options for various types of conductors.
Presently, there are no equivalent requirements for cables. There is a companion proposal to add listing requirements for cable temperature rating and marking requirements to new 725.179(Q). The companion proposal in 725.179 will have minimal cost impact on cable manufacturers.
Panel Meeting Action: Reject
Panel Statement: Class 1 conductors and any Class 2 or 3 conductors permitted in 725.130(A) as Class 1 wiring methods are covered by the requirements in Article 310 and specifically by 310.10 for conductors with temperature limitations, therefore, a reference back to 310.10 is not necessary.
Proposed (2) is unnecessary since compliance with 725.154 is already a requirement in Part III of Article 725.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.
SEPULVEDA, M.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-165 Log #667 NEC-P03 **Final Action: Reject**
(725.7)

Submitter: Gregory P. Bierals, Samaritan's Purse World Medical Mission
Recommendation: 725.7 should be 725.21.
Substantiation: The reference to the section is incorrect.
Panel Meeting Action: Reject
Panel Statement: The reference "725.7" only appears in the 2008 NEC in the index under the heading of "Accessible," and the submitter did not provide enough substantiation as to where the reference was incorrect to Accept this proposal.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-166 Log #4344 NEC-P03 **Final Action: Reject**
(725.13(K) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.3(K)
(K) Corrosive Locations.
(1) Conductors. Conductors shall comply with 110.11, 300.6(C)(2), and 310.9, where installed in corrosive locations.
(2) Cables. Class 2 and Class 3 cables shall comply with the appropriate requirements of 725.154.
Substantiation: This proposal develops requirements for circuits installed in corrosive locations. This proposal has text parallel to 760.3(D), with the addition of requirements for cables.
Corrosive locations have the potential to degrade cable and conductor insulation and cause system malfunction.
There are companion proposals to address installation of cables in corrosive locations.
Panel Meeting Action: Reject
Panel Statement: The section reference is incorrect at the top of the proposal. It should be 725.3(K) rather than 725.13(K).
90.3 states that Chapters 1 through 4 apply except as amended by Chapters 5, 6, and 7 for the particular conditions.
725.3 only exempts compliance with certain parts of Article 300, not all parts of the NEC.

The addition of the requirement to comply with 110.11, 300.6(C)(2), and 310.9 is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.
SEPULVEDA, M.: The Panel Statement is correct with respect to Part II, where Part III circuits are installed using Part II methods and materials. The goal of this proposal was to clarify requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-167 Log #955 NEC-P03 **Final Action: Reject**
(725.24)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
~~Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner.~~ Cables and conductors ~~installed on the surface and sidewalls~~ shall be secured in place and supported by the structural members ~~in such a manner that the cables will not be damaged by normal building use~~. (remainder unchanged)
Substantiation: Edit. “Neat” and “workmanlike” are subjective and terms to be avoided per the Style Manual, and do not necessarily have any relation to safety as long as installations comply with applicable provisions of the Code. Support should be required whether or not installed on the surface and such support doesn’t necessarily damage, which is covered by 110.27(B).
Panel Meeting Action: Reject
Panel Statement: While the submitter is correct that the terms “neat” and “workmanlike” are indeed contained in the Table 3.2.1 list in the NEC Manual of Style, the manual also states that terms “shall be reviewed in context, and, if the resulting requirement is unenforceable or vague, the term shall not be used.”
The context in which these terms are used in 725.24 is appropriate as the section further clarifies what has to be done to achieve a compliant installation, and, therefore, is enforceable.
The submitter does not substantiate the need to delete the entire first sentence or any reference to Class 1, Class 2, and Class 3 circuits.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-168 Log #2148 NEC-P03 **Final Action: Reject**
(725.24)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text as follows:
The installation shall also conform to 300.4(D), ~~and~~ 300.11~~.~~, and 334.15(C).
Substantiation: Cables ran across joists need running boards or bored holes to protect them from occupants hanging and damaging the conductors and cables.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for Class 1, Class 2, and Class 3 circuits to comply with 300.11, therefore, the reference is inappropriate.
334.15(C) only applies to NM cable, used for exposed installations and would not apply to Class 1, Class 2, or Class 3 installations using wiring methods other than NM cable, therefore, the addition of this reference is also inappropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-169 Log #2149 NEC-P03 **Final Action: Reject**
(725.24)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text as follows:
The installation shall also comply with 300.4(D), and 334.15(C).
Substantiation: Cables ran across joists need running boards or bored holes to protect them from occupants hanging and damaging the conductors and cables.
Panel Meeting Action: Reject
Panel Statement: 334.15(C) only applies to NM cable used for exposed installations. This section would not apply to Class 1, Class 2, or Class 3 installations using wiring methods other than NM cable, therefore, the addition of this reference is inappropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-170 Log #2388 NEC-P03 **Final Action: Reject**
(725.24)

Submitter: Jamie McNamara, Hastings, MN
Recommendation: Revise text to read as follows:
725.24 Mechanical Execution of Work.
The installation shall also conform with 300.4(D) and 300.11.
Substantiation: To harmonize with the requirements in Articles 770, 800, 820 and 830.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for Class 1, Class 2, and Class 3 circuits to comply with 300.11, therefore, the reference is inappropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-171 Log #2897 NEC-P03 **Final Action: Reject**
(725.24)

Submitter: John R. Jennings, DR Electric
Recommendation: Add new text to read as follows:
Class 1, Class 2, Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(B) and 300.11.
Substantiation: It is important that cables not be supported by the ceiling grid when installed above suspended ceilings, both for the protection of the cables, and for access above the ceiling at later dates. I believe that 300.11 has been intended to apply to these installations, and the addition of this rule will make it easier to enforce.
This Article is, as it stands, almost word-for-word with similar limited energy/low voltage sections, such as 770.24, 800.24, and 830.24.
With the added wording, there will be identical requirements for all limited energy/low voltage installations.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for Class 1, Class 2, and Class 3 circuits to comply with 300.11, therefore, the reference is inappropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-172 Log #3086 NEC-P03 **Final Action: Reject**
(725.24)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
725.24 Mechanical Execution of Work.
Class 1, Class 2, and Class 3 circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4~~(D)~~ and 300.11.
Substantiation: This is one of a series of proposals intended to provide correlation with sections 640.6(B), 725.24, 760.24, 770.24, 800.24, 820.24 and 830.24. Due to the power limitations of these circuits, there is no reason that the requirements should be different.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for Class 1, Class 2, and Class 3 circuits to comply with 300.11, therefore, the reference is inappropriate.
No problem was cited to expand the requirement to include all of 300.4
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-173 Log #4549 NEC-P03 **Final Action: Reject**
(725.25)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
725.25 Abandoned Cables.
The accessible portion of abandoned Class 2, Class 3, and PLTC cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. Removal of abandoned cables shall be performed in a neat and workmanlike manner.
Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 725.24. It is important to point out that similar care must be taken when removing cables.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Consistent wording is being proposed for other sections in the code.
For information, see relevant definitions in the NEC.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation for the proposed change, and compliance with this requirement would be unenforceable.
This is already covered under 90.4 and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-174 Log #3239 NEC-P03 **Final Action: Reject**
(725.31(A) Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text as follows:
Exception: Remote control circuits shall not be required to be classified as Class 1 where the equipment is identified as suitable for use with Class 2 circuits.
Substantiation: Present wording requires Class I wiring for example, for a gas-fired furnace with a high limit temperature control, which, if it fails, may introduce a potentially direct fire hazard if the controlling thermostat circuit does not operate properly.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to warrant this change. High temperature controls for a gas fire boiler would not constitute a requirement for a Class 1 circuit classification.
Equipment identified as suitable for use with Class 2 circuits does not ensure that 725.31 Safety-Control Equipment concerns will be met.
By requiring the Class 2 or Class 3 remote control circuits that may introduce a fire hazard or a life hazard to be classified as Class 1 circuits, the conductors must be 600-volt as required by 725.49, not 150- or 300-volt as would normally be permitted by 725.179(G), the circuits must comply with the wiring methods of the appropriate Articles in Chapter 3 and all of the requirements in Part I of Article 300, in addition to the other requirements in Part II of Article 725.
The proposed exception would inappropriately delete all of these safety requirements.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-175 Log #2420 NEC-P03 **Final Action: Reject**
(725.31(B))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follows:
"All conductors of such remote-control circuits shall be installed in rigid metal conduit, intermediate metal conduit, rigid ~~non-metallic~~ PVC conduit, electrical metallic tubing...".
Substantiation: Conforming to the style manual Article 352.
Panel Meeting Action: Reject
Panel Statement: The current text is adequate and covers PVC. "rigid non-metallic conduit" is generic and covers all types of conduit.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-176 Log #2195 NEC-P03 **Final Action: Reject**
(725.43)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
725.43 Class 1 Circuit Overcurrent Protection.
Overcurrent protection for conductors 14 AWG and larger shall be provided in accordance with the conductor ampacity, without applying the ampacity adjustment ~~derating~~ factors of 310.15 to the ampacity calculation. Overcurrent protection shall not exceed 7 amperes for 18 AWG conductors and 10 amperes for 16 AWG.
Exception: Where other articles of this Code permit or require other overcurrent protection.
FPN: For example, see 430.72 for motors, 610.53 for cranes and hoists, and 517.74(B) and 660.9 for X-ray equipment.
Substantiation: The terms "ampacity adjustment factors" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.
Panel Meeting Action: Reject
Panel Statement: Derating factors referenced in 310.15 apply to ambient temperature correction factors and adjustment factors, therefore, the proposal is unclear as to whether or not the suggested change applies to both.
The panel suggests that the submitter provide further clarification.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-177 Log #3035 NEC-P03 **Final Action: Reject**
(725.43)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
725.43 Class 1 Circuit Overcurrent Protection.
Overcurrent protection for conductors 14 AWG and larger shall be provided in accordance with the conductor ampacity, without applying the ampacity adjustment ~~derating~~ factors of 310.15 to the ampacity calculation. Overcurrent protection shall not exceed 7 amperes for 18 AWG conductors and 10 amperes for 16 AWG.
Exception: Where other articles of this Code permit or require other overcurrent protection.
FPN: For example, see 430.72 for motors, 610.53 for cranes and hoists, and 517.74(B) and 660.9 for X-ray equipment.
Substantiation: The terms "adjustment factor" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-176.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-178 Log #2390 NEC-P03 **Final Action: Reject**
(725.43 Exception No. 2 (New))

Submitter: Thomas F. Mueller, Southern Company
Recommendation: Add Exception No. 2 as follows:
Exception No. 2: Where the Class I circuit is an extension of a vendor supplied device or circuit provided with integral short circuit and ground fault protection, conductors sized #14 AWG and larger shall be permitted to be protected at not more than 300 percent of their ampacity.
Substantiation: Vendor supplied devices such as circuitry for solenoids and trip coils are frequently equipped with integral overcurrent devices sized higher than normal due to the high inrush currents present. But, the high currents are short lived. Short duration high currents (like motor starting currents) are allowed and are not injurious to conductors and/or insulations. As currently written, a device supplied with a 30 amp fuse would require a #10 AWG Class I circuit. A #10 AWG Class I circuit while certainly allowed is inconsistent with the whole intent of remote control wiring as stated in the FPN under 725.1. Such circuits are not branch circuits, and are not subject to overload, and requiring overload protection does not enhance safety. It only increases the expense associated with Class I circuit wiring. Adding the exception would align the requirements of 725.43 with 725.45(C) where the 300 percent allowance is already codified, and be similar to the requirements of 430.72(B) for control circuits that extend beyond motor control enclosures. Those sections recognize that such circuits need not be protected against overload.
Panel Meeting Action: Reject
Panel Statement: The purpose of the overcurrent protection for Class 1 circuits is protection for the conductors.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

Comment on Affirmative:

STENE, S.: The Class 1 circuit may be a branch circuit based on the definition of branch circuit in Article 100 but modifications to the requirements of Articles 210 and 240 can be readily seen in Part II of Article 725. Section 725.43 provides a modification of the requirements for the conductors, based on 310.15, not requiring derating of the conductors in 310.15(B)(2)(a) or the ambient temperature derating in the ampacity tables, such as Table 310.16. Section 725.45, as well as 430.72, Table 450.3(B), 240.21(B) and (C), and 210.19(A)(4), Exception No. 1 would permit conductors smaller than the overcurrent device under special circumstances. The existing exception in 725.43 already permits these applications as noted above.

3-179 Log #1413 NEC-P03 **Final Action: Reject**
(725.48)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

(B) Class 1 circuits shall be permitted to be installed with power ~~supply~~ and lighting conductors as specified in 725.48(B)(1) through (B)(4).

(1) Class 1 circuits and power ~~supply~~ and lighting circuits shall be permitted to occupy the same cable, flexible cord or cable, enclosure, or raceway only where the equipment powered is functionally associated, except as permitted in 724.48(B)(2), (3), and (4).

(2) Class 1 circuits and power ~~supply~~ and lighting circuits shall be permitted to be installed in factory or field-assembled control centers. (3) Class 1 circuits and power ~~supply~~ and lighting circuits shall be permitted to be installed as underground conductors in a manhole, handhole, or box as permitted in the exception for 314.29, in accordance with one or more of the following:

(1) The power ~~supply~~ and lighting conductors or Class 1 circuit conductors are in a raceway, metal-covered cable, or multiconductor Type UF cable. Where Type UF cable is employed for both the power and lighting circuits and Class 1 circuits the cables shall be separated, grouped according to their use, and identified by approved means.

(2) The Class 1 circuit conductors are effectively and permanently separated from power ~~supply~~ and lighting conductors by a firmly fixed nonconductor such as flexible tubing or barriers in addition to the insulation on the wires.

(3) The Class 1 circuit conductors are permanently and effectively separated from other conductors and securely fastened to racks, insulators, or other approved supports where installed in manholes.

Substantiation: Edit. "Power" may imply lighting circuits are not included. Flexible cords and cables should be included, also handholes and boxes permitted in the exception for 314.29. A reference to (B)(2) in (B)(1) will remove any perceived conflict with (B)(2) which doesn't require functional association with all conductors. Type UF cable should be multiconductor type, single-conductor type is essentially no different other than conductors for general wiring. The provisions of (B)(3)(3) are generally suitable only for manholes.
Panel Meeting Action: Reject
Panel Statement: Class 1 circuits can be power-limited supply circuits where a higher voltage supplied conversion unit (power supply), such as a transformer or a solid state unit, could be used to drop the voltage of the Class 1 circuit from line voltage to maximum 30 volts so deleting "supply" and adding "lighting" is an incorrect application since the existing text deals with the power supply, not lighting.

Adding flexible cord is not appropriate since there was not technical substantiation provided to expand permission to include cords.

Cables are already covered in the existing text.

Adding the phrase "except as permitted in 725.48(B)(2), (3), and (4)" is not appropriate since (1) only applies to cables, enclosures, and raceways, whereas (2) applies specifically to factory or field assembled control centers, (3) applies in a manhole, and (4) applies in cable trays.

Since 725.46 already provides installation requirements in accordance with Chapter 3 wiring methods, Article 314 would permit handholes and UF cable to be used. However, the specific requirements for manholes are provided in the existing 725.48(B)(3) since manholes were moved to Article 110 Part V dealing with conductor and equipment spacing, not the specific Class 1 conductor and cable requirements as spelled out in (3). There is no reason to require spacing of UF cables for power and Class 1 or to add multiconductor UF cable since existing 725.48(B)(3)(1) already states the power supply conductors or Class 1 conductors are in Type UF cable. The conductors cannot be "in" a single conductor UF cable; therefore, the proposed text is unnecessary. The panel refers the submitter to 90.1(C).
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-180 Log #4688 NEC-P03 **Final Action: Reject**
(725.48(B)(1))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Revise to read as follows:

Class 1 circuits and power supply circuits shall be permitted to occupy the same cable, enclosure, or raceway only where one or more Class 1 conductors are functionally associated with one or more power supply circuit conductors.
Substantiation: If there are two unrelated motors at the same general location, it is beyond question that the two sets of branch-circuit conductors to the two motors can run in a common raceway. Now, add a set of control conductors for each motor to the same conduit. Are these control conductors functionally associated with the power conductors? Obviously. However, is every control conductor functionally associated with every power conductor? Obviously not. Is this, therefore, a violation of 725.48(B)(1)? The words of the NEC say "functionally associated" and leave it at that. The answer cannot be determined based on the current literal text of the Code. This proposal affords a definitive answer.
The usual objections to this practice run to the undesirability of exposing unrelated control conductors to a fault and thereby disabling multiple motor functions in unrelated processes. Although that is a reasonable design argument, there are serious limitations to this argument as a matter of NEC minimum standards. The power and control wiring that goes to those two motors can originate in the same vertical motor control center section, as covered in 725.48(B)(2). There are no limits on running the two power circuits together to the motors, as already covered. And a fault in one of those motor circuits will certainly disable the other motor, yet that is clearly allowed. Why then object to the control conductors? There is no supportable argument that multiple functions in a single raceway (other than very rare exceptions as with fire pump and emergency circuits) rise to the level of a fire or electrocution hazard, which, as covered in 90.1, is and ought to be the controlling principle. Note further, the rule also applies to enclosures. If this were to be applied in the opposite, exclusionary direction, machine tool control wiring practice as we know it in most industrial occupancies would be disrupted, unless the functional association rule were expanded to the point of meaninglessness (as in, "sure, everything in this factory is associated with everything else"). This wording has been the source of confusion for decades.
Panel Meeting Action: Reject
Panel Statement: "Functionally associated" refers to equipment or a system that can disconnect all circuits of the system being supplied.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:

STENE, S.: Class 1 control conductors are used to provide activation of motors. Even though short circuits are not an everyday occurrence, the intent of the existing text is to provide some safety provisions so a short circuit from a related power circuit would not inadvertently cause the energizing of the control circuit and thus cause the motors to operate.

3-180a Log #CP302 NEC-P03 **Final Action: Accept**
(725.49)

Submitter: Code-Making Panel 3,
Recommendation: Revise existing 725.49 as follows:

"725.49 Class 1 Circuit Conductors.

(B) Insulation. Insulation on conductors shall be ~~suitable~~ rated for 600 volts. Conductors larger than 16 AWG shall comply with Article 310. Conductors in sizes 18 AWG and 16 AWG shall be Type FFH-2, KF-2, KFF-2, PAF, PAFF, PF, PFF, PGF, PGFF, PTF, PTFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFFN, TFN, ZF, or ZFF. Conductors with other types and thicknesses of insulation shall be permitted if listed for Class 1 circuit use."
Substantiation: "Suitable" was changed to "rated" since the conductor insulation must be rated for 600-volts.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-181 Log #2196 NEC-P03 **Final Action: Accept**
(725.51)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
725.51 Number of Conductors in Cable Trays and Raceway, and Ampacity Adjustment. ~~Derating.~~
(A) Class 1 Circuit Conductors. Where only Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply only if such conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor.
(B) Power-Supply Conductors and Class 1 Circuit Conductors. Where power-supply conductors and Class 1 circuit conductors are permitted in a raceway in accordance with 725.48, the number of conductors shall be determined in accrodance with 300.17. The ampacity adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply as follows:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(C) Text to remain unchanged.
Substantiation: The term “ampacity adjustment factors” is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-182 Log #3036 NEC-P03 **Final Action: Accept**
(725.51)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
725.51 Number of Conductors in Cable Trays and Raceway, and Ampacity Adjustment. ~~Derating.~~
(A) Class 1 Circuit Conductors. Where only Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply only if such conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor.
(B) Power-Supply Conductors and Class 1 Circuit Conductors. Where power-supply conductors and Class 1 circuit conductors are permitted in a raceway in accordance with 725.48, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply as follows:
(1) Text to remain unchanged.
(2) Text to remain unchanged.
(C) Text to remain unchanged.
Substantiation: The term “adjustment factor” is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-183 Log #4488 NEC-P03 **Final Action: Accept in Principle**
(725.51)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
725.51 Number of Conductors in Cable Trays and Raceway, and ~~Derating~~ Adjustment Factors.
(A) Class 1 Circuit Conductors. Where only Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The ~~derating~~ adjustment factors given in 310.15(B)(2)(a) shall apply only if such conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor.
(B) Power-Supply Conductors and Class 1 Circuit Conductors. Where power-supply conductors and Class 1 circuit conductors are permitted in a raceway in accordance with 725.48, the number of conductors shall be determined in accordance with 300.17. The ~~derating~~ adjustment factors given in 310.15(B)(2)(a) shall apply as follows:
[remainder of 725.51(B) and 725.51(C) unchanged by this Proposal]
Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term “adjustment factors”, not the unspecific generalization “derating factors”.
366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term “correction factors” and imprecise term “derating factors”, respectively, to “adjustment factors”, the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel actions on Proposals 3-181 and 3-182 that address the submitter’s concerns.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-184 Log #4359 NEC-P03 **Final Action: Reject**
(725.52)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 725.52
~~725.52 Circuits Extending Beyond One Building.~~
~~Class 1 circuits that extend aerially beyond one building shall also meet the requirements of Article 225.~~
725.52 Class 1 Circuits Extending Beyond One Building.
Class 1 circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 800, the applicable sections of Part I of Article 300, and the applicable sections of Part I of Article 225.
Substantiation: Class 1 circuits should have equivalent requirements to those required for non-power-limited fire alarm circuits. The proposed text is parallel to the requirements for non-power-limited fire alarm circuits.
Class 1 and non-power-limited fire alarm circuits are permitted to be installed together in the same cable or raceway. It is important for both types of circuits to have the same requirements where installed outdoors, and transient protection as required by Article 800.
Panel Meeting Action: Reject
Panel Statement: Only power-limited fire alarm circuits that extend beyond one building are required by 760.32 to meet the installation requirements of Parts II, III, and IV of Article 800 or meet the installation requirements of Part I of Article 300.
Class 1 non-power-limited circuits are only limited to 600 volts; therefore, to try to apply the requirements in Article 800 to these types of control voltages would be dangerous since most phone systems operate at less than 50 volts.
Article 285 covers transient protection.
The existing text adequately applies Article 225 to these circuits that extend outside the building.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:
EGESDAL, S.: The purpose of this proposal was to impose the requirements of Parts II, III, & IV of Article 800, which does not specify equipment specifications. Obviously a 50 volt primary protector would be a poor choice for a 120 volt Class 1 circuit. There are lightning protection (transient protection) devices available that handle up to 600 volts. Additionally, the requirement for meeting the appropriate sections of Part I of Article 300 imposes underground requirements. Article 225 has requirements for overhead wiring installations.
KAHN, S.: I agree with the proposer’s substantiation and the proposal should have been approved. The Panel Statement is confusing.
SEPULVEDA, M.: The purpose of this proposal was to impose the requirements of Parts II, III, & IV of Article 800, which does not specify equipment specifications. Obviously a 50 volt primary protector would be a poor choice for a 120 volt Class 1 circuit. There are lightning protection (transient protection) devices available that handle up to 600 volts. Additionally, the requirement for meeting the appropriate sections of Part I of Article 300 imposes underground requirements. Article 225 has requirements for overhead wiring installations.

3-185 Log #4833 NEC-P03 **Final Action: Reject**
(725.121(A)(4), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN No. 1: ~~One way to determine applicable requirements for listing of information technology (computer) equipment is to refer to UL 60950-1-2003, Standard for Safety of Information Technology Equipment.~~ Typically such circuits are used to interconnect information technology equipment for the purpose of exchanging information (data).
FPN No. 2: See {2}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-186 Log #2018 NEC-P03 **Final Action: Reject**
(725.130)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: Conductors and cables installed in wet locations or where subject to direct sunlight shall be identified for such use.
Substantiation: Where conductors or cables are installed in these locations, they should be identified for such use. These conductors are not covered by 310.1 and 310.8
Panel Meeting Action: Reject
Panel Statement: This proposal is not in compliance with 4.3.3(b) of the Regulations Governing Committee Projects since it does not provide the specific location where the submitter would like this text inserted.
The proposed text would be more appropriately addressed in 725.179 covering listing of Class 2 and 3 conductors and cables, not under 725.130 for wiring methods and materials.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-187 Log #2197 NEC-P03 **Final Action: Accept**
(725.130(A) Exception No. 1)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:
725.130 Wiring Methods and Materials on Load Side of the Class 2 or Class 3 Power Source.
Class 2 and Class 3 circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with either 725.130(A) or (B).
(A) Class 1 Wiring Methods and Materials. Installation shall be in accordance with 725.46.
Exception No. 1: The ampacity adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall not apply.
Substantiation: The term “ampacity adjustment factors” is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-188 Log #3037 NEC-P03 **Final Action: Accept**
(725.130(A) Exception No. 1)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:
725.130 Wiring Methods and Materials on Load Side of the Class 2 or Class 3 Power Source.
Class 2 and Class 3 circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with either 725.130(A) or (B).
(A) Class 1 Wiring Methods and Materials. Installation shall be in accordance with 725.46.
Exception No. 1: The ampacity adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall not apply.
Substantiation: The term “adjustment factor” is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-189 Log #4489 NEC-P03 **Final Action: Accept in Principle**
(725.130(A) Exception No. 1)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:
725.130 Wiring Methods and Materials on Load Side of the Class 2 or Class 3 Power Source.
Class 2 and Class 3 circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with either 725.130(A) or (B).
(A) Class 1 Wiring Methods and Materials. Installation shall be in accordance with 725.46.
Exception No. 1: The ~~derating~~ adjustment factors given in 310.15(B)(2)(a) shall not apply.
[remainder of 725.130 unchanged by this Proposal]
Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term “adjustment factors”, not the unspecific generalization “derating factors”.
366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term “correction factors” and imprecise term “derating factors”, respectively, to “adjustment factors”, the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.
A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action on Proposal 3-187 that addresses the submitter’s concerns.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-190 Log #4358 NEC-P03 **Final Action: Reject**
(725.130(B))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new text to 725.130(B)
(B) Class 2 and Class 3 Wiring Methods. Conductors on the load side of the power source shall be insulated at not less than the requirements of 725.179 and shall be installed in accordance with 725.133 and 725.154. The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.
Substantiation: Part III of Article 725 is silent on whether power-limited conductors and cables have to meet the conduit fill requirements of Chapter 3 and Chapter 9. Communications cables are not required to meet the raceway fill requirements [800.110, The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.]. Communications cables are permitted to substitute for fire alarm power-limited cables, so this proposal provides parallel requirements to 800.110.
Panel Meeting Action: Reject
Panel Statement: 725.3(A) reads: “Number and Size of Conductors in Raceway. Section 300.17.” for class 1, 2 & 3 circuits.
Since 725.35(2) requires Class 2 and 3 circuits comply with Parts I and III and 725.3(A) is in Part I, compliance with 300.17 is required so the raceway fill requirements do apply.
The Fine Print Note in 300.17 also references Class 1, Class 2, and Class 3 circuits in Article 725. In addition, 90.3 requires compliance with Chapter 1 through 4 generally, except as amended by Chapter 5, 6, or 7 and Article 725 does not amend raceway fill.
There was also no technical substantiation provided to make this major change.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-191 Log #4357 NEC-P03 **Final Action: Reject**
(725.130(J) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.130(J)
(J) Bushing. A bushing shall be installed where cables emerge from raceway used for mechanical support or protection in accordance with 300.15(C).
Substantiation: Conduits and other raceways are often used for mechanical support or protection of cables. A bushing is needed to protect cables from damage. Article 300 does not apply unless referenced.
Panel Meeting Action: Reject
Panel Statement: The panel does not know where to apply this text and the submitter has indicated a section reference that is completely out of sequence.
The submitter has not provided technical substantiation indicating that cable damage has occurred.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: This proposal should have been to 725.136(J) [New].
Article 300 does not apply to Article 725, unless referenced. Including a reference to 300.15(C) provides protection against abrasion for Class 2 & 3 cables that emerge from raceway (no box). A Class 2 or Class 3 cable may be installed in a raceway system with the wiring method changed to “exposed” out of a field-cut section or raceway (e.g., EMT).
Because 300.15(C) exists, it should not be required to show damage has occurred to Class 2 or 3 cables.
SEPULVEDA, M.: This proposal should have been to 725.136(J) [New]. Article 300 does not apply to Article 725, unless referenced. Including a reference to 300.15(C) provides protection against abrasion for Class 2 & 3 cables that emerge from raceway (no box). A Class 2 or Class 3 cable may be installed in a raceway system with the wiring method changed to “exposed” out of a field-cut section or raceway (e.g., EMT).
Because 300.15(C) exists, it should not be required to show damage has occurred to Class 2 or 3 cables.
Comment on Affirmative:
KAHN, S.: The panel action is correct since the Proposal is deficient in that it proposes an addition in the wrong place (it probably intended to add a new 725.136(J). There is merit to the Proposal, however, and it should receive serious consideration if resubmitted.
OWEN, R.: In addition to the panel’s statement on lack of technical substantiation, the same submitter, in Proposal 3-190 proposed eliminating the raceway fill tables in Chapters 3 & 9. If mechanical protection is needed to protect cables from damage, then Proposal 3-190 to allow unlimited raceway fill would seem to contradict this Proposal.

3-192 Log #3123 NEC-P03 **Final Action: Reject**
(725.133)

Submitter: Sanford E. Egesdal, Egesdal Associates PLC
Recommendation: Revise 725.133
725.133 Installation of Cables and Conductors, and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, **and Raceways for Class 2 and Class 3 Circuits.**
Cables, conductors, and equipment, and raceways for Class 2 and Class 3 circuits shall be installed in accordance with 725,133(A) through (H) and 725.136 through 725.143.
(A) Listing. Class 2 and Class 3 cables, conductors, and raceways shall be listed.
(B) Air Ducts and Plenums. The following cables, conductors, and raceways shall be permitted in air ducts and plenums as described in 300.22(B).
(1) Types CL2P, CL2P-CI, CL3P, and CL3P-CI
(2) Plenum signaling raceway
(3) Types CL2P and CL3P installed in plenum signaling raceway
(4) Listed cables and conductors installed in raceways that are installed in compliance with 300.22(B)
(C) Other Spaces Used For Environmental Air. The following cables, conductors, and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C).
(1) Types CL2P, CL2P-CI, CL3P, and CL3P-CI
(2) Plenum signaling raceway
(3) Types CL2P and CL3P installed in plenum signaling raceway
(4) Listed cables and conductors installed in raceways that are installed in compliance with 300.22(C)
(D) Risers-Wires and Cables in Vertical Runs. The following wires, cables, and signaling raceways shall be permitted in vertical runs penetrating more than one floor and in vertical runs in a shaft:
(1) Types CL2R, CL2R-CI, CL3R, and CL3R-CI
(2) Plenum and riser signaling raceways
(3) Types CL2P, CL3P, CL2R, and CL3R installed in plenum or riser signaling raceway
(E) Risers-Cables in Metal Raceways, Fireproof Shafts, and One- and Two-Family Dwellings. The following cables and raceways shall be permitted in metal raceway, in a fireproof shaft with firestops at each floor, and in one- and two-family dwellings:
(1) Types CL2, CL3, CL2X, and CL3X or other listed wiring methods as covered in Chapter 3
(2) Plenum, riser, and general-purpose signaling raceways
(3) Types CL2, CL3, CL2X, and CL3X installed in plenum, riser, or general-purpose signaling raceway
(F) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays.
(1) Type PLTC where installed outdoors
(2) Types PLTC, CL3P, CL3R, CL3, CL2P, CL2R, and CL2 where installed indoors
(3) Plenum, riser and general-purpose signaling raceways
(4) Types PLTC, CL3P, CL3R, CL3, CL2P, CL2R, and CL2 installed in plenum, riser or general-purpose signaling raceway
(G) Hazardous (Classified) Locations. The following cables shall be permitted to be installed in hazardous (classified) locations.
(1) Type PLTC where permitted by 501.10(B), 502.10(B), and 504.20, the cable shall be installed in cable trays, in raceways, supported by messenger wire, or otherwise adequately supported and mechanically protected by angles, struts, channels, or other mechanical means. Type PLTC shall be permitted to be directly buried where the cable is listed for this use.
(2) Wiring for nonincendive circuits as permitted by 501.10(B)(3), and wiring for intrinsically safe circuits as permitted by 504.20, shall be permitted for circuits derived from Class 2 sources.
(3) Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.
(4) Type PLTC cable in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, shall be permitted in accordance with either (a) or (b):
(a) Type PLTC cable, with a metallic sheath or armor in accordance with725.179(E), shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).
(b) Type PLTC cable, without a metallic sheath or armor, that complies with the crush and impact requirements of Type MC cable and identified for such use with the marking PLTC-ER, shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).
(H) Other Wiring Within Buildings. The following cables installed in building locations, other than those covered in 725.133(B) through (G), shall be permitted to be any of (H)(1) through (H)(7).
(1) Type CL2 or CL3
(2) Type CL2X or CL3X installed in a raceway or in accordance with other wiring methods covered in Chapter 3.
(3) Type CL2X and Type CL3X cables shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).
(4) Type CL2X cables less than 6 mm (0.25 in.) in diameter and Type CL3X cables less than 6 mm (0.25 in.) in diameter in one- and two-family dwellings.
(5) Type CL2X cables less than 6 mm (0.25 in.) in diameter and Type CL3X cables less than 6 mm (0.25 in.) in diameter installed in nonconcealed spaces in multifamily dwellings.
(6) Type CMUC installed under carpet.
(7) Type PLTC in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is not subject to physical damage. Type PLTC cable that complies with the crush and impact requirements of Type MC cable and is identified for such use shall be permitted to be exposed between the cable tray and the utilization equipment or device. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be supported and secured at intervals not exceeding 1.8 m (6 ft).
(F) Type CL2 or CL3 conductors or cables shall be used for cross-connect arrays.
Substantiation: This proposal is editorial and technical.
The cable and raceway applications sections of articles 725, 760, 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 725.133.
A companion proposal for section 725.154 greatly simplifies the statement of the applications of communications cables and raceways by using a table.
This proposal and its companion proposal for section 725.154 need to be considered together as a package.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided for this rewrite of 725.133 and the companion Proposal for 725.154. As it is presently written, 725.133 provides a requirement that Class 2 and Class 3 circuits must be installed in accordance with 725.136 through 725.143. These referenced sections are definitely installation requirements.
For example, 725.136 provides installation requirements for separation of Class 2 and 3 circuits from power, light, and similar higher voltage circuits.
In 725.133(A) of the proposed text, the submitter is requiring listing of Class 2 and Class 3 cables, conductors, and raceways. This is a 725.179 issue since existing Part IV deals with listing issues.
Proposed 725.133(B) would permit cable Types CL2P, CL2P-CI, CL3P, and CL3P-CI, plenum signaling raceways, as well as Cable Types CL2P and CL3P installed in plenum signaling raceways without any restriction on length of runs inside of the fabricated ducts. Existing 300.22(B) restricts installation of wiring methods to metal raceways and then only for connection to equipment necessary for direct action on or sensing of the contained air within the fabricated duct.
There was no technical substantiation provided for proposed 725.133(E) for Risers-Cables in Metal Raceways, Fire-Proof Shafts, and One- and Two-Family Dwellings. There was no rationale provided as to why these three installations were in the same subsection together since one- and two-family dwellings seldom deal with risers and fireproof shafts.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
CONNAUGHTON, T.: Remove installation rules from the applications section 725.154 and relocate them in the installation section 725.133. Simplify cable applications by using a table.
Comment on Affirmative:
EGESDAL, S.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.
KAHN, S.: This is one of a series of proposals that would separate installation rules and cable applications. I participated in the Task Group that worked on the simplification of the installation rules, cable applications and correlation with NFPA 90A (as directed by the Standards Council). CMP-16 improved on the series of proposals in their meeting the week following the CMP-3 meeting. This proposal, along with 3-198, was intended to remove installation rules from the applications section 725.154 and relocate them in the installation section 725.133 and to simplify cable applications by using a table. The Proposal should be reconsidered.
SEPULVEDA, M.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

3-193 Log #953 NEC-P03 **Final Action: Reject**
(725.136(G))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Class 2 and Class 3 circuit conductors shall be permitted to be installed in the same cable trays with other system conductors where the conductors of the Class 2 and Class 3 circuit conductors or all other system conductors are installed in raceways or metal covered cables.
Exception: Separation from communication circuit conductors shall not be required if the Class 2 and Class 3 circuit conductors comply with 725.139(D)(1).
Substantiation: "Electric light" implies that electric "power" conductors are not included. Effective separation can be accomplished by raceways and metal covered cables other than Type MC. Separation from conductors of communications circuits should not be required since 725.139(D)(1) and (E) permit installation in the same cable or cable tray.
Panel Meeting Action: Reject
Panel Statement: 725.139(C) allows for Class 2 and Class 3 circuits to be installed within a raceway to separate them from Class 1 circuits.
725.136(G) allows the separation to occur as a result of the control circuits being contained with Type MC cable.
Deleting and rewriting the text as proposed by the submitter is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-194 Log #2419 NEC-P03 **Final Action: Reject**
(725.136(H))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Revise text to read as follows:
In hoistways, class 2 or class 3 circuit conductors shall be installed in rigid metal conduit, rigid ~~nonmetallic~~ PVC conduit intermediate metal conduit.
Substantiation: Conforming to style manual Article 352.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-175.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-195 Log #4689 NEC-P03 **Final Action: Reject**
(725.136(I)(3) (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add a third condition as follows:
(3) All of the electric light, power, Class 1, non-power limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated within a listed cable assembly from all of the Class 2 and Class 3 circuit conductors through the use of sheathing that provides for system separation that does not rely on conductor or cable insulation alone.
Substantiation: There is not and has never been any express permission to include Class 2 or Class 3 conductors within a common cable assembly with power conductors. Para (2) here comes the closest, because it recognizes a "continuous and firmly fixed nonconductor." This is crucial to the production of hybrid cables, where additional separation beyond the conductor insulation is applied to the power-limited conductors in accordance with the spirit of these principles. For example, 334.116(C) expressly recognizes this type of construction for Type NMS cable, and UL has been listing such constructions for many years. This topic must be addressed in the limited-power wiring articles, and this proposal is designed to raise the issue.
Panel Meeting Action: Reject
Panel Statement: The purpose of 725.136(I)(2) is to permit flexible tubing inside of a wiring harness where the Class 2 or Class 3 conductors are enclosed by the flexible tubing and separated from the power conductors by more than just the insulation on the conductors.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-195a Log #CP301 NEC-P03 **Final Action: Accept**
(725.139)

Submitter: Code-Making Panel 3,
Recommendation: Revise the heading of 725.139 to read as follows:
"Installation of Conductors of Different Circuits in the Same Cable, Enclosure, Cable Tray, or Raceway".
Substantiation: This action revised the heading to be consistent with the body of the text.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-196 Log #2269 NEC-P03 **Final Action: Reject**
(725.139(E))

TCC Action: The Technical Correlating Committee directs that the Chairs of Code-Making Panels 3 and 16 form a Task Group to correlate the actions taken on this proposal and Proposal 16-12.
Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:
(E) Class 2 or Class 3 Cables with Other Circuit Cables. Jacketed cables of Class 2 or Class 3 circuits shall be permitted in the same enclosure, cable tray, ~~or~~ raceway or optical fiber/communications cable routing assembly, with jacketed cables of any of the following:
(1) Power-limited fire alarm systems in compliance with Article 760
(2) Nonconductive and conductive optical fiber cables in compliance with Article 770
(3) Communications circuits in compliance with Article 800
(4) Community antenna television and radio distribution systems in compliance with Article 820
(5) Low-power, network-powered broadband communications in compliance with Article 830
Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber /communications cable routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)
For further information see the attached application guide from one of the manufacturers or got to http://www.storage-expo.com/ExhibitorLibrary/302/FiberRunner_6.pdf on the web.
The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
We have submitted companion proposals to provide for a change of the scope of Article 770 to include optical fiber /communications cable routing assemblies and to provide listing and application for requirements for them. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: Since these are optical fiber/communications routing assemblies and are to be used in information technology equipment rooms, this proposal should be forwarded to Code-Making Panel 12 for possible action.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:
EGESDAL, S.: The proposed assembly is a mechanical support for cables and is suitable for use in Article 725. The cable routing assembly is not listed as a cable tray. These assemblies can be used to support Class 2 & 3 cables, or Type CM cables used as a substitute for Class 2 & 3 cables.
Note: Panel 16 changed the name of the assembly to "cable routing assembly."
KAHN, S.: The proposal should have been approved and the Panel Statement does not address the proposer's substantiation. CMP-16 changed the name to "cable routing assembly." The proposed support is a mechanical assembly and appropriate to Article 725 and is not a cable tray.
SEPULVEDA, M.: The proposed assembly is a mechanical support for cables and is suitable for use in Article 725. The cable routing assembly is not listed as a cable tray. These assemblies can be used to support Class 2 & 3 cables, or Type CM cables used as a substitute for Class 2 & 3 cables.
Note: Panel 16 changed the name of the assembly to "cable routing assembly."

3-197 Log #4360 NEC-P03 **Final Action: Reject**
(725.141)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 725.141
~~725.141 Installation of Circuit Conductors Extending Beyond One Building. Where Class 2 or Class 3 circuit conductors extend beyond one building and are run so as to be subject to accidental contact with electric light or power conductors operating over 300 volts to ground, or are exposed to lightning on interbuilding circuits on the same premises, the requirements of the following shall also apply:~~
~~(1) Sections 800.44, 800.50, 800.53, 800.93, 800.100, 800.170(A), and 800.170(B) for other than coaxial conductors~~
~~(2) Sections 820.44, 820.93, and 820.100 for coaxial conductors~~
725.141 Class 2 and Class 3 Circuits Extending Beyond One Building. Class 2 and Class 3 circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 800 and shall comply with the applicable sections of Part I of Article 300.

Substantiation: Class 2 and Class 3 circuits should have equivalent requirements to those required for power-limited fire alarm circuits. The proposed text is parallel to the requirements for power-limited fire alarm circuits.

Class 2, Class 3 and non-power-limited fire alarm circuits are permitted to be installed together in the same cable or raceway. It is important for both types of circuits to have the same protection where installed outdoors, and transient protection as required by Article 800.

Panel Meeting Action: Reject

Panel Statement: Part of the intent of Article 725 is to provide alternative methods of installations including minimum installation requirements.

The current text already references the requirements necessary from Article 800.

There was no technical substantiation provided in the proposal for this change.

Not all Class 2 or Class 3 circuits installed beyond the building of origin of the circuit need to have over-voltage protection or lightning protection.

Where there is exposure to these hazards, 725.141 adequately provides the appropriate section references for the extra protection necessary for the circuit.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: The present text in 725-141 does not include 800.90, which requires primary protectors for circuits entering a building. It is important to require transient protection and the applicable sections of Part I of Article 300 (e.g., sealing for temperature differences). Because Class 2 & 3 circuits are often installed with fire alarm circuits, it is important for both types of circuits to require the same protection.

800.90, which is not a referenced requirement in 725.41, required lightning protection, and identifies where lightning protection is not required.

SEPULVEDA, M.: The present text in 725-141 does not include 800.90, which requires primary protectors for circuits entering a building. It is important to require transient protection and the applicable sections of Part I of Article 300 (e.g., sealing for temperature differences). Because Class 2 & 3 circuits are often installed with fire alarm circuits, it is important for both types of circuits to require the same protection.

800.90, which is not a referenced requirement in 725.41, required lightning protection, and identifies where lightning protection is not required.

3-198 Log #3124 NEC-P03 **Final Action: Reject**
(725.154)

Submitter: Sanford E. Egesdal, Egesdal Associates PLC

Recommendation: Revise 725.154

Add new Table 725.154(A)

Delete 725.154(A) through (F) and 725.154(H).

Renumber Table 725.154(G) to 725.154(B)

Renumber Figure 725.154(G) to 725.154(B)

~~725.154 Applications of Listed Class 2, Class 3, and PLTC Cables.~~

~~Class 2, Class 3, and PLTC cables shall comply with any of the requirements described in 725.154(A) through (H).~~

~~(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum signaling raceways shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.~~

~~(B) Riser. Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3):~~

~~(1) Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CL2R or CL3R. Floor penetrations requiring Type CL2R or CL3R shall contain only cables suitable for riser or plenum use. Listed riser signaling raceways and listed plenum signaling raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CL2R, CL3R, CL2P, or CL3P cables shall be permitted to be installed in these raceways.~~

~~(2) Other cables as covered in Table 725.154(G) and other listed wiring methods as covered in Chapter 3 shall be installed in metal raceways, or located in a fireproof shaft having firestops at each floor.~~

~~(3) Type CL2, CL3, CL2X, and CL3X cables shall be permitted in one- and two-family dwellings. Listed general-purpose signaling raceways shall be permitted for use with Type CL2, CL3, CL2X, and CL3X cables.~~

~~FPN: See 300.21 for firestop requirements for floor penetrations.~~

~~(C) Cable Trays. Cables installed in cable trays outdoors shall be Type PLTC. Cables installed in cable trays indoors shall be Types PLTC, CL3P, CL3R, CL3, CL2P, CL2R, and CL2.~~

~~Listed general-purpose signaling raceways, listed riser signaling raceways, and listed plenum signaling raceways shall be permitted for use with cable trays.~~

~~FPN: See 800.154(D) for cables permitted in cable trays.~~

~~(D) Hazardous (Classified) Locations. Cables installed in hazardous locations shall be as described in 725.154(D)(1) through (D)(4).~~

~~(1) Type PLTC. Cables installed in hazardous (classified) locations shall be Type PLTC. Where the use of Type PLTC cable is permitted by 501.10(B), 502.10(B), and 504.20, the cable shall be installed in cable trays, in raceways, supported by messenger wire, or otherwise adequately supported and mechanically protected by angles, struts, channels, or other mechanical means. The cable shall be permitted to be directly buried where the cable is listed for this use.~~

~~(2) Intrinsically Safe Circuits and Nonincendive Field Wiring. Wiring for nonincendive circuits as permitted by 501.10(B)(3), and wiring for intrinsically safe circuits as permitted by 504.20, shall be permitted for circuits derived from Class 2 sources.~~

~~(3) Thermocouple Circuits. Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.~~

~~(4) In Industrial Establishments. In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type PLTC cable shall be permitted in accordance with either (1) or (2):~~

~~(1) Type PLTC cable, with a metallic sheath or armor in accordance with725.179(E), shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).~~

~~(2) Type PLTC cable, without a metallic sheath or armor, that complies with the crush and impact requirements of Type MC cable and identified for such use with the marking PLTC-ER, shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).~~

~~(E) Other Wiring Within Buildings. Cables installed in building locations other than those covered in 725.154(A) through (D) shall be as described in any of (E)(1) through (E)(7).~~

~~(1) General. Type CL2 or CL3 shall be permitted.~~

~~(2) In Raceways or Other Wiring Methods. Type CL2X or CL3X shall be permitted to be installed in a raceway or in accordance with other wiring methods covered in Chapter 3.~~

~~(3) Nonconcealed Spaces. Type CL2X and Type CL3X cables shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).~~

~~(4) One- and Two-Family Dwellings. Type CL2X cables less than 6 mm (0.25 in.) in diameter and Type CL3X cables less than 6 mm (0.25 in.) in diameter shall be permitted to be installed in one- and two-family dwellings.~~

~~(5) Multifamily Dwellings. Type CL2X cables less than 6 mm (0.25 in.) in diameter and Type CL3X cables less than 6 mm (0.25 in.) in diameter shall be permitted to be installed in nonconcealed spaces in multifamily dwellings.~~

~~(6) Under Carpets. Type CMUC undercarpet communications wires and cables shall be permitted to be installed under carpet.~~

~~(7) Industrial Establishments. In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is not subject to physical damage, Type PLTC cable that complies with the crush and impact requirements of Type MC cable and is identified for such use shall be permitted to be exposed between the cable tray and the utilization equipment or device. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be supported and secured at intervals not exceeding 1.8 m (6 ft).~~

~~(F) Cross-Connect Arrays. Type CL2 or CL3 conductors or cables shall be used for cross-connect arrays.~~

~~(H) Class 2, Class 3, PLTC Circuit Integrity (CI) Cable or Electrical Circuit Protective System. Circuit integrity (CI) cable or a listed electrical circuit protective system shall be permitted for use in remote control, signaling, or power-limited systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions.~~

~~(G) Class 2 and Class 3 Cable Substitutions. The substitutions for Class 2 and Class 3 cables listed in Table 725.154(G) and illustrated in Figure 725.154(G) shall be permitted. Where substitute cables are installed, the wiring requirements of Article 725, Parts I and III, shall apply.~~

~~FPN: For information on Types CMP, CMR, CM, and CMX, see 800.179.~~

725.154 Applications of Listed CL2, CL3, and PLTC Cables and Signaling Raceways.

Permitted and non-permitted applications of listed CL2, CL3, and PLTC cables and signaling raceways shall be as indicated in Table 725.154(A). The substitutions for cables listed in Table 725.154(B) and illustrated in Figure 725.154(B) shall be permitted.

Table 725.154(A), Applications of CL2 and CL3 Cables and Signaling Raceways

Wire, Cable or Raceway Type	Applications													
	In air ducts and plenums as described in 300.22(B)	In other spaces used for environmental air as described in 300.22(C)	In risers	In building locations other than air ducts, plenums, other spaces used for environmental air, risers, cable trays, distributing frames and cross-connect arrays	In one- and two-family and in multi-family dwellings	In multifamily dwellings In nonconcealed spaces	Industrial establishments	In cable trays	Under carpets	In cross-connect arrays	In any raceway in Chapter 3	In plenum signaling raceways	In riser signaling raceways	In general-purpose signaling raceways
CL2P and CL3P	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CL2R and CL3R	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CL2 and CL3	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CL2X	N	N	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y	Y
CL3X	N	N	N	N	Y	Y	Y	N	N	N	Y	N	N	N
PLTC	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N
CMUC	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
Plenum Signaling Raceways	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-
Riser Signaling Raceways	N	N	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-
General-Purpose Signaling Raceways	N	N	N	Y	Y	Y	Y	Y	-	-	-	-	-	-

Note. Applications indicated by “Y” shall be permitted. Applications indicated by an “N” shall not be permitted. Applications with a “–“ are not addressed.

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 725, 760, 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal for section 725.154 greatly simplifies the statement of the applications of fiber cables and raceways by using a table where the permitted applications are indicated by a "Y" and the applications that are not permitted are indicted by an "x". A companion proposal moves the installation rules to section 725.113 Installation of cables and signaling raceways.

This proposal makes no changes to the existing permitted and not permitted applications of cables and raceways.

This proposal and its companion proposal for section 725.113 need to be considered together as a package.

This proposal provides parallel requirements to a group of Proposals prepared by the CMP 16 Special Editorial Task Group for articles 770, 800, 820, and 830 for the 2011 NEC. The goals of the Panel 16 task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Panel 16 Task Group members were Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson, Stan Kahn, Stan Kaufman, and Harry Odhe.

Panel Meeting Action: Reject

Panel Statement: See the panel action and statement on Proposal 3-192.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

AYER, L.: This proposal should have been accepted in principle with the wording shown below. This section has been confusing to user of the code for many cycles and needs to be re-written to provide necessary clarity on where specifically fire alarm cables can be used.

There are two main reasons that the wording should be changed within section 760.154.

First, several proposals have been submitted and accepted in some form by Code Panel 3 to change the terms "ducts or plenums" found in 300.22(B). The term Òducts or plenumsÓ is being changed to "ducts specifically fabricated for environmental air" for clarity. This change will help the user of the code have a clear delineation that 300.22(B) is sheet metal ducts (or equivalent) used to transport air and 300.22(C) covers areas traditionally defined and understood by trades people as plenums (traditionally as other space).

Second, the latest edition of NFPA 90A has made changes to how cables are treated should they be installed within sheet metal ductwork (or equivalent). NFPA 90A dictates that wiring can be installed within a duct only if it is associated with the airflow. It also limits the amount of cable connected to a piece of equipment within a duct to no more than 4 ft. If the present wording remains with the NEC the user of the code would be unaware that cable installed in fabricated ducts is limited in scope. The revised wording proposed would provide clear guidance on this issue and would correlate with 90A. NFPA 90A does have purview in this area and the NEC must correlate.

725.154 Applications of Listed Class 2, Class 3, and PLTC Cables. Class 2, Class 3, and PLTC cables
shall comply with any of the requirements described in 725.154(A) through (H).

(A) Ducts. Cables shall be permitted to be installed in ducts specifically fabricated for environmental
air if all of the following conditions are met:
(1) The cable shall be Type CL2P or CL3P and
(2) The cable is directly associated with the air distribution system and
(3) The cable shall not exceed 1.22m (4 ft) in length.

(B) Other Space Used for Environmental Air.~~(A) Plenums.~~ Cables installed in ~~ducts, plenums, and~~ other
spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum signaling raceways shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.

(C) ~~(B)~~**Riser**. Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3):

CONNAUGHTON, T.: Remove installation rules from the applications section 725.154 and relocate them in the installation section 725.133. Simplify cable applications by using a table.

Comment on Affirmative:

EGESDAL, S.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

KAHN, S.: This is one of a series of proposals that would separate installation rules and cable applications. I participated in the Task Group that worked on the simplication of the installation rules, cable applications and correlation with NFPA 90A (as directed by the Standards Council). CMP-16 improved on the series of proposals in their meeting the week following the CMP-3 meeting. This proposal, along with 3-192, was intended to remove installation rules from the applications section 725.154 and relocate them in the installation section 725.133 and to simplify cable applictions by using a table. The Proposal should be reconsidred.

SEPULVEDA, M.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

3-199 Log #126 NEC-P03 **Final Action: Accept in Principle**
(725.154(A))

Submitter: Gerald Lee Dorna, Belden

Recommendation: Add the following text at the end of 725.154(A):
<u>Metallic cable trays and metallic cable tray systems shall be permitted to be installed in other spaces used for environmental air. Types CL2P and CL3P cables and plenum signaling raceways shall be permitted to be installed in these cable trays and cable tray systems. Types CL2R, CL3R, PLTC, CL3, CL2, CL3X and CL2X cables, and riser and general-purpose signaling raceways shall not be permitted to be installed in these cable trays and cable tray systems.</u>

Substantiation: Article 392, Cable Trays, has requirements for cable trays in air handling spaces in section 392.4.

392.4 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

Section 300.22 has provisions for cable trays in 300.22(C), Other Space Used For Environmental Air.

(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.
Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

Section 300.22(C)(1) permits only solid bottom metal cable tray with solid metal covers. Optical fiber, communications, CATV, signaling and fire-alarm plenum cables, and plenum raceways are often installed in metal cable trays and metal cable tray systems in plenums (other spaces used for environmental air). These installations are "neat and workmanlike" and safe. They should be permitted.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel and action and statement on Proposal 3-97.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-200 Log #4343 NEC-P03 **Final Action: Reject**
(725.154(A))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 725.154(A)

(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CL2P or CL3P. Listed wires and cables installed in compliance with 300.22 shall be permitted. Listed plenum ~~signaling~~ communications raceways shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C). Only Type CL2P or CL3P cable shall be permitted to be installed in these raceways.
Substantiation: This proposal correlates with the recently published NFPA 90A-2009, which does not permit plenum signaling raceways in a plenum. The NFPA 90-2009 requirements follows:

NFPA 90A-2009, 4.3.11.2.6.4 Optical fiber and communication raceways shall be listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.5 m (5 ft) or less when tested in accordance with ANSI/UL 2024, *Standard for Safety Optical-Fiber and Communications Cable Raceway.*
Panel Meeting Action: Reject
Panel Statement: The Scope does not include communications raceways, and neither does 725.3(C).

While the basic UL standard for these raceways is UL 2024, Optical Fiber and Communication Cable Raceway, the UL product name for these raceways can be, as appropriate: ''Optical Fiber Raceway,'' ''Communications Cable Raceway,'' ''Signaling Cable Raceway,'' ''Coaxial Cable Raceway'' or ''Optical Fiber/Communications/Signaling/Coaxial Cable Raceway''; therefore, renaming the raceway to "communications raceway" appears to not meet the submitter's concern.

The panel requests input from the Technical Correlating Committee regarding correlation issues between this panel and the NFPA 90A Committee concerning the appropriate product name for these type of raceways.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:

EGESDAL, S.: The name of the plenum raceway in the proposal was to correlate NFPA 90A-2009 and the NEC. The name of a raceway is not relevant to the types of cables permitted to be installed in the raceway. NFPA 90A-2009 does not identify a plenum signaling raceway as being permitted in an air handling space. Hopefully, the NEC TCC will provide guidance to CMP 3, as to the need to correlate with the requirements in NFPA 90A, where combustible material is exposed to airflow.

CMP 16 revised Article 820 to use plenum, riser, or general-purpose communications raceway for CATV cables, dropping the listing for CATV raceways.

KAHN, S.: This proposal is intended to correlate with NFPA 90A and should have been accepted.

SEPULVEDA, M.: The name of the plenum raceway in the proposal was to correlate NFPA 90A-2009 and the NEC. The name of a raceway is not relevant to the types of cables permitted to be installed in the raceway. NFPA 90A-2009 does not identify a plenum signaling raceway as being permitted in an air handling space. Hopefully, the NEC TCC will provide guidance to CMP 3, as to the need to correlate with the requirements in NFPA 90A, where combustible material is exposed to airflow.
CMP 16 revised Article 820 to use plenum, riser, or general-purpose communications raceway for CATV cables, dropping the listing for CATV raceways.

3-201 Log #1604 NEC-P03 **Final Action: Reject**
(725.154(B)(1))

Submitter: Ray R. Keden, ERICO, Inc. / Rep. BICSI
Recommendation: Revise text to read as follows:

Cables installed in vertical runs and penetrating one or more floors ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type CL2R or CL3R. Floor penetrations requiring Type CL2R or CL3R shall contain only cables suitable for riser or plenum use. Listed riser signaling raceways and listed plenum signaling raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CL2R, CL3R, CL2P, or CL3P cables shall be permitted to be installed in these raceways.
Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The panel contends that the existing text does meet the panel's intention.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:

KEDEN, R.: I understand that the intention of the Panel 3 majority was to allow for general use cable to be used between two floors only, but I disagree. Since Panel 16 accepted similar proposals, this will become an issue for the Correlating Committee

3-202 Log #2849 NEC-P03 **Final Action: Reject**
(725.154(D))

Submitter: Donald W. Ankele, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
(D) Type PLTC and Type PLTC-ER Cables ~~Hazardous (Classified) Locations~~.
Cables shall be installed ~~in hazardous locations shall be~~ as described in 725.154(D)(1) through (D)(4).
(1) Type PLTC. ~~Cables installed in hazardous (classified) locations shall be Type PLTC.~~ Where the use of Type PLTC cable is permitted ~~by 501.10(B), 502.10(B), and 504.20~~, the cable shall be installed in cable trays, in raceways, supported by messenger wire, or otherwise adequately supported and mechanically protected by angles, struts, channels, or other mechanical means. The cable shall be permitted to be directly buried where the cable is listed for this use.
(2) Intrinsically Safe Circuits and Nonincendive Field Wiring. Wiring for nonincendive circuits as permitted by 501.10(B)(3), and wiring for intrinsically safe circuits as permitted by 504.20, shall be permitted for circuits derived from Class 2 sources.
(3) Thermocouple Circuits. Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.
(4) In Industrial Establishments. In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation,
Type PLTC cable shall be permitted in accordance with either (1) or (2):

(1) Type PLTC cable, with a metallic sheath or armor in accordance with 725.179(E), shall be permitted to be installed exposed. The cable shall be continuously supported
and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).

(2) Type PLTC cable, without a metallic sheath or armor, that complies with the crush and impact requirements of Type MC cable and identified for such use with the marking PLTC-ER, shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).
Substantiation: This proposal removes unnecessary restrictions on installations and provides benefits to all users.

1) The hazardous (Classified) location requirements remain in Chapter 5, where permitted, as referenced in 725.3(D),

2) None of the requirements in this Article are unique to Classified locations nor required by Chapter 5,

3) This proposal makes extended run (-ER) cable available outside of a Classified location,

4) This proposal permits direct burial outside of a Classified location.
Panel Meeting Action: Reject
Panel Statement: 336.10(7) restricts Type TC-ER to industrial locations only.

No technical documentation was been provided to support the expanded use of PLTC-ER as a subset of Type TC-ER.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:

STENE, S.: The intent of the submitter was to move the requirements for cables used in hazardous locations out of Article 725, while still permitting the use of Type PLTC-ER in industrial applications. Section 725.154(E)(7) permits "Type PLTC cable that complies with the crush and impact requirements of Type MC cable and is identified for such use shall be permitted to be exposed." The appropriate identification is Type PLTC-ER in accordance with the listing requirements, therefore, the submitter is not adding or expanding the use of PLTC-ER in industrial applications as it is already permitted. The '-ER' marking was not specifically called out in 725.154(E)(7) in the 2008 NEC but there is no reason to exclude it. If Type PLTC-ER can be used in a Class I, Division 2, Class II, Division 2, or in an intrinsically safe hazardous location, it certainly could be used for limited applications within an industrial facility. The proposed text indicates that the identification shall be 'PLTC-ER'

The requirements for thermocouple circuits currently located in 725.154(D)(3) should be relocated as 725.154(I) (new).

The panel should have voted for an Accept in Principle with the following modified text:
~~**725.154 (D) Hazardous (Classified) Locations.** Cables installed in hazardous locations shall be as described in 725.154(D)(1) through (D)(4).~~
~~**(1) Type PLTC.** Cables installed in hazardous (classified) locations shall be Type PLTC. Where the use of Type PLTC cable is permitted by 501.10(B), 502.10(B), and 504.20, the cable shall be installed in cable trays, in raceways, supported by messenger wire, or otherwise adequately supported and mechanically protected by angles, struts, channels, or other mechanical means. The cable shall be permitted to be directly buried where the cable is listed for this use.~~

~~**(2) Intrinsically Safe Circuits and Nonincendive Field Wiring.** Wiring for nonincendive circuits as permitted by 501.10(B)(3), and wiring for intrinsically safe circuits as permitted by 504.20, shall be permitted for circuits derived from Class 2 sources.~~
~~**(3) Thermocouple Circuits.** Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.~~
~~**(4) In Industrial Establishments.** In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation,~~
~~Type PLTC cable shall be permitted in accordance with either (1) or (2):~~
~~(1) Type PLTC cable, with a metallic sheath or armor in accordance with 725.179(E), shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).~~
~~(2) Type PLTC cable, without a metallic sheath or armor, that complies with the crush and impact requirements of Type MC cable and identified for such use with the marking PLTC-ER, shall be permitted to be installed exposed. The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be secured at intervals not exceeding 1.8 m (6 ft).~~
725.154 (E) Other Wiring Within Buildings. Cables installed in building locations other than those covered in 725.154(A) through (D) shall be as described in any of (E)(1) through (E)(7).
(7) Industrial Establishments. In industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is not subject to physical damage, Type PLTC cable that complies with the crush and impact requirements of Type MC cable, is identified for such use with the marking PLTC-ER, shall be permitted to be exposed. ~~between the cable tray and the utilization equipment or device.~~ The cable shall be continuously supported and protected against physical damage using mechanical protection such as dedicated struts, angles, or channels. The cable shall be supported and secured at intervals not exceeding 1.8 m (6 ft).
725.154 (I) Thermocouple Circuits. Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.

3-203 Log #1814 NEC-P03 **Final Action: Reject**
(725.154(D) and (E))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence of (D)(4) and (E)(7): In industrial and commercial establishments... (remainder unchanged).
Delete last two sentences of (D)(4)(1) and (2) and (E)(7) and substitute: The cable shall be securely fastened to supports at intervals not exceeding 1.8 m (6 ft) and protected by approved means where likely to be subject to physical damage.
Add after (D)(4)(2) and (E)(7): Exception: The cable shall be permitted to be fished through concealed spaces in finished buildings or structures where supporting is Impractical and the cable is securely fastened and supported where it becomes accessible.
Substantiation: Commercial establishments should be included; conditions of maintenance and supervision should be the criteria, not occupancy. "Continually" supported does not allow for installation in cable trays without a solid bottom or where cable crosses open spaces. Present wording requires protection whether or not damage is likely. (D)(4) and (E)(7) same occupancy, but suggest that installation in cable tray or raceways is not considered protection. "Likely" is defined as such a nature or circumstance as to take something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The word "industrial" is an occupancy classification in the IBC, while "commercial" is not identified in either the IBC or NFPA 5000.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-204 Log #4354 NEC-P03 **Final Action: Reject**
(725.154(H))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 725.154(H)
(H) Class 2, Class 3, and PLTC Cables With Suffix Markings. Class 2, Class 3, or PLTC cables with single or multiple suffix markings shall be permitted where required to meet special applications.
(~~H~~1) Class 2, Class 3, and PLTC Circuit Integrity (CI) Cables or Electrical Circuit Protective System. Circuit integrity (CI) cables or a listed electrical circuit protective system shall be permitted for use in remote control, signaling, or power-limited systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. Circuit integrity cable shall be marked in accordance with 725.179(F).
(2) Class 2 and Class 3 Cables for Dry, Damp, or Wet Locations. Class 2 or Class 3 cables installed in dry, damp, or wet locations shall be marked in accordance with 725.179.(M).
(3) Class 2 and Class 3 Cables Exposed to Direct Sunlight. Class 2 or Class 3 Cables installed exposed to direct sunlight shall be marked in accordance with 725.179(N).
(4) Class 2 and Class 3 Cables in Corrosive Locations. Class 2 and Class 3 cables installed in corrosive locations shall be marked in accordance with 725.179(P).
(5) Class 2 and Class 3 Very-Low-Smoke Producing Cables. Class 2 or Class 3 very-low-smoke producing cables installed to provide low flame spread and very-low-smoke emissions shall be marked in accordance with 725.179(Q).
(6) Class 2 and Class 3 Fire Hazard Cables. Class 2 or Class 3 fire hazard cables installed to provide low flame spread, very-low-smoke, and known potential heat release shall be marked in accordance with 725-179(R).
Substantiation: This proposal permits cables identified in 725.154(A), (B), (D), and (E) to have suffix markings.
This proposal establishes 725.154(H) for cables with suffixes for installation in locations requiring special cable characteristics, and moves existing 725.154(H) to 725.154(H)(1).
Panel Meeting Action: Reject
Panel Statement:
None of the suggested changes in this proposal deal with applications; all are dealing with markings more appropriately covered in 725.179.
This application section is designed to provide information where a particular cable can be installed. This proposal does not provide any application for any of the proposed cables, and there are no installation requirements for these cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: While the intent of the proposal was to provide application requirements, the proposal should have included more specific text, as to applications. The installation requirements for Class 2 & Class 3 cables are detailed in 725.130(B), so a proposal to these sections was unnecessary.
SEPULVEDA, M.: While the intent of the proposal was to provide application requirements, the proposal should have included more specific text, as to applications. The installation requirements for Class 2 & Class 3 cables are detailed in 725.130(B), so a proposal to these sections was unnecessary.

3-205 Log #2019 NEC-P03 **Final Action: Reject**
(725.179)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "or structures" after "buildings".
Substantiation: Edit. Structures not deemed as buildings should be included.
Panel Meeting Action: Reject
Panel Statement: The NEC definition of "buildings" uses the term "structures". "Structure" is a defined NEC term. The proposal would create confusing text.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-206 Log #4355 NEC-P03 **Final Action: Reject**
(725.179)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 725.179
725.179 Listing and Marking of Class 2, Class 3, and Type PLTC Cables.
Class 2, Class 3, and Type PLTC cables and nonmetallic signaling raceways installed as wiring methods within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 725.179(A) through (K) and 725.179(M) through (R) and shall be marked in accordance with 725.179(L).
Substantiation: The revision to 725.179 is editorial and accommodates new cable listing requirements.
Panel Meeting Action: Reject
Panel Statement: Based on the lack of any applications provided in proposals for 725.154, other than marking requirements, listing requirements for these cables cannot be accepted in 725.179.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: This proposal was primarily editorial to correlate with the new cable suffix markings in companion proposals to 725.179.
SEPULVEDA, M.: This proposal was primarily editorial to correlate with the new cable suffix markings in companion proposals to 725.179.

3-207 Log #1647 NEC-P03 **Final Action: Reject**
(725.179(A), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(A) FPN as follows:
FPN: One method of defining low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, ~~to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: These fine print notes are not written in mandatory language and are simply expressing some of the maximum peak smoke and optical density or the maximum flame spread provided in the referenced NFPA 262 document.
This FPN is providing information on various methods of defining smoke producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: The submitter is correct by referring to 3.1.3 of the NEC Style Manual which states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language." Clearly, this FPN contains what could be determined to be mandatory language and could imply a requirement that goes well beyond the purpose of FPN's to simply inform.

3-208 Log #4558 NEC-P03 **Final Action: Accept in Principle**
(725.179(A), FPN)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
725.82 Listing and Marking of Class 2, Class 3, and Type PLTC Cables.
Class 2, Class 3, and Type PLTC cables installed as wiring within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 725.179(A) through 725.179 (K) and shall be marked in accordance with 725.179(L).
(A) Types CL2P and CL3P. Types CL2P and CL3P plenum cables shall be listed as being suitable for use in ducts, plenums, and other space used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.
FPN: One method of defining <u>a cable that is</u> low smoke-producing cable<u> and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.</u> ~~is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-1999, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~
No change for 725.179 (B) through 725.179 (K)
Substantiation: This comment recommends a slight change in wording for the existing Fine Print Note, by recognizing that listing of plenum cable by NFPA 262 represents listing to both low smoke and low flame spread, and that cables cannot be listed separately to either property. This is basically an editorial change, as a clarification, to the existing Fine Print Note.
The same change is being proposed to the corresponding Fine Print Notes in article 760. The new language is consistent with the language in the corresponding fine print notes in articles 770, 800, 820 and 830, all of which deal with the same type of cables.
This has been proposed before but was caught in the NEC moratorium associated with plenum cables.
Panel Meeting Action: Accept in Principle
Revise the proposed fine print note to read as follows:
"FPN: One method of defining low smoke-producing and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."
Panel Statement: The revised language clarifies the intent of the panel and meets the intent of the submitter.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
AYER, L.: NFPA 262 deals with testing of cables for low-smoke and flame travel properties. Adding the term "fire-resistant" may confuse the user since fire-resistant cables typically means cables that can withstand several hours of direct flame contact.
Comment on Affirmative:
EGESDAL, S.: The submitter's text is consistent with the text in 770, 800, 820, and 830. If the CMP 3 "tweaking" of the submitter's text is better grammar, hopefully, the NEC TCC will direct CMP 16 to revise the corresponding 770, 800, 820, and 830 FPN's.
KAHN, S.: The submitted text is identical to the corresponding FPN's in 770, 800, 820, and 830. If the revised text is better, it should be incorporated into the other Articles.
SEPULVEDA, M.: The submitter's text is consistent with the text in 770, 800, 820, and 830. If the CMP 3 "tweaking" of the submitter's text is better grammar, hopefully, the NEC TCC will direct CMP 16 to revise the corresponding 770, 800, 820, and 830 FPN's.

3-209 Log #4834 NEC-P03 **Final Action: Reject**
(725.179(A), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~ <u>See {3}, Annex I.</u>
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. T This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-210 Log #4835 NEC-P03 **Final Action: Reject**
(725.179(B), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666- 2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~ <u>See {4}, Annex I.</u>
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-211 Log #1648 NEC-P03 **Final Action: Reject**
(725.179(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(C) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text.
Definitions cannot contain mandatory text but the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for Class A GFCI devices.
These Fine Print Notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL1685 or CSA C22.2 documents.
This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-212 Log #4836 NEC-P03 **Final Action: Reject**
(725.179(C), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~ See {5} and {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-213 Log #4837 NEC-P03 **Final Action: Reject**
(725.179(D), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of determining that cable is resistant to flame spread is by testing the cable to the VW-1 (vertical wire) flame test in ANSI/UL 1581-2001, Reference Standard for Electrical Wires, Cables and Flexible Cords.~~ See {7}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-214 Log #1649 NEC-P03 **Final Action: Reject**
(725.179(E), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(E) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-211.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-215 Log #4838 NEC-P03 **Final Action: Reject**
(725.179(E), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~
~~Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {5} and {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-216 Log #1650 NEC-P03 **Final Action: Reject**
(725.179(F), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(F) FPN as follows:
FPN: One method of ~~defining~~ determining circuit integrity is ~~by establishing a minimum 2-hour fire resistance rating when tested~~ testing in accordance with UL 2196-2002, Standard for Tests of Fire Resistive Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: Definitions cannot contain mandatory text however, the FPN for the definition can provide dimensions and amounts of materials or current.
For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.
These Fine Print Notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 2196 document.
This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-217 Log #4839 NEC-P03 **Final Action: Reject**
(725.179(F), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining circuit integrity is by establishing a minimum 2-hour fire resistance rating when tested in accordance with UL 2196-2002, Standard for Tests of Fire Resistive Cables.~~ See {8}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-218 Log #1651 NEC-P03 **Final Action: Reject**
(725.179(H), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(H) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-211.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-219 Log #4840 NEC-P03 **Final Action: Reject**
(725.179(H), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~
~~Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {5} and {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-220 Log #1652 NEC-P03 **Final Action: Reject**
(725.179(J), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(J) FPN as follows:
FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways are tested in accordance with the ~~pass the requirements of the~~ Test for Flame Propagation (Riser) in UL 2024, Standard for Optical Fiber Cable Raceway.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 2024 documents.
This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-221 Log #4841 NEC-P03 **Final Action: Reject**
(725.179(J), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the Test for Flame Propagation (Riser) in UL 2024, Standard for Optical Fiber Cable Raceway.~~ See {9}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel Statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-222 Log #1653 NEC-P03 **Final Action: Reject**
(725.179(K), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 725.179(K) FPN as follows:
FPN: One method of ~~defining~~ determining resistance to the spread of fire is ~~that the raceways pass the requirements of the~~ testing in accordance with the Vertical-Tray Flame Test (General use) in UL 2024, Standard for Optical Fiber Cable Raceway.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 2024 documents. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-223 Log #4842 NEC-P03 **Final Action: Reject**
(725.179(K), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General use) in UL 2024, Standard for Optical Fiber Cable Raceway.~~ See {9}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-224 Log #4356 NEC-P03 **Final Action: Reject**
(725.179(L) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 725.179(L).
(L) Marking. Cables shall be marked in accordance with 310.11(A)(2), (A)(3), (A)(4), and (A)(5) and Table 725.179.
(1) Voltage ratings shall not be marked on the cables.
FPN: Voltage markings on cables may be misinterpreted to suggest that the cables may be suitable for Class 1 electric light and power applications.
Exception: Voltage markings shall be permitted where the cable has multiple listings and a voltage marking is required for one or more of the listings.
(2) Temperature ratings greater than 60ºC shall be marked on the cable.
(3) Cables listed as suitable for installation at temperatures lower than 60ºC shall have the lowest permitted temperature marked on the cable.
(4) Cables listed as meeting the requirements of 179.(A) through (E) shall be permitted to have additional suffixes that comply with other 725.179 subsections.
Substantiation: There is no marking on cables rated at 60ºC (140ºF). There is no indication in this article as to the temperature rating. Article 310 does an excellent job of identifying temperature rating of conductors. The goal of this proposal is to provide equivalent requirements.
See companion proposal to add new 725.179(O).
The additional subsections added to 725.179(L) correlate with markings identified in other subsections of 725.179 [e.g., 725.179(F) provides for a "-CI" suffix that can be added to any of the cables identified in 725.179(A) through (E)].
Panel Meeting Action: Reject
Panel Statement: Marking requirements for cables for temperatures in excess of 60 degrees C is already covered by the UL product standard UL 13, covering power-limited circuit cables. These cables are available based on the standard requirements for temperatures up to 250 degrees C or 482 degrees F. Where an application occurs with a temperature in excess of 140 degrees F, the installer would install a cable with a high enough temperature rating for the ambient temperature.
Class 2 and Class 3 cables are not required by the standard to be marked where the cable is rated for just 60 degrees C, unlike the power conductors in Article 310. Power conductor insulation in the 600-volt and lower voltage range are normally rated at 60 degrees C, 75 degrees C, and 90 degrees C to provide an ampacity rating for the conductor where terminating on an overcurrent protective device or a load device or both with a rating of 60 degrees C or 75 degrees C. The ampacity tables will then provide the allowable ampacity based on the insulation characteristics. This method of determining the ampacity of a conductor based on the conductor insulation is not required for a Class 2 or Class 3 cable and related conductors since the ampacity range of the conductors are based on Tables 11(A) and (B) in Chapter 9 and not based on the ampacity tables in Article 310. Therefore, there is no reason to provide the marking requirements in Article 310 for Class 2 and 3 cables or conductors.
Where a high ambient temperature is encountered in the installation of Class 2 or Class 3 cables and conductors, higher temperature cables can be required, obtained, and installed. There was no technical substantiation provided to justify this requirement.
Class 2 and 3 cables can be purchased that have been subjected to a cold bend test to ensure bending capability for cold temperatures down to minus 70 degrees C; however, this is not an installation temperature; it is an application temperature.
Again, the standard provides testing for this; however, there has been no substantiation provided to insert this into the NEC.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The purpose of this proposal is to establish requirements in Article 725 for cable; requirements that provide equivalency to Chapter 3 conductor marking requirements. The requirements in this proposal match what is in the UL standard. Cables listed to the requirements in the UL standard have provided the industry with a reliable product. The specific marking would not have a financial impact on manufacturers.
Article 725 circuits are sometimes installed in harsh environments (e.g., wet locations, exposed to sunlight, walk-in freezers, rooftops). It is important that the NEC establish requirements that are needed for application and installation of Article 725 cables, and not rely on whatever a testing organization somewhere in the world decides is appropriate. Specific marking requirements would be useful to designers, buyers, installers, and AHJ's.
SEPULVEDA, M.: The purpose of this proposal is to establish requirements in Article 725 for cable; requirements that provide equivalency to Chapter 3 conductor marking requirements. The requirements in this proposal match what is in the UL standard. Cables listed to the requirements in the UL standard have provided the industry with a reliable product. The specific marking would not have a financial impact on manufacturers.
Article 725 circuits are sometimes installed in harsh environments (e.g., wet locations, exposed to sunlight, walk-in freezers, rooftops). It is important that the NEC establish requirements that are needed for application and installation of Article 725 cables, and not rely on whatever a testing organization somewhere in the world decides is appropriate. Specific marking requirements would be useful to designers, buyers, installers, and AHJ's.

3-225 Log #4347 NEC-P03 **Final Action: Reject**
(725.179(M) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.179(M):
(M) Conductors and Cables in Dry, Damp, or Wet Locations. Cables specified in 725.154(A), (B), (D)(1), and (E) shall be listed for installation in dry, damp, or wet locations, or shall have a moisture-impervious metal sheath, and shall be marked as required in 725.179(M)(a), (b), or (c).
(a) Conductors and cables installed in dry location shall not be required to have an additional suffix marking.
(b) Conductors and cables suitable for installation in damp locations shall be identified with the suffix "-DAMP". Conductors and cables listed for damp locations shall be suitable for installation in dry locations.
FPN: One method of defining suitability for installation in damp locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
(c) Conductors and cables suitable for installation in wet locations shall be identified with the suffix "-WET". Conductors and cables listed for wet locations shall be suitable for installation in dry or damp locations.
FPN: One method of defining suitability for installation in wet locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies which Class 2, Class 3, and PLTC cables are suitable for dry, damp, or wet locations. Cables suitable for installation in dry locations that are installed in damp or wet locations have the potential to cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-206.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-224.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-224.

3-226 Log #4350 NEC-P03 **Final Action: Reject**
(725.179(N) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.179(N)
(N) Class 2 and Class 3 Conductors and Cables Exposed to Direct Sunlight. Class 2 and Class 3 conductors and cables installed exposed to direct sunlight shall be listed as sunlight resistant cable. Cables specified in 725.154(A), (B), and (E), and used for installations exposed to direct sunlight shall have the additional classification using the suffix "-SR".
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies Class 2, and Class 3 conductors and cables as being suitable for installation exposed to direct sunlight. Cables that are not listed for exposure to direct sunlight and are installed exposed to direct sunlight have the potential to cause system malfunction. There have been job failures where cables supported by an aerial messenger wire failed due to sunlight exposure.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-206.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-224.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-224.

3-227 Log #4352 NEC-P03 **Final Action: Reject**
(725.179(O) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.179(O)
(O) Class 2 and Class 3 Cable Temperature Ratings. Class 2 and Class 3 cables shall be listed for a temperature rating of not less than 60ºC (140ºF). Class 2 and Class 3 cables and PLTC shall be permitted to have an additional temperature rating for the lowest permitted temperature.
Substantiation: Class 2 and Class 3 cables are often installed in areas where the temperature exceeds the 60ºC (140ºF) rating, which is not marked on the cable. For example, cable installed in conduit on a rooftop could have a temperature internal to the conduit in excess of 160 ºF.
Additionally, Class 2 and Class 3 circuits are sometimes installed in cold areas (e.g., walk-in freezer or home fire alarm/security system pre-wire installation), so an indication of the minimum permitted temperature is important.
There is a companion proposal to revise 725.179(L) to add temperature marking requirements
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-224.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-224.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-224.

3-228 Log #4345 NEC-P03 **Final Action: Reject**
(725.179(P) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 725.179(P)
(P) Class 2 and Class 3 Conductors and Cables Installed in Corrosive Locations. Class 2 and Class 3 conductors and cables installed in corrosive locations shall be listed as suitable for corrosive locations. Cables specified in 725.154(A), (B), and (E), and used for installation in corrosive locations shall have the additional classification using the following suffixes: "-PR" for oil resistant, and "-GR" for gasoline and oil resistant.
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies which Class 2, and Class 3 cables as being suitable for installation in corrosive locations. Corrosive locations have the potential to degrade cable and conductor insulation and cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-206.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-224.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-224.

3-229 Log #4353 NEC-P03 **Final Action: Reject**
(725.179(Q) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 179(Q)
(Q) Very-Low-Smoke Producing Cables. Class 2, Class 3 and PLTC cables used to provide very-low-smoke producing characteristics shall be listed as very-low-smoke producing (50) and shall be listed as having low flame spread characteristics and very-low-smoke producing characteristics. Cables specified in 725.154(A), (B), (C), (D)(1), and (E) shall have the additional classification using the suffix "-50"..
FPN: One method of defining a very-low-smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core.
Substantiation: This proposal establishes a listing and marking for cable for installation where minimal smoke generation is required. This cable meets the requirement for installation in concealed spaces that permit a maximum flame spread index of 25 and a maximum smoke developed index of 50. The proposed cable has low flame spread characteristics and very-low-smoke-producing characteristics. Presently, a number of manufacturers have cables listed as meeting the proposed requirements, but do not have a unique marking permitted by the NEC.
The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.
Establishing a listing and marking for cables listed for a "-50" suffix provides cables with physical parameters (flame spread index, smoke developed index) that is consistent with requirements in other codes.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-206.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials.
SEPULVEDA, M.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials.

3-230 Log #4348 NEC-P03 **Final Action: Reject**
(725.179(R) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 179(R)
(R) Fire Hazard Cables. Class 2, Class 3 and PLTC cables used to provide low combustible loading shall be listed as fire hazard cable (FHC) and shall be listed as having low flame spread characteristics, very-low-smoke producing characteristics, and a low potential heat release value. Cables specified in 725.154(A), (B), (C), (D)(1), and (E) shall have the additional classification using the suffix "-FHC".
FPN: One method of defining a low flame spread and very low smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core. One method of defining a low potential heat cable is that the cable exhibits a maximum potential heat value of exceeding 8141 kJ/kg (3500 BTU/lb) when tested in accordance with NFPA 259, *Standard Test Method for Potential Heat of Building Materials.*
Substantiation: This proposal establishes a listing and marking for cable permitted as an electrical wiring option in concealed spaces where a smoke developed index no greater than 50 is required or large quantities of cable may cause combustible loading. The proposed cable has low flame spread characteristics, very-low-smoke-producing characteristics, and a low potential heat release value. Presently, a number of manufacturers have cables listed to the proposed requirements.
The testing criteria are based on the requirements found in NFPA 13 and the International Mechanical Code.
NFPA 13, Section 8.14.1.2.1 follows: "Noncombustible and limited combustible concealed spaces with no combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum." The proposed cable has a very low heat of combustion. While the term "combustible loading" is not defined, the fuel load can be calculated to determine the potential hazard from large quantities of cable.

The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.

Establishing a listing and marking for cables listed for a "FHC" suffix provides cables with physical parameters (flame spread index, smoke developed index, potential heat release) that is consistent with requirements in other codes.

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8.15 Special Situations.

8.15.1 Concealed Spaces.

8.15.1.1 Concealed Spaces Requiring Sprinkler Protection. All concealed spaces enclosed wholly or partly by exposed combustible construction shall be protected by sprinklers except in concealed spaces where sprinklers are not required to be installed by 8.15.1.2.1 through 8.15.1.2.16 and 8.15.6.

8.15.1.2* Concealed Spaces Not Requiring Sprinkler Protection.

8.15.1.2.1* Concealed spaces of noncombustible and limited-combustible construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. (For additional information on combustible loading, see A.8.15.1.2.1.)

8.15.1.2.2 Concealed spaces of noncombustible and limited-combustible construction with limited access and not permitting occupancy or storage of combustibles shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

8.15.1.2.3 Concealed spaces formed by studs or joists with less than 6 in. (152 mm) between the inside or near edges of the studs or joists shall not require sprinkler protection. (See Figure 8.6.4.1.5.1.)

8.15.1.2.4 Concealed spaces formed by bar joists with less than 6 in. (152 mm) between the roof or floor deck and ceiling shall not require sprinkler protection.

8.15.1.2.5 Concealed spaces formed by ceilings attached directly to or within 6 in. (152 mm) of wood joist construction shall not require sprinkler protection.

Presently, there are a number of companies with cables listed, having met the test requirements in the proposed fine print note.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-206.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials; and a low potential heat release not greater than 8141 kJ/kg (3500 BTU/lb), as tested in accordance with UL 2424, Standard Test Method of Potential Heat of Building Materials. A number of manufacturers have products that meet this criteria. The NEC does not provide a marking requirement for this robust cable.

SEPULVEDA, M.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials; and a low potential heat release not greater than 8141 kJ/kg (3500 BTU/lb), as tested in accordance with UL 2424, Standard Test Method of Potential Heat of Building Materials. A number of manufacturers have products that meet this criteria. The NEC does not provide a marking requirement for this robust cable.

ARTICLE 727 — INSTRUMENTATION TRAY CABLE: TYPE ITC

3-231 Log #1654 NEC-P03 **Final Action: Reject**
(727.6, FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 727.6 FPN as follows:

FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: These Fine Print Notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 1685 or CSA C22.2 documents. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-232 Log #4843 NEC-P03 **Final Action: Reject**
(727.6, FPN)

Submitter: T. David Mills, T. David Mills Associates

Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable. Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {5} and {6}, Annex I.

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-72.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

ARTICLE 760 — FIRE ALARM SYSTEMS

3-233 Log #4844 NEC-P03 **Final Action: Reject**
(760.1, FPN 1)

Submitter: T. David Mills, T. David Mills Associates

Recommendation: Modify the fine print note as follows:

FPN No. 1: Fire alarm systems include fire detection and alarm notification, guard's tour, sprinkler waterflow, and sprinkler supervisory systems. Circuits controlled and powered by the fire alarm system include circuits for the control of building systems safety functions, elevator capture, elevator shutdown, door release, smoke doors and damper control, fire doors and damper control and fan shutdown,

but only where these circuits are powered by and controlled by the fire alarm system. ~~For further information on the installation and monitoring for integrity requirements for fire alarm systems, refer to the NFPA 72®-2007, National Fire Alarm Code®.~~ See {10}, Annex I.

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-72.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-234 Log #812 NEC-P03 **Final Action: Reject**
(760.2.Abandoned Fire Alarm Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Fire Alarm Cable. Installed fire alarm cable that is not terminated at equipment other than a connector and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: To allow one single definition for "abandoned cable" would not be appropriate.

Each article has different requirements for what constitutes an abandoned cable. Some applications require that a connector be installed along with an identification tag on the cable, whereas others, such as the one for Article 760, require only that the cable not be terminated at equipment and an identification tag be installed for it to not be considered to be abandoned.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-235 Log #1176 NEC-P03 **Final Action: Reject**
(760.3)

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Revise 725.3 to read as follows:
"…shall comply with 725.3(A) through (J)."
Substantiation: This is a companion to proposals that seek to add new requirements to 725.3.
Panel Meeting Action: Reject
Panel Statement: This was inadvertently applied to Article 760 and should have been for Article 725.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-236 Log #1180 NEC-P03 **Final Action: Reject**
(760.3)

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Revise 760.3 to read as follows:
"…shall comply with 760.3(A) through (J)."
Substantiation: This is a companion to proposals that seek to add new requirements to 760.3.
Panel Meeting Action: Reject
Panel Statement: The expansion of the text numbering will be accomplished if additional proposals are accepted.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-237 Log #4081 NEC-P03 **Final Action: Accept**
(760.3(A))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.3(A) as follows:
760.3 (A) Spread of Fire or Products of Combustion. Section 300.21. ~~The accessible portion of abandoned fire alarm cables shall be removed.~~
Substantiation: This proposal is editorial. The requirement to remove abandoned cable is covered in 760.25.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-238 Log #4543 NEC-P03 **Final Action: Accept**
(760.3(A))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
760.3 Other Articles.
Circuits and equipment shall comply with 760.3(A) through (G). Only those sections of Article 300 referenced in this article shall apply to fire alarm systems.
(A) Spread of Fire or Products of Combustion. Section 300.21. ~~The accessible portion of abandoned fire alarm cables shall be removed.~~
Substantiation: The text proposed for deletion is duplicative of the text in section 760.25.
For information, see section 760.25:
760.25 Abandoned Cables.
The accessible portion of abandoned fire alarm cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-239 Log #4082 NEC-P03 **Final Action: Reject**
(760.3(B))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Delete 760.3(B).
~~(B) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22, where installed in ducts or plenums or other spaces used for environmental air.~~
~~Exception: As permitted in 760.53(B)(1) and (B)(2) and 760.154(A).~~
Substantiation: Section 760.3(B) is redundant. Sections 760.53(B) and 760.154(A) have requirements for installation of fire alarm cables in ducts, plenums, and other spaces used for environmental air, and permits fire alarm circuits to be installed in accordance with 300.22.
Panel Meeting Action: Reject
Panel Statement: The panel contends that this is not redundant, but rather clarification. Article 760 has the exclusive control of the installations of fire alarm systems, and 760.3 identifies sections in Chapters 1 through 4 that are enforceable in Article 760.
Therefore, 760.3(B) indicates that 300.22 does apply.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 11 Negative: 4
Explanation of Negative:
AYER, L.: This proposal should have been accepted in principle. The present wording in 760.3(B) is confusing. Thetext should be rewritten to match similar text in 725, 770, and Article 800. The reference to 760.53(B)(1) inthe exception is not needed since not permitting NFPLP cables to be installed in ducts would not be incontradiction to 300.22
760.3(B) Ducts, ~~Plenums,~~ and Other Air-Handling Spaces. ~~Section 300.22, where installed in ducts or plenums or other spaces used for environmental air.~~ **Fire Alarm Circuits installed in ducts or in other spaces used for environmental air shall comply with 300.22.**
Exception: As permitted in 760.53~~(B)(1) and~~ (B)(2) and 760.154(A).
EGESDAL, S.: The reference to 300.22 is adequately covered in 760.53(B) and 760.154(A). There are many references to sections in Chapters 1-4 throughout Article 760 that are not duplicated in 760.3.
KAHN, S.: The proposer's substantiation is correct - 760.3(B) is redundant. Installation requirements are adequately covered in 760.53(B) and 760.154(A). There are many other references to Chapters 1-4 that are not included in 760.3(B).
SEPULVEDA, M.: The reference to 300.22 is adequately covered in 760.53(B) and 760.154(A). There are many references to sections in Chapters 1-4 throughout Article 760 that are not duplicated in 760.3.
Comment on Affirmative:
STENE, S.: This reference to 300.22 is necessary in 760.3 to ensure that non-power-limited and power-limited fire alarm conductors and cables comply with the requirements in environmental air ducts and other spaces used for environmental air (plenums). As can be seen in 300.22(B), only metallic wiring methods can be used in a fabricated environmental air duct and then only long enough to connect to electrical equipment that directly acts upon or sensing of the contained air. The second sentence in 760.154(A) also requires compliance with 300.22 for listed wires and cables, reinforcing the text in 760.3(B). Both references to 300.22 compliance, one in 760.3(B) and one in 760.154(A), make it totally clear that metal encasement of conductors and cables in a fabricated duct is necessary.

3-240 Log #4048 NEC-P03 **Final Action: Reject**
(760.3(D))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.3(D).
(D) Corrosive~~, Damp, or Wet~~ Locations.
(1) Conductors. Conductors shall comply with ~~Sections 110.11,~~ 300.6(C)(2) and 310.9, where installed in corrosive locations.
(2) Non-Power-Limited Fire Alarm Cables. Non-power-limited fire alarm cables shall comply with the appropriate requirements of 760.53.
(3) Power-Limited Fire Alarm Cables. Power-limited fire alarm cables shall comply with the appropriate requirements of 760.154.
Substantiation: The references in 760.3(D) apply to corrosive locations that may be dry, damp, or wet. There are dry, damp, and wet locations that are not corrosive.
Existing 760.3(D) provides requirements for Chapter 3 conductors, but does not address Article 760 cables.
There are companion proposals to 760.176 and 760.179 for listing and marking of cables suitable for installation in corrosive locations, and to 760.53 and 760.154 for application requirements.
There is a companion proposal to 760.3 to address installation of conductors of cables in dry, damp and wet locations.
Panel Meeting Action: Reject
Panel Statement: 300.6(C)(2) refers to chemical exposure, and not corrosion. The panel contends that 300.6(C)(2) is not the appropriate section, but rather 310.9.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.

SEPULVEDA, M.: The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.

Comment on Affirmative:

STENE, S.: The use of the word "or" applies this section to corrosive locations, whether the locations are dry, damp, or wet but the other two locations, damp and wet, are also provided for in the text so there is no technical reason to delete coverage of damp and wet locations. Section 110.11 covers corrosive, damp or wet conditions so that reference must be retained in the existing text. In addition, 300.6 applies to cables with a nonmetallic outer jacket and internal metal armor or jacket or cable sheathing that may be affected by sunlight, chemical exposure, or other corrosive conditions so all of 300.6 must apply and be retained. Section 760.35 requires compliance with Parts I and II for non-power-limited fire alarm circuits and Parts I and III for power limited fire alarm circuits thus requiring compliance with 760.3, where applicable, for both power-limited and non-power-limited fire alarm cables.

3-241 Log #1177 NEC-P03 **Final Action: Accept**
(760.3(H))

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 760.3(H) to read as follows:

<u>"(H) Raceways Exposed to Different Temperatures. Installations shall comply with 300.7(A)".</u>

Substantiation: Condensation often forms in conduit exposed to non-conditioned and conditioned space. We recently experienced several fire alarm system failures because condensation dripped into the controls and shorted the equipment. This change is proposed to bring the requirements of 300.7(A) into Article 760. There are companion proposals for Article 725.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:

AYER, L.: 300.7 is already a requirement of Article 760. Adding a separate sentence is redundant and not necessary.

Comment on Affirmative:

STENE, S.: The title in proposed 760.3(H) should be changed by adding "Cables, Raceways, or Sleeves" to read as follows: Cables, Raceways, or Sleeves Exposed to Different Temperatures."

The text in proposed 760.3(H) should be changed to read as follows: "Where portions of cables, raceways, or sleeves are exposed to different temperatures and condensation is known to be a problem, fire alarm system installations shall comply with 300.7(A)." This proposed text would provide specific information for the user with installation applications pertaining to the specific use of 300.7(A).

3-242 Log #2907 NEC-P03 **Final Action: Accept in Principle**
(760.3(H) (New))

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Add new section as follows :

760.3(H) Vertical Support For Fire Rated Cable. Installation of circuit integrity (CI) and Electrical Protective Systems shall be in accordance with 300.19(B).

Substantiation: Support requirements for fire- rated cable are critical and contained in 300.19(B). The strength of copper decreases with heat. Cables may break if not properly supported in a fire situation.
Panel Meeting Action: Accept in Principle
Revise the wording in the proposal as follows:

"Vertical Support for Fire Rated Cables and Conductors. Vertical installations of circuit integrity (CI) cables and conductors or cables of electrical circuit protective systems shall be in accordance with 300.19(B)."

Panel Statement: The text in the proposal was changed in the title and the section to cover both cables and conductors since circuit integrity cables and electrical circuit protective systems could be either cables or conductors.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:

EGESDAL, S.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type FPLR-CI NPLFR-CI). Circuit integrity cable (CI) is not an electrical circuit protective system, such as CIC in raceway or Type MI. While both are tested using UL 2196, the tests are not identical. The difference is recognized in Section 760.154(G), where the title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."

Further information, as to the differences, is described in The National Fire Alarm Code: NFPA 72-2007, 6.9.10.4.2 differentiates between a "(1) A 2-hour fire rated circuit integrity (CI) cable" and a "(2) A 2-hour fire rated cable system (electrical circuit protective system)."

SEPULVEDA, M.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type FPLR-CI NPLFR-CI). Circuit integrity cable (CI) is not an electrical circuit protective system, such as CIC in raceway or Type MI. While both are tested using UL 2196, the tests are not identical. The difference is recognized in Section 760.154(G), where the title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."
Further information, as to the differences, is described in The National Fire Alarm Code: NFPA 72-2007, 6.9.10.4.2 differentiates between a "(1) A 2-hour fire rated circuit integrity (CI) cable" and a "(2) A 2-hour fire rated cable system (electrical circuit protective system)."

3-243 Log #4051 NEC-P03 **Final Action: Reject**
(760.3(H) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.3(H)
<u>(H) Conductors and Cables in Dry, Damp, or Wet Locations.</u>
<u>(1) Conductors. Conductors shall comply with the appropriate requirements of 310.8(A), (B), or (C).</u>
<u>(2) Cables. Non-power-limited cables shall comply with the appropriate requirements of 760.176.</u>
<u>(3) Cables. Power-limited cables shall comply with the appropriate requirements of 760.179.</u>
Substantiation: The goal of this proposal is to develop listing and marking requirements for non-power-limited and power-limited fire alarm cables installed in dry, damp, and wet locations with requirements that that are equivalent to conductors

Article 760 circuit conductors must comply with 310(A), (B), or (C). However, there are no listing and marking requirements for non-power-limited and power-limited fire alarm cables installed in dry, damp, or wet locations.

There are system problems where an inappropriate cable is installed in a damp or wet location. This proposed change to marking in a companion proposal to establish marking requirements in 760.176 for non-power-limited fire alarm cables and 760.179 for power-limited fire alarm cables, and to 760.53 and 760.154 for application requirements.
Panel Meeting Action: Reject
Panel Statement: Based on sections 760.46, 760.49, and 760.130(A) covering non-power-limited conductors and power-limited conductors, using non-power-limited methods and materials, compliance with the appropriate requirements in articles in Chapter 3, including Article 310, therefore, referencing back to 310.8, is unnecessary.

In addition, non-power-limited fire alarm cables must comply with 760.176 and power-limited cables must comply with 760.179, making these two references unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:

EGESDAL, S.: The Panel Statement is correct with respect to Part II. The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.

SEPULVEDA, M.: The Panel Statement is correct with respect to Part II. The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-244 Log #1178 NEC-P03 **Final Action: Accept**
(760.3(I))

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 760.3(I) to read as follows:

<u>"(I) Number and Size of Cables and Conductors in Raceway. Installations shall comply with 300.17".</u>

Substantiation: The FPN following 300.17 already references Article 760, but no reference exists in Article 760. This proposal seeks to impose the fill requirements to prevent abrasions and other problems associated with overfull conduit. Although conductor heating is not an issue, the reference will clarify the intent to allow installation and withdrawal of conductors without inflicting damage. There are companion proposals for Article 725.
Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:

EGESDAL, S.: The submitter's substantiation is incorrect. A reference to 300.17 is in 760.51. The submitter did not provide evidence of a problem with the present installation requirements. The Panel statement on 3-191 could have been used here to reject this proposal: "The submitter has not provided technical substantiation indicating that cable damage has occurred."

Acceptance of this proposal has the potential for undue consequences. Where a short section of raceway is used for mechanical support and the conduit fill percentage is exceeded, the local authority may not approve the installation.

KAHN, S.: I do not agree with the proposer's substantiation - there is a reference to 300.17 in 760.51.

SEPULVEDA, M.: The submitter's substantiation is incorrect. A reference to 300.17 is in 760.51. The submitter did not provide evidence of a problem with the present installation requirements. The Panel statement on 3-191 could have been used here to reject this proposal: "The submitter has not provided technical substantiation indicating that cable damage has occurred."
Acceptance of this proposal has the potential for undue consequences. Where a short section of raceway is used for mechanical support and the conduit fill percentage is exceeded, the local authority may not approve the installation.
Comment on Affirmative:

CASPARRO, P.: I support the action taken by the Panel on this proposal.

3-245 Log #4056 NEC-P03 **Final Action: Reject**
(760.3(I) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.3(I).
<u>(I) Conductors and Cables Exposed to Direct Sunlight.</u>
<u>(1) Conductors. Conductors shall comply with 310.8(D).</u>
<u>(2) Non-Power-Limited Fire Alarm Cables. Non-power-limited fire alarm cables shall comply with 760.53.</u>
<u>(3) Power-Limited Fire Alarm Cables. Power-limited fire alarm cables shall comply with 760.154.</u>
Substantiation: Article 760 fire alarm non-power-limited fire alarm circuit conductors have to comply with 310(D). However, there is no marking to identify cable as being sunlight resistant.
System problems may occur where an inappropriate cable is installed exposed to direct sunlight. This proposed change to marking in companion proposals will clearly identify the installation location permitted for cables.
There are companion proposals to add listing requirements to 760.176 and 760.179 to support this proposed requirement, and to 760.53 and 760.154 for application requirements.
Panel Meeting Action: Reject
Panel Statement: Individual conductors based on 760.46 and 760.49 must already comply with 310.8(D), making this reference unnecessary.
Cables covered with a listed sunlight resistant material may change the flame rating of a cable and leave it unsuitable for the installation and may cause obscuration of other cable marking.
Non-power-limited fire alarm cables must already comply with 760.53 and power-limited fire alarm cables must comply with 760.154; therefore, this proposed reference is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The Panel Statement is correct with respect to Part II. The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.
SEPULVEDA, M.: The Panel Statement is correct with respect to Part II. The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-246 Log #1179 NEC-P03 **Final Action: Reject**
(760.3(J))

Submitter: Merton W. Bunker, Jr., US Department of State
Recommendation: Add a new 760.3(J) to read as follows:
<u>“(J) Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies. Installations shall comply with 314.16”.</u>
Substantiation: Overfilled boxes often result in shorts and overheating (non power-limited) on certain circuits. Overfilled boxes are also much more difficult to service, and could result in low system reliability. This proposal seeks to impose the fill requirements to prevent short circuits, and other problems associated with overfilled boxes. There are companion proposals for Article 725.
Panel Meeting Action: Reject
Panel Statement: 760.46 requires compliance with “other appropriate articles in Chapter 3,” including 314.16 for box fill.
There was no technical substantiation to apply 314.16 to power-limited fire alarm systems using 760.130(B) wiring methods.
If non-power-limited wiring methods were used, then compliance with 760.46 would also require compliance with 314.16 for box fill.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-247 Log #4059 NEC-P03 **Final Action: Reject**
(760.3(J) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.3(J).
<u>(J) Temperature Limitations of Conductors and Cables.</u>
<u>(1) Conductors. Conductors installed using non-power-limited fire alarm methods and materials shall comply with 310.10 or 402.3.</u>
<u>(2) Non-power-limited fire alarm cables shall comply with the appropriate requirements of 760.53.</u>
<u>(3) Power-Limited Fire Alarm Cables. Power-limited fire alarm cables shall comply with the appropriate requirements of 760.154.</u>
Substantiation: All Article 760 circuits using non-power-limited methods and materials must meet the temperature requirements of 310.10 or 402.3. These tables provide temperature rating options for various types of conductors.
Presently, there are no equivalent requirements for cables. There are companion proposals to 760.176 and 760.179 that provide requirements for marking cable that will have minimal cost impact on cable manufacturers.
Panel Meeting Action: Reject
Panel Statement: Individual conductors based on 760.46 and 760.49 must already comply with 310.10 or 402.3, making this reference unnecessary.
Non-power-limited fire alarm cables must already comply with 760.53 and power-limited fire alarm cables must comply with 760.154; therefore, this proposed reference is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The Panel Statement is correct with respect to Part II. The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.
SEPULVEDA, M.: The Panel Statement is correct with respect to Part II. The goal of this proposal was to establish requirements for Part III cables and conductors that are not installed in accordance with Part II.

3-248 Log #4696 NEC-P03 **Final Action: Reject**
(760.7 (New))

Submitter: Michael A. Anthony, University of Michigan / Rep. Association of Education Facilities Executivies
Recommendation: Revise text to read as follows:
760.7 +(NEW) Mechanical Execution of Work.
Fire alarm circuits shall be installed in a neat workmanlike manner <u>**and shall be permitted to be installed without conduit unless noted otherwise in NFPA 72.**</u> Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with <u>300.4(D)</u>.
Substantiation: This requires that the user looking for savings refer to the Fire Alarm Code to determine where conduit is required (verticals, surviveables, etc). There could be a net increase in overall safety if the cost savings can be deployed in a more risk-informed manner elsewhere in the life safety infrastructure.
Panel Meeting Action: Reject
Panel Statement: The NEC Style Manual prohibits direct references to other standards within mandatory text in the NEC. “Neat” and “workmanlike” are already covered in 760.24; therefore, it is unnecessary in this suggested new section.
Installing non-power-limited or power-limited fire alarm cable without conduit is already accepted in Parts II and III of Article 760; therefore, adding this to a new section is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-249 Log #2073 NEC-P03 **Final Action: Reject**
(760.21)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text to read as follows:
The installation shall also comply with 300.4(D) <u>and 334.15(C).</u>
Substantiation: Cables and conductors run across joists need running boards or bored holes to protect them from occupants hanging and damaging the conductors.
Panel Meeting Action: Reject
Panel Statement: The proposed text is not in 760.21, rather, it is in 760.24.
334.15(C) only applies to NM cable used for exposed installations. This section would not apply to fire alarm system installations using wiring methods other than NM cable; therefore, the addition of this reference is inappropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-250 Log #2898 NEC-P03 **Final Action: Reject**
(760.24)

Submitter: John R. Jennings, DR Electric
Recommendation: Add new text to read as follows:
Fire alarm circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, hangers, and cable ties, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4(B) <u>and 300.11</u>.
Substantiation: It is important that cables not be supported by the ceiling grid when installed above suspended ceilings, both for the protection of the cables, and for access above the ceiling at later dates. I believe that 300.11 has been intended to apply to these installations, and the addition of this rule will make it easier to enforce.
This Article is, as it stands, almost word-for-word with similar limited energy/low voltage sections, such as 770.24, 800.24, and 830.24.
With the added wording, there will be identical requirements for all limited energy/low voltage installations.

Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for power-limited fire alarm circuits to comply with all of 300.11; therefore, the proposed reference is inappropriate.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-251 Log #3087 NEC-P03 **Final Action: Reject**
(760.24)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
Fire alarm circuits shall be installed in a neat workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with 300.4~~(D)~~ and 300.11.
Substantiation: This is one of a series of proposals intended to provide correlation with sections 640.6(B), 725.24, 760.24, 770.24, 800.24, 820.24 and 830.24. Due to the power limitations of these circuits, there is no reason that the requirements should be different.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-250.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-252 Log #4070 NEC-P03 **Final Action: Reject**
(760.24)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add a fine print note to 760.24 Mechanical Execution of Work.
FPN: Accepted industry practices are described in ANSI/NECA 301-2001, Standard for Fire Alarm System Job Practices.
Substantiation: This proposal provides the fire alarm industry a specific reference to a ANSI/NECA standard and complements 110.12, which follows.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
There are other NEC Articles that have fine print notes referencing ANSI/NECA standards: 427, 770, 800, and 820.
Panel Meeting Action: Reject
Panel Statement: 110.12, FPN, already contains reference to workmanship; therefore, this reference is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:
EGESDAL, S.: Section 110.12 addresses mechanical execution of work, so manufacturers' instructions would certainly be covered by 110.12, and not necessary to repeat in Article 760. But, the ANSI/NECA standard is not a manufacturer's instruction document. The ANSI/NECA standard addresses job execution practices from drawings through testing and maintenance. This standard for a life safety system provides value to users of the NEC. It may be more appropriate to reference this ANSI/NECA Standard as a new FPN in 760.1 Scope.
There are FPN's for similar types of documents (ANSI/NECA/BICSI) in 770.24, 800.24, 820.24, and 830.24.
KAHN, S.: Addition of this FPN is consistent with many other instances where the NEC refers to workmanship. They are placed in many NEC sections where they are appropriate and are consistent with 110.12 Mechanical Execution of Work. ANSI/NECA 301-2001 is an approved ANSI standard that has been subjected to public review prior to its adoption.
SEPULVEDA, M.: Section 110.12 addresses mechanical execution of work, so manufacturers' instructions would certainly be covered by 110.12, and not necessary to repeat in Article 760. But, the ANSI/NECA standard is not a manufacturer's instruction document. The ANSI/NECA standard addresses job execution practices from drawings through testing and maintenance. This standard for a life safety system provides value to users of the NEC. It may be more appropriate to reference this ANSI/NECA Standard as a new FPN in 760.1 Scope.
There are FPN's for similar types of documents (ANSI/NECA/BICSI) in 770.24, 800.24, 820.24, and 830.24.

3-253 Log #4550 NEC-P03 **Final Action: Reject**
(760.25)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
760.25 Abandoned Cables.
The accessible portion of abandoned fire alarm cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. Removal of abandoned cables shall be performed in a neat and workmanlike manner.
Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 760.24. It is important to point out that similar care must be taken when removing cables.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Consistent wording is being proposed for other sections in the code.
For information, see relevant definitions in the NEC.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided technical substantiation for the proposed change, and compliance with this requirement would be unenforceable.
This is already covered under 90.4 and 110.2.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-254 Log #4075 NEC-P03 **Final Action: Reject**
(760.32, 760.52 (New), and 760.141 (New))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to the NFPA 72 Technical Correlating Committee Task Group on Wiring for information.
Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Delete 760.32 and replace with 760.52 [New] and 760.141 [New].
~~760.32 Fire Alarm Circuits Extending Beyond One Building.~~
~~Power-limited fire alarm circuits that extend beyond one building and run outdoors either shall meet the installation requirements of Parts II, III, and IV of Article 800 or shall meet the installation requirements of Part I of Article 300. Non–power-limited fire alarm circuits that extend beyond one building and run outdoors shall meet the installation requirements of Part I of Article 300 and the applicable sections of Part I of Article 225.~~
760.52 Non-Power-Limited Fire Alarm Circuits Extending Beyond One Building.
Non-Power-limited fire alarm circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 800, the applicable sections of Part I of Article 300, and the applicable sections of Part I of Article 225.
760.141 Power-Limited Fire Alarm Circuits Extending Beyond One Building.
Power-limited fire alarm circuits that extend beyond one building and run outdoors shall meet the installation requirements of Parts II, III, and IV of Article 800 and shall comply with the applicable sections of Part I of Article 300.
Substantiation: This proposal is primarily editorial with a change to correlate with NFPA 72-2007, National Fire Alarm Code.
This proposal revises 760.32 to correlate with the requirements of NFPA 72-2007, National Fire Alarm Code. NFPA 72, 4.4.4.3 requires transient protection for all fire alarm circuits extending outside a building. The main purpose or the NFPA 72 requirements is to protect fire alarm circuits from transients due to lightning. The National Fire Alarm Code requirement follows:
NFPA 72-2007, 4.4.4.3 Transient Protection. To reduce the possibility of damage by induced transients, circuits and equipment shall be properly protected in accordance with the requirements of NFPA 70, National Electrical Code, Article 800.
It is important to note that the overcurrent protection required for all non-power-limited circuits is not a substitute for transient protection. While the general requirement is to meet Article 800, Parts II, III, and IV, the key requirement is found in 800.90: lightning protection at the point of entrance to the building.
There is a proposed change in progress to revise NFPA 72 to revise the reference to Article 800 to Parts ii, III, and IV of Article 800. The reference to Parts II, III, and IV of Article 800 presently in 760.32 is correct, as Parts 1 and V or Article 800 do not apply.
This proposal establishes section numbers to parallel Article 725.
Panel Meeting Action: Reject
Panel Statement: The panel does not agree that this is an editorial change.
Based on 760.41(A), the power source of non-power-limited fire alarm circuits shall have an output voltage not greater than 600 volts.
Requiring non-power-limited fire alarm circuits extending beyond one building to comply with Parts II, III, and IV of Article 800 would be a safety hazard at the very least, if not a potential fire hazard.

Compliance with Parts II and III of Article 800 would require primary and secondary protectors to be installed on these non-power-limited conductors or cables where entering into the second building based on 800.50(C).

Primary protectors are not rated for the permissible voltage of the non-power-limited circuit of up to 600 volts and with ampere ratings based on 310.15.

Most technicians are familiar with primary protectors for phone systems and would not associate primary protectors with system voltage of greater than the 48 volts used for communications system circuits and could inadvertently be connected into a circuit with possible electrocution.

Part IV of Article 800 deals with grounding methods for primary protectors and, thus, non-power-limited fire alarm circuits, which would require the grounding conductor of at least a No. 14 be installed to the non-power-limited circuit and be within 20 ft of the entrance of the circuit into the building.

If a grounding electrode was not provided at the second building, a 5-ft ground rod could be installed for the grounding electrode for the non-power-limited system. These are violations of the requirements in Article 225 and the appropriate sections in Article 250 for power circuits.

The correlation with the requirement in 4.4.4.3 on page 30 in NFPA 72 is unrealistic for non-power-limited fire alarm circuits.

Article 800 should not be referenced in 4.4.4.3 since power circuit transient protection is located in Article 285, and not in Article 800.

The panel requests that the Technical Correlating Committee contact the NFPA 72 Technical Correlating Committee, Task Group on Wiring, and the NFPA 780 Technical Committee to address the correlation issues between NFPA 70, 72, and 780.

There was no technical substantiation provided to require compliance with both Article 800 and Article 300 requirements.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

EGESDAL, S.: The proposal should have been accepted in part in principal: accept splitting the requirements in 760.32 (Part I) to sections in Part II and III that match the section numbers in Article 725. Also, accept the change of "or" to "and" in the requirements for power-limited circuits to correlate with NFPA 72-2007, 4.4.4.3. The present text in 760.32 permits power-limited circuits extending beyond one building to not install transient protection that is required by NFPA 72-2007, 4.4.4.3. That is, the existing text permits installers to meet the applicable sections of Part I of Article 300 and ignore the transient protection requirement. Subsequent to the job approval by the electrical inspector, the fire marshal may force compliance with the NFPA 72 requirement. The NEC should correlate with NFPA 72.

KAHN, S.: This proposal should have been "Accepted in Part in Principle" so that there is correlation with NFPA 72-2007 while considering the points raised in the Panel Statement.

SEPULVEDA, M.: The proposal should have been accepted in part in principal: accept splitting the requirements in 760.32 (Part I) to sections in Part II and III that match the section numbers in Article 725. Also, accept the change of "or" to "and" in the requirements for power-limited circuits to correlate with NFPA 72-2007, 4.4.4.3. The present text in 760.32 permits power-limited circuits extending beyond one building to not install transient protection that is required by NFPA 72-2007, 4.4.4.3. That is, the existing text permits installers to meet the applicable sections of Part I of Article 300 and ignore the transient protection requirement. Subsequent to the job approval by the electrical inspector, the fire marshal may force compliance with the NFPA 72 requirement. The NEC should correlate with NFPA 72.

3-255 Log #1171 NEC-P03 **Final Action: Reject**
(760.33)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to the NFPA 72 Technical Correlating Committee Task Group on Wiring for information.

Submitter: Merton W. Bunker, Jr., US Department of State

Recommendation: Add a new 760.33 to read as follows:

"760.33 Transient Protection. All circuits extending beyond one building shall be protected in accordance with the requirements of Article 800."

Substantiation: Non power-limited circuits are not immune to transient s caused by lightning. Power-limited circuits run outdoors are sometimes reclassified as permitted by 760.130(A), Exception 3. However, reclassified circuits are just as susceptible to transients, but are not subject to the requirements for transient protection afforded by Article 800.

This change is intended to clarify code requirements for transient protection and correlate with Section 4.4.4.3 of NFPA 72, National Fire Alarm Code, which requires transient protection on all circuits that extend outdoors.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-254.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-256 Log #4078 NEC-P03 **Final Action: Reject**
(760.35)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 760.35 as follows:

760.35 Fire Alarm Circuit Requirements.

Fire alarm circuits shall comply with 760.35(A), ~~and~~ (B) or (C).

(A) All systems shall test free of grounds.

Exception:

Parts of circuits or equipment that are intentionally and permanently grounded to provide ground-fault detection, noise suppression, emergency ground signaling, and circuit protection grounding shall be permitted.

(B~~A~~) Non–Power-Limited Fire Alarm (NPLFA) Circuits. See Parts I and II.

(C~~B~~) Power-Limited Fire Alarm (PLFA) Circuits. See Parts I and III.

II. Non–Power-Limited Fire Alarm (NPLFA) Circuits.

Substantiation: Article 250 applies to fire alarm equipment. However, most fire alarm circuits on the load side of the power supply have ground detection circuits. It is important for proper system operation that fire alarm circuits are installed free of grounds, and that equipment be grounded in accordance with Article 250.

Panel Meeting Action: Reject

Panel Statement: 110.7 covering wiring integrity already states the same information, and applies to Chapters 1 through 7 wiring methods.

The text reads as follows:

"110.7 Wiring Integrity. Completed wiring installations shall be free from short circuits, ground faults, or any connections to ground other than as required or permitted elsewhere in this Code."

The only way to determine that the circuit is not inadvertently grounded is by testing. Ground-fault protection and detection as well as other grounding requirements for noise suppression are already covered in Article 250, where applicable.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: It is important for installers to understand that fire alarm circuits are not required to be grounded, but the power wiring to a fire alarm panel must meet Article 250. Article 250 has many requirements, so it is difficult to find fire alarm requirements. The text in the proposal correlates well with the requirements in NFPA 72, National Fire Alarm Code.

SEPULVEDA, M.: It is important for installers to understand that fire alarm circuits are not required to be grounded, but the power wiring to a fire alarm panel must meet Article 250. Article 250 has many requirements, so it is difficult to find fire alarm requirements. The text in the proposal correlates well with the requirements in NFPA 72, National Fire Alarm Code.

3-257 Log #1422 NEC-P03 **Final Action: Reject**
(760.36 (New))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Add new text to read as follows:

760.XX Listing. Fire alarm system cables and equipment shall be listed and identified for the use.

Substantiation: Listing should be a requirement.

Panel Meeting Action: Reject

Panel Statement: Listing requirements of fire alarm equipment are outside the scope of Code-Making Panel 3 and are under the jurisdiction of NFPA 72 where 4.3.1, on page 26, requires "equipment constructed and installed in conformity with NFPA 72 shall be listed for the purpose for which it is used."

The cables are already required to be listed based on 760.176 for NPLFA and 760.179 for PLFA.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-258 Log #4076 NEC-P03 **Final Action: Reject**
(760.37 (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 760.37.

760.37 Class A Fire Alarm Circuits

Class A circuits using physical conductors shall be installed such that the outgoing and return conductors, exiting from and returning to the control unit, respectively, are routed separately. The outgoing and return circuit conductors shall not be run in the same cable assembly enclosure, or raceway. Where the power to a device is supplied over a separate circuit from the signaling line circuit or initiating device circuit, the operation of the power circuit shall meet the performance requirements of the initiating device circuit or signaling line circuit.

Exception:

The outgoing and return (redundant) circuit conductors shall be permitted to be run in the same cable assembly, enclosure, or raceway under any of the following conditions:

(1) For a distance not to exceed 3 m (10 ft) where the outgoing and return conductors enter or exit the initiating device, notification appliance, or control unit enclosures

(2) Single conduit/raceway drops to individual devices or appliances
(3) Single conduit/raceway drops to multiple devices or appliances installed within a single room not exceeding 92.9 m2 (1000 ft2) in area.

Substantiation: Class A circuits require special routing, compared to Class B circuits that do not have special routing requirements. It is important for system operation to keep the outbound and return circuits separated. A Class A circuit will permit all devices to operate when both circuit conductors are cut. If the outbound and return circuits are in the same cable or raceway, severing that part of the circuit will disable a portion of the system.

Panel Meeting Action: Reject

Panel Statement: The class of fire alarm system will determine the installation requirements for each different style of fire alarm circuit. As stated in 6.4.2.1 of the NFPA 72, 2007 edition, initiating device circuits, notification appliance circuits, and signaling line circuits can be designated as Class A or B, depending upon their performance during non-simultaneous single-circuit fault conditions.

There are too many different conditions and details contained within NFPA 72 to extract the information and insert it into the NEC.

The installer must have a total understanding of all of these issues before attempting the installation.

Extracting some of the information into the NEC and not the remainder will not provide the installer with the required information to install the system and will cause confusion.

To truly understand what is being proposed would require definitions of Class A, Class B, initiating line circuits, signaling line circuits, and notification appliances.

Since NFPA 72 and the NEC are not in the same cycle, any change in NFPA 72 may make the two requirements different, leaving the installer with the requirement to install the circuits in accordance with two different standards.

The suggested text uses the term “appliances,” which has a different definition in the NEC then that provided in NFPA 72.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

EGESDAL, S.: Class A fire alarm circuits require special installation methods: outgoing and return circuit separated throughout the entirety of the installation (with some special case exceptions). Class B circuits use standard installation methods detailed in Article 760, so do not have to be covered in the NEC. If a Class A circuit is opened (cut apart), the outgoing and return conductors continue to connected to all devices on the Class A circuit. Installers sometime install the outgoing and return circuits in the same cable or raceway, which defeats the life safety robustness of the Class A circuit.

KAHN, S.: I agree with the proposer’s substantiation.

SEPULVEDA, M.: Class A fire alarm circuits require special installation methods: outgoing and return circuit separated throughout the entirety of the installation (with some special case exceptions). Class B circuits use standard installation methods detailed in Article 760, so do not have to be covered in the NEC. If a Class A circuit is opened (cut apart), the outgoing and return conductors continue to connected to all devices on the Class A circuit. Installers sometime install the outgoing and return circuits in the same cable or raceway, which defeats the life safety robustness of the Class A circuit.

3-259 Log #4079 NEC-P03 **Final Action: Accept in Principle in Part**
(760.41)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 760.41 as follows:

760.41 NPLFA Circuit Power Source Requirements.

(A) Power Source.

(1) The dedicated branch circuit between the power source and fire alarm equipment controlling ~~of~~ non–power-limited fire alarm circuits shall comply with Chapters 1 through 4.

Exception: The dedicated branch circuit shall be permitted to connect to multiple pieces of fire alarm equipment.

(2) ~~, and~~ The output voltage shall ~~be~~ not be greater ~~more~~ than 600 volts, nominal.

(B) Branch Circuit.

(1) A~~n individual~~ dedicated branch circuit shall be required for the supply of the power source.

Exception: The dedicated branch circuit shall be permitted to connect to multiple pieces of fire alarm equipment.

(2) The~~is~~ dedicated branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.

FPN: See 210.8(A)(5), Exception, for receptacles in dwelling-unit unfinished basements that supply power for fire alarm systems.

(3) The dedicated branch circuit(s) and connections shall be mechanically protected.

(4) The circuit disconnecting means shall have a red marking, shall be accessible only to authorized personnel, and shall be identified as “FIRE ALARM CIRCUIT.”

(5) The location of the circuit disconnecting means shall be permanently identified at the fire alarm control unit.

Substantiation: This proposal provides correlation with NFPA 72-2007, National Fire Alarm Code. NFPA 72 uses the term “dedicated branch circuit” rather than the generic “individual branch circuit.” It is important for continued fire alarm system operation that the fire alarm system, and only the fire alarm system, be connected to a branch circuit.

The proposed changes are from NFPA 72-2007, 4.4.1.4.2.

Panel Meeting Action: Accept in Principle in Part

Revise the existing code text of 760.41 to read as follows:

“**(A) Power Source.** The power source of non-power-limited fire alarm circuits shall comply with Chapter 1 through 4, and the output voltage shall be not more than 600 volt, nominal. Fire alarm disconnect shall be permitted to be secured in the “on” position.

(B) Branch Circuit. The branch circuit supplying the fire alarm equipment(s) shall supply no other loads. The location of the branch circuit overcurrent protective device shall be permanently identified at the fire alarm control panel. This branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.

FPN: See 210.8(A)(5), Exception, for receptacles in dwelling-unit unfinished basements that supply power for fire alarm systems.”

The remainder of the proposed text is rejected.

Panel Statement: The new text in (A) is provided to address the concern of inadvertent disconnection as determined by the Code-Making Panel 3, and the new text in (B) is provided to address the submitter’s concerns related to the need for dedicated branch circuits.

“Dedicated branch circuit” is not defined in Article 100 of the NEC, whereas “individual branch circuit” is defined as “a branch circuit that supplies only one utilization equipment.” The use of individual branch circuit in 760.41 determines that this branch circuit can supply only fire alarm equipment (can consist of multiple pieces of the same equipment), so the suggested changes are not consistent with the NEC style. The branch circuit must be installed based on the wiring methods in Chapter 3 and, if there is a possibility for physical damage, then an appropriate wiring method must be used, so mechanically protecting the circuit is not consistent with any requirements in Chapter 3 wiring methods.

A new sentence was added as a second sentence to 760.41(B) to read as follows: “The location of the branch circuit overcurrent protective device shall be permanently identified at the fire alarm control panel.” This added sentence provides marking of the location of the overcurrent protective device on the fire alarm panel so a maintenance person can quickly determine where to locate the overcurrent device.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

AYER, L.: While I agree with the panel action, this proposal along with proposal 3-280 will add the same requirements in two sections of Article 760. It would be more appropriate to add branch circuit requirements for fire alarm circuits in one place regardless of whether the circuit is power-limited or non-power limited. Revised wording to 760.35, 760.41, and 760.121 is as follows:

760.35 Fire Alarm Circuit Requirements. Fire alarm circuits shall comply with 760.35 (A), (B) and ~~(B)~~ (C).

(A) Branch Circuit. The branch circuit supplying the fire alarm equipment(s) shall supply no other loads. The location of the branch circuit overcurrent protective device shall be permanently identified at the fire alarm control panel. This branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.

~~(A)~~ (B) Non-Power-Limited Fire Alarm (NPLFA) Circuits…..

~~(B)~~ (C) Power-Limited Fire Alarm (PLFA) Circuits …….

760.41 NPLFA Circuit Power Source Requirements.

(A) Power Source…..

~~(B) Branch Circuit. An individual branch circuit shall be required for the supply of the power source. This branch circuit not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.~~

760.121 Power Sources for PLFA Circuits.

(A) Power Source…..

~~(B) Branch Circuit. An individual branch circuit shall be required for the supply of the power source. This branch circuit not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.~~

OWEN, R.: See my Comment on Affirmative on Proposal 3-260 (Log #3762).

3-260 Log #3762 NEC-P03 **Final Action: Reject**
(760.41(B))

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as “Reject” because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Jebediah J. Novak, Cedar Rapids Electrical JATC / Rep. Int’l Brotherhood of Electrical Workers

Recommendation: Delete text to read as follows:

(B) Branch Circuit. An individual branch circuit shall be required for the supply of the power source. ~~This branch circuit shall not be supplied through ground fault circuit interrupters or arc fault circuit interrupters.~~

Substantiation: This requirement should be deleted. Both AFCI and GFCI devices are intended to protect people and property from fire and shock hazards. The substantiation used in the past to justify this requirement was that de-energizing the fire alarm control panel (FACP) would result in the system ceasing to function with no indication of the loss of power,or that nuisance tripping would be an issue. This requirement seems to imply that is better to have an arcing condition persist and grow into a fire scenario, because the FACP will be able to notify the building occupants of the fire that was started by it's own branch-circuit. Similar arguments could be made in regards to a ground-fault that could result in shock or electrocution.

However, the building occupants will be aware of the loss of power if the fire alarm is installed in accordance with NFPA 72, the National Fire Alarm Code. Section 4.4.1.5.3 of NFPA 72 requires that fire alarm systems be provided with a minimum of 24 hours of standby power, with enough power available at the end of the 24 hour period for the system to go into full alarm for 5 minutes (15 minutes of maximum connected load for emergency voice communications systems). Section 4.4.7.3.1 of NFPA 72 requires that failure of either the primary or secondary power supplies to be annunciated with a trouble signal in accordance with Section 4.4.3.5, that requires the trouble condition to be annunciated within 200 seconds at a location where it is likely to be heard.

The loss of primary power is also required to be transmitted to any supervising station that is monitoring the system. Unless prohibited by the AHJ, loss of power trouble signals may have a delayed transmission to the remote supervising stations by a period of 60-180 minutes in case of a widespread power outage to prevent overwhelming the stations communications equipment. This is still well within the time-frame of the 24 hours required standby capacity. Upon receipt of the power supply failure transmission, Chapter 8 of NFPA 72 gives specific instructions to the personnel in the supervising stations to ensure appropriate action is taken.

As I read through the past proposals and comments addressing this issue, it became very apparent that there is a lack of understanding when differentiating between single/multiple station smoke alarms and smoke detectors. As a panel member of NFPA 72, it is important to distinguish that single/multiple station smoke alarms do not meet the criteria of a fire alarm system as defined by Chapter 3 of NFPA 72, and therefore are still subject to the GFCI requirements of 210.8 and the AFCI requirements of 210.12. Household fire alarm systems are defined by 3.3.67.3 as having a fire alarm control unit (panel) that is interconnected to the devices that are used for initiation and notification.

Another substantiation used in past revision cycles was that often times the batteries are not provided, are missing, are dead, or smoke detectors are "rendered inoperable by, e.g., a shower cap. This quoted material was proposal 3-236, Log #1598 in the Report on Proposals from May of 2004. The CMP-accepted this proposal at that time. This substantiation implies that since the systems may not be properly installed, inspected or tested that the NEC will allow other potentially dangerous conditions to exist as well.

Again, loss of the secondary power supply is required to be annunciated with a trouble signal within 200 seconds of the condition occurring. Furthermore, Chapter 10 of NFPA 72 details specific inspection and testing procedures that are to be performed at required intervals. A visual inspection of the primary and secondary power supplies is required to be performed at the time of initial acceptance or during any reacceptance of the system. Batteries, depending on the type, are required to be visually inspected at either monthly or seminannual intervals depending on the type use. The primary and secondary power supplies are required to be tested at regular intervals as well, with Table 10.4.2.2 detailing how those tests are to be performed. For a system to be up and running, the batteries would have to be in place and operating correctly.

To summarize my position on this proposal:

1. Building occupants will be notified of a loss of power
2. GFCI's and AFCI's have been shown to increase safety for personnel and property from hazards arising from the use of electricity, as evidenced by each type of protection being applied to increasing locations in 210.8 and 210.12, respectively
3. It is the building owner's responsibility to properly maintain the fire alarm system
4. If the AFCI or GFCI is tripping the branch-circuit supplying the FACP, it is because a potentially hazardous condition exists and the situation needs to be corrected.

Panel Meeting Action: Accept

The panel understands that the action taken on this proposal modifies the action taken on Proposal 3-259.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 8 Negative: 7

Explanation of Negative:

CONNAUGHTON, T.: A Local Fire Alarm System could be rendered useless with the tripping of a GFCI device

EGESDAL, S.: This proposal should have been rejected to correlate with the action on 3-259 and for life safety reasons.

The submitter did not identify specific job problems. The submitter did not show that a GFCI would not trip when a fire alarm circuit (initiating, notification, signaling line) was grounded. The submitter did not show that an AFCI would not trip when the contacts of a fire alarm relay "arc" when being connected or disconnected to a highly inductive load.

Connecting a Local Fire Alarm System to a GFCI or an AFCI creates a potential life safety situation. A Local Fire Alarm System that receives standby power from an emergency generator will have 4 hours of battery power. If this type of fire alarm system is connected to a GFCI or an AFCI that has an inadvertent trip, here's the probably outcome: (1) The FA panel, which is probably locked in a remote electrical room, will sound a trouble signal until the battery is depleted; (2) The emergency generator will not start, as it starts when power to the build is lost; (3) The building, such as a condo, will be without a fire alarm system, and nobody may be aware.

KAHN, S.: This proposal should have been rejected to correlate with the panel's action on 3-259.

OWEN, S.: The submitter's first sentence, quoted from the 2008 NEC, has been modified by Panel Action on ROP 3-259 and is therefore rejected here in 3-260. The submitter's strikethrough of the present 2008 NEC second sentence has the effect of deleting the present requirement to prohibit arc-fault circuit interrupters or ground-fault circuit interrupters on non-power-limited fire alarm circuits without technical substantiation or documentation. This proposal should be rejected.

SANDERS, M.: The panel action should be "Accept in Principle" since by accepting the proposal in total with the phrase "to read as follows" implies that the final wording negates entirely the panel action taken on Proposal 3-259, which is not the intent of the panel.

SEPULVEDA, M.: This proposal should have been rejected to correlate with the action on 3-259 and for life safety reasons.

The submitter did not identify specific job problems. The submitter did not show that a GFCI would not trip when a fire alarm circuit (initiating, notification, signaling line) was grounded. The submitter did not show that an AFCI would not trip when the contacts of a fire alarm relay "arc" when being connected or disconnected to a highly inductive load.

Connecting a Local Fire Alarm System to a GFCI or an AFCI creates a potential life safety situation. A Local Fire Alarm System that receives standby power from an emergency generator will have 4 hours of battery power. If this type of fire alarm system is connected to a GFCI or an AFCI that has an inadvertent trip, here's the probably outcome: (1) The FA panel, which is probably locked in a remote electrical room, will sound a trouble signal until the battery is depleted; (2) The emergency generator will not start, as it starts when power to the build is lost; (3) The building, such as a condo, will be without a fire alarm system, and nobody may be aware.

SLEIGHTS, J.: The required annunciation of a trouble signal from the fire alarm in response to the loss of primary power is often effective in calling attention to the condition. However, in practice it sometimes is not. The signal may be ignored or there may not be anyone on-premises during the duration the secondary power supply (typically battery) is capable of operating the signal. Since it is the intent of CMP-3 to coordinate with the National Fire Alarm Code and require the fire alarm equipment to be supplied by an 'individual branch circuit' it is not likely that the nonfunctionality of some other equipment or lighting will in any way call attention to the loss of primary power to the specific circuit for the fire alarm system. In some situations the signal is transmitted off-premises, but not in all cases. Thus the detection of the loss of power falls to inspection or in the worse case scene investigation after a loss has occurred. Inspection is by nature periodic with some duration of time expected where the system is left to itself. The 2007 edition of NFPA 72 National Fire Alarm Code, Table 10.3.1 Visual Inspection Frequencies indicates that a 'Weekly' visual inspection is required of 'Fire Alarm Control Unit Trouble Signals'. If inspections were actually performed at that interval it could still leave a 5-6 day window of questionable performance for a system with a 24 hour secondary power supply.

Notwithstanding what may be added or removed in this Code cycle, Article 210 in the 2008 edition permits GFCI protection be omitted only for a dedicated receptacle in an unfinished basement supplying a permanent fire alarm system (210.8(A)(5) Exception) with an FPN referencing the Article 760 sections we are currently pondering. 210.12 currently requires AFCI protection for some branch circuits only in the dwelling unit areas listed in 210.12(B). It does however permit AFCI protection to be omitted from the branch circuit supplying a fire alarm system in 210.12(B) Exception 2 where the branch circuit is installed with the specific wiring methods listed. A FPN is also included referencing the Article 760 sections we are currently pondering.

What is not discussed until Article 760 is the permission to use a GFCI or AFCI on any circuit supplying a fire alarm system in other than a dwelling unit. Without the prohibition in Article 760 it will be permitted and likely required if the circuit location falls under one requiring such protection in Article 210 (absent the specific wiring methods in the Exception) or is specified above minimum Code requirements by a designer. Also, it needs to be kept in mind that the branch circuit ultimately used MAY predate the fire alarm installation and as such may have older GFCI or AFCI equipment installed. Simple circuit breaker 'locks' will not protect against tripping via the test button on most circuit breakers.

The argument that NFPA 72 does not specifically prohibit a fire alarm system from being supplied by a branch circuit protected by a GFCI or AFCI and is therefore permits it is hollow. That document was able to look to the NEC and read the requirements in Article 760 that specifically prohibits the devices.

Finally, if the fire alarm system is located within a dwelling unit the scope of coverage is usually limited to the unit. On a larger scale, the 'fire alarm system' may be installed in a common space to provide service to sections or floors of a building, an entire building, complex or larger entity. These installations are not likely covered by the Article 210 sections.

The submitter of the proposals did not provide any technical substantiation that the current arrangement presents any increased hazard in locations where the Code currently requires GFCI or AFCI protection. It also does not examine in detail the increased risk of power loss to fire alarm systems that may arise from inadvertent tripping of these devices, nor the compatibility of the vast array of fire alarm equipment that may be required to function on a circuit so protected.

Based on my experience and evaluation of this issue I vote to REJECT proposals ROP 3-260 and 3-281 that remove the prohibition of GFCI and AFCI protection on fire alarm system branch circuits.

Comment on Affirmative:

AYER, L.: Article 760 provides the necessary requirements for using cables and conductors to wire a fire alarm system. NFPA 72 fills in the other blanks by providing the performance, reliability and and other pertinent installation requirements. NFPA 72 includes such items as when a secondary power supply is required, how long should batteries last, does the system require a dedicated branch circuit, and what are the proper marking requirements of the branch circuit disconnect.

The requirement to prohibit arc-fault or ground-fault protection on a fire alarm circuit should rest entirely with NFPA 72. This issue only rears its ugly head in residential fire alarm systems. It is highly unlikely that you would see arc-fault or ground fault protection on a branch circuit feeding a commercial fire alarm system.

Chapter 11 of the fire alarm code deals with Household Fire Alarm Systems. The text within this section permits fire alarm systems (panels) or smoke detectors to be installed on arc-fault devices if they are provided with some sort of secondary power. Section 11.6.3.5 is a new addition to the fire alarm code which mandates that any smoke alarm powered by an AFCI must have a secondary power source. Section 11.6.2 covers power for fire alarm panels in residential settings. NFPA 72 does not specifically dictate that fire alarm panels can be wired on an arc-fault breaker, however, it would be inferred that it would be acceptable since fire alarm systems or panels must be provided with a secondary power source.

Any wording placed in the NEC in Article 760 regarding this issue will create confusion. Telling someone that is not okay to wire fire alarm panels or detectors to an arc-fault or ground-fault device when it is permitted in various locations in NFPA 72 would not be appropriate. It is better to delete the last sentence so the user of the code understands that the responsibility over home fire alarm systems reside in NFPA 72 and Article 210.

The National Electrical Code is an installation document. It is not intended to provide or solve performance and reliability issues of fire alarm systems or devices. The authority to address those issues should reside with NFPA 72.

KEDEN, R.: I vote affirmative but expect that NFPA 72 will take a position on this issue in the future.

OWEN, R.: This action should probably have been "accept in principle" and accept the modification of the first sentence per Proposal 3-259 and the deletion of the second sentence of existing text in part (B).

The Panel changed the wording in the first sentence of (B) in Proposal 3-259 to "The branch circuit supplying the fire alarm equipment(s) shall supply no other loads." By accepting 3-260 the panel may have created confusion because the first sentence in this proposal matches the original NEC text, not the change from 3-259.

3-261 Log #2198 NEC-P03 **Final Action: Accept**
(760.43)

Submitter: James W. Carpenter, International Association of Electrical Inspectors

Recommendation: Revise text as follows:

760.43 NPLFA Circuit Overcurrent Protection.

Overcurrent protection for conductors 14 AWG and larger shall be provided in accordance with the conductor ampacity without applying the <u>ampacity adjustment and correction</u> ~~derating~~ factors of 310.15 to the ampacity calculation. Overcurrent protection shall not exceed 7 amperes for 18 AWG conductors and 10 amperes for 16 AWG conductors.

Exception: Where other articles of this Code permit or require other overcurrent protection.

Substantiation: The terms "ampacity adjustment factors" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-262 Log #3038 NEC-P03 **Final Action: Accept**
(760.43)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

760.43 NPLFA Circuit Overcurrent Protection.

Overcurrent protection for conductors 14 AWG and larger shall be provided in accordance with the conductor ampacity without applying the <u>ampacity adjustment and correction</u> ~~derating~~ factors of 310.15 to the ampacity calculation. Overcurrent protection shall not exceed 7 amperes for 18 AWG conductors and 10 amperes for 16 AWG conductors.

Exception: Where other articles of this Code permit or require other overcurrent protection.

Substantiation: The terms "adjustment factor" and "correction" are the terms used in 310.15(B)(2)(a) and 310.16.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-263 Log #2916 NEC-P03 **Final Action: Accept**
(760.46)

Submitter: Thomas Guida, TJG Services, Inc.

Recommendation: Revise text to read as follows:

760.46 NPLFA Circuit Wiring. Installation of non–power-limited fire alarm circuits shall be in accordance with 110.3(B), 300.7, 300.11, 300.15, 300.17, <u>300.19(B)</u> and other appropriate articles of Chapter 3.

Exceptions 1 and 2 are unchanged.

Substantiation: Support requirements for fire- rated cable are critical and contained in 300.19(B). The strength of copper decreases with heat. Cables may break if not properly supported in a fire situation.

Panel Meeting Action: Accept

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type FPLR-CI NPLFR-CI). Section 300.19(B) Circuit integrity (CI) cable is not an electrical circuit protective system, such as CIC in raceway or Type MI. While both are tested using UL 2196, the tests are not identical. The difference is recognized in Section 760.154(G), where the title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."

Further information, as to the differences, is described in The National Fire Alarm Code: NFPA 72-2007, 6.9.10.4.2 differentiates between a "(1) A 2-hour fire rated circuit integrity (CI) cable" and a "(2) A 2-hour fire rated cable system (electrical circuit protective system)."

SEPULVEDA, M.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type FPLR-CI NPLFR-CI). Section 300.19(B) Circuit integrity (CI) cable is not an electrical circuit protective system, such as CIC in raceway or Type MI. While both are tested using UL 2196, the tests are not identical. The difference is recognized in Section 760.154(G), where the title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."

Further information, as to the differences, is described in The National Fire Alarm Code: NFPA 72-2007, 6.9.10.4.2 differentiates between a "(1) A 2-hour fire rated circuit integrity (CI) cable" and a "(2) A 2-hour fire rated cable system (electrical circuit protective system)."

3-264 Log #3088 NEC-P03 **Final Action: Reject**
(760.46)

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

760.46 NPLFA Circuit Wiring.

Installation of non–power-limited fire alarm circuits shall be in accordance with 110.3(B), 300.7, 300.11, 300.15, 300.17, and other appropriate articles of Chapter 3. <u>Where non-power-limited fire alarm systems contain outlets in areas requiring AFCI protection, the circuit(s) shall be installed in RMC, IMC, EMT, or steel armored cable, Type AC, meeting the requirements of 250.118, with metal outlet and junction boxes.</u>

Exception No. 1: As provided in 760.48 through 760.53.

Exception No. 2: Where other articles of this Code require other methods.

Substantiation: This proposal is intended to clarify that compliance with 210.12(B) Ex. No 2 is not optional. The code user that installs fire alarm systems is often not aware of Article 210 requirements, such as Ex No 2 to 210.12(B).

Panel Meeting Action: Reject

Panel Statement: This text is already provided in 210.12, and since Chapters 1 through 4 apply, unless supplemented or modified by Article 760, the proposed text is unnecessary.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-265 Log #2468 NEC-P03 **Final Action: Reject**
(760.48)

Submitter: Daniel G. Decker, Safety Systems, Inc.
Recommendation: Revise text to read as follows:

760.48 Conductors of Different Circuits in Same Cable, Enclosure, or Raceway.

(A) Class 1 with NPLFA Circuits. Class 1 and non-power-limited fire alarm circuits shall be permitted to occupy the same cable, enclosure, or raceway without regard to whether the individual circuits are alternating current or direct current, provided all conductors are insulated for the maximum voltage of any conductor in the enclosure or raceway.

(B) ~~Fire Alarm with Power Supply Circuits.~~ Electric Light and Power with NPLFA Circuits. ~~Power supply~~ Electric Light and Power and non-power limited fire alarm circuit conductors shall be permitted in the same cable, enclosure, or raceway only where connected to the same equipment.

Substantiation: The phrase “power supply” and “Electric Light and Power” are apparently used interchangeably in Article 760 (760.48 and 760.136 for example). The term “power supply circuits” may confuse users assuming this refers to circuits connected to the fire alarm power supply. Use of the term “Electric Light and Power” is consistent with other references in this section to the same type of circuit. The term “non-power limited” should be inserted ahead of “fire alarm circuit” in 760.48(B) for consistency with 760.48(A).

Panel Meeting Action: Reject

Panel Statement: The use of “power supply” is intentional since the fire alarm power supply conductors can only occupy the same cable, enclosure, or raceway if the conductors are connected to the same equipment (functionally associated).

This section does not provide permission to put normal light and power conductors supplying power to other loads into the same cable, enclosure, or raceway.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-265a Log #CP303 NEC-P03 **Final Action: Accept**
(760.49)

Submitter: Code-Making Panel 3,
Recommendation: Revise the existing code text to read as follows:

“760.49 NPLFA Circuit Conductors.

(B) Insulation. Insulation on conductors shall be ~~suitable~~ rated for 600 volts. Conductors larger than 16 AWG shall comply with Article 310. Conductors 18 AWG and 16 AWG shall be Type KF-2, KFF-2, PAFF, PTFF, PF, PFF, PGF, PGFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF. Conductors with other types and thickness of insulation shall be permitted if listed for non–power-limited fire alarm circuit use.”

Substantiation: “Suitable” was changed to “rated” since the conductor insulation must be rated for 600-volts.

Panel Meeting Action: Accept
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-266 Log #2904 NEC-P03 **Final Action: Reject**
(760.49(A))

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise text to read as follows:

760.49 NPLFA Circuit Conductors.

(A) Sizes and Use. Only copper conductors shall be permitted to be used for fire alarm systems. Size 18 AWG and 16 AWG conductors shall be permitted to be used, provided they supply loads that do not exceed the ampacities given in Table 402.5 and are installed in a raceway, an approved enclosure, or a listed cable. Conductors larger than 16 AWG shall not supply loads greater than the ampacities given in 310.15, as applicable. For circuit integrity (CI) cable and electrical circuit protective systems minimum conductor size shall be 16 AWG.

Substantiation: The strength of copper decreases under a fire. UL 2196 has added a strength test to determine the maximum distance between supports in a vertical run. Only 2 manufacturers have achieved a listing for vertical use on an 18 AWG, one is 16 feet and the other is 27 feet. This distance is not practical for most vertical installations. The vertical limit for 16 AWG is 53 feet for one manufacturer and 100 feet for the other. The other manufacturers’ 18 AWG cannot be used in a vertical run. The majority of the fire rated cable is used vertically and is 18 AWG. Since the limits are not practical, the concern is that it will be used beyond its limits.

Panel Meeting Action: Reject

Panel Statement: 300.19 and the accompanying Table 300.19 permits 18-gauge copper conductors installed in vertical raceways to be supported at 100 feet or greater.

There was no technical substantiation provided in the proposal for the exclusion of 18-gauge conductors and to require all circuit integrity cable and electrical circuit protective systems to be sized at 16-gauge conductor size.

Many installations using 18-gauge conductors may never be installed in a vertical distance in excess of 10 or 15 feet in a raceway.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-267 Log #2199 NEC-P03 **Final Action: Accept in Principle**
(760.51)

Submitter: James W. Carpenter, International Association of Electrical Inspectors
Recommendation: Revise text as follows:

760.51 Number of Conductors in Cable Trays and Raceways, and Ampacity Adjustment. ~~Derating.~~

(A) NPLFA Circuits and Class 1 Circuits. Where only non–power-limited fire alarm circuit and Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply if such conductors carry continuous load in excess of 10 percent of the ampacity of each conductor.

(B) Power-Supply Conductors and Fire Alarm Circuit Conductors. Where power-supply conductors and fire alarm circuit conductors are permitted in a raceway in acrodance with 760.48, the number of conductors shall be determined in accordance with 300.17. The adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply as follows:

(1) Text to remain unchanged.
(2) Text to remain unchanged.
(3) Text to remain unchanged.

Substantiation: The term “ampacity adjustment factors” is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept in Principle

In the proposed text, add “Factors” after “Adjustment” in the title to read as follows:

760.51 Number of Conductors in Cable Trays and Raceways, and Ampacity Adjustment Factors.”

(A) NPLFA Circuits and Class 1 Circuits. Where only non–power-limited fire alarm circuit and Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment factors given in 310.15(B)(2)(a) shall apply if such conductors carry continuous load in excess of 10 percent of the ampacity of each conductor.

(B) Power-Supply Conductors and Fire Alarm Circuit Conductors. Where power-supply conductors and fire alarm circuit conductors are permitted in a raceway in accordance with 760.48, the number of conductors shall be determined in accordance with 300.17. The ampacity adjustment factors given in 310.15(B)(2)(a) shall apply as follows:

(No other changes are to be made to the existing text.)

Panel Statement: The panel added the word “factors” to the title to make it consistent with the text in the subsection.

The phrase “ampacity adjustment factors” is more technically correct since it is the ampacity of the conductors that are being adjusted by the factor in 310.15(B)(2)(a).

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-268 Log #2467 NEC-P03 **Final Action: Reject**
(760.51)

Submitter: Daniel G. Decker, Safety Systems, Inc.
Recommendation: Revise text to read as follows:

760.51 Number of Conductors in Cable Trays and Raceways, and Derating.

(A) NPLFA Circuits and Class I Circuits. Where only non-power-limited fire alarm circuit and Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The derating factors given in 310.15(B)(2)(a) shall apply if such conductors carry continuous load in excess of 10 percent of the ampacity of each conductor.

(B) ~~Power-Supply Conductors and Fire Alarm Circuit Conductors.~~ NPLFA Circuits and Electric Light and Power Circuits. Where ~~power supply~~ electric light and power conductors and non-power limited fire alarm circuit conductors are permitted in a raceway in accordance with 760.48, the number of conductors shall be determined in accordance with 300.1 7. The derating factors given in 310.15(B)(2)(a) shall apply as follows:

(1) To all conductors where the fire alarm circuit conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor and where the total number of conductors is more than three

(2) To the ~~power supply~~ electric light and power conductors only, where the fire alarm circuit conductors do not carry continuous loads in excess of 10 percent of the ampacity of each conductor and where the number of ~~power supply~~ electric light and power conductors is more than three.

Substantiation: The phrase “power supply” and “electric light and poower” are apparently used interchangeably in Article 760 (760.51 and 760.136 for example). The term “power supply circuits” may confuse users assuming this refers to circuits connected to the fire alarm power supply. Use of the term “electric light and power” is consistent with other references in this section to the same type of circuit. The term “non-power limited” should be inserted ahead of “fire alarm circuit” in 760.51(B) for consistency with 760.51(A).

Panel Meeting Action: Reject

Panel Statement: See the panel action on Proposal 3-265.

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-269 Log #3039 NEC-P03 **Final Action: Accept in Principle**
(760.51)

Submitter: Ryan Jackson, West Valley City, UT
Recommendation: Revise text to read as follows:

760.51 Number of Conductors in Cable Trays and Raceways, and Ampacity Adjustment. ~~Derating.~~

(A) NPLFA Circuits and Class 1 Circuits. Where only non–power-limited fire alarm circuit and Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply if such conductors carry continuous load in excess of 10 percent of the ampacity of each conductor.

(B) Power-Supply Conductors and Fire Alarm Circuit Conductors. Where power-supply conductors and fire alarm circuit conductors are permitted in a raceway in accordance with 760.48, the number of conductors shall be determined in accordance with 300.17. The adjustment ~~derating~~ factors given in 310.15(B)(2)(a) shall apply as follows:

(1) Text to remain unchanged.
(2) Text to remain unchanged.
(C) Text to remain unchanged.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-267.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-270 Log #4490 NEC-P03 **Final Action: Accept in Principle**
(760.51)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Revise text to read as follows:

760.51 Number of Conductors in Cable Trays and Raceway, and ~~Derating~~ Adjustment Factors.

(A) NPLFA Circuits and Class 1 Circuits. Where only non–power-limited fire alarm circuit and Class 1 circuit conductors are in a raceway, the number of conductors shall be determined in accordance with 300.17. The ~~derating~~ adjustment factors given in 310.15(B)(2)(a) shall apply only if such conductors carry continuous loads in excess of 10 percent of the ampacity of each conductor.

(B) Power-Supply Conductors and Fire Alarm Circuit Conductors. Where power-supply conductors and fire alarm circuit conductors are permitted in a raceway in accordance with 760.48, the number of conductors shall be determined in accordance with 300.17. The ~~derating~~ adjustment factors given in 310.15(B)(2)(a) shall apply as follows:

[remainder of 760.51(B) and 760.51(C) unchanged by this Proposal]

Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".

366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.

A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).

Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-267.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-271 Log #1427 NEC-P03 **Final Action: Reject**
(760.53)

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (A)(1) change "adequately" to "securely"; in (A)(2) change "adequate protection can be afforded" to "approved protection is provided"; in (A)(3) add "liquidtight flexible metal conduit".
Substantiation: "Adequately" and "adequate" are subjective terms to be avoided per the Style Manual. Liquidtight flexible metal conduit is as suitable as liquidtight flexible nonmetallic conduit.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided that "adequately supported" is the same as "securely supported" in the recommendation and that the existing text is a safety issue. The same applies to the recommended change "adequate protection can be afforded."

There was no technical substantiation provided to add liquidtight flexible metal conduit. Various wiring methods can be used in hoistways, but still must comply with the special requirements in other parts of the NEC, such as those requirements for restricted lengths of certain raceways within the hoistway as provided in 620.21(A)(1).

Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-272 Log #4071 NEC-P03 **Final Action: Reject**
(760.53(A))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.53(A).

No change to 760.53(B).

760.53 Multiconductor NPLFA Cables.

Multiconductor non–power-limited fire alarm cables that meet the requirements of 760.176 shall be permitted to be used on fire alarm circuits operating at 150 volts or less and shall be installed in accordance with 760.53(A) and (B).

(A) NPLFA Wiring Method. Multiconductor non–power-limited fire alarm circuit cables shall be installed in accordance with 760.53(A)(1), (A)(2), ~~and~~ (A)(3) and (A)(4).

(1) Exposed or Fished in Concealed Spaces. In raceway or exposed on surface of ceiling and sidewalls or fished in concealed spaces. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall. In metal raceway or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor unless adequate protection can be afforded by building construction such as detailed in 760.53(A)(1) or unless an equivalent solid guard is provided.

(3) In Hoistways. In rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

(4) Bushing. A bushing shall be installed where cables emerge from raceway used for mechanical support or protection in accordance with 300.15(C).

Substantiation: Conduits and other raceways are often used for mechanical support or protection of cables. A bushing is needed to protect cables from damage. Article 300 does not apply unless referenced.
Panel Meeting Action: Reject
Panel Statement: 760.46 requires compliance with 300.15 for non-power-limited fire alarm circuits; therefore, adding this requirement in 760.53(A) is unnecessary.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 12 Negative: 3
Explanation of Negative:

EGESDAL, S.: The Panel's substantiation is correct and incomplete. There is an exception to 760.46 that permits installation of non-power-limited cable (760.53). The purpose of the proposal was to assure that non-power-limited cable that used short lengths of raceway or tubing would have a bushing where the cable emerges from the raceway or tubing: 760.53 does not reference 300.15.

SANDERS, M.: The panel action should have been Accept in Principle with the following modification to the proposed text to read, "(4) If a Box or Conduit Body is Not Required. If a box or conduit body is not required, as permitted in 300.15(C), a fitting, such as a bushing, shall be installed where cables emerge from raceway used for mechanical support or protection." This rewording addresses the concern of the submitter to have information specifically included in 760.53(A) providing protection of cables without relying on the inferred requirement to follow 300.15(C) via 760.46.

SEPULVEDA, M.: The Panel's substantiation is correct and incomplete. There is an exception to 760.46 that permits installation of non-power-limited cable (760.53). The purpose of the proposal was to assure that non-power-limited cable that used short lengths of raceway or tubing would have a bushing where the cable emerges from the raceway or tubing: 760.53 does not reference 300.15.

3-273 Log #4073 NEC-P03 **Final Action: Reject**
(760.53(A))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.53(A).

760.53 Multiconductor NPLFA Cables.

Multiconductor non–power-limited fire alarm cables that meet the requirements of 760.176 shall be permitted to be used on fire alarm circuits operating at 150 volts or less and shall be installed in accordance with 760.53(A) and (B).

(A) NPLFA Wiring Method. Multiconductor non–power-limited fire alarm circuit cables shall be installed in accordance with 760.53(A)(1), (A)(2), and (A)(3). <u>The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.</u>
(1) Exposed or Fished in Concealed Spaces. In raceway or exposed on surface of ceiling and sidewalls or fished in concealed spaces. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall. In metal raceway or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor unless adequate protection can be afforded by building construction such as detailed in 760.53(A)(1) or unless an equivalent solid guard is provided.

(3) In Hoistways. In rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

Substantiation: Part II of Article 760 is silent on non-power-limited cable must meet the raceway fill requirements of Chapter 9, Table 1. Non-power-limited is normally installed exposed, but may use short lengths of raceway for support or protection (e.g., to 7 feet above the floor).

Panel Meeting Action: Reject

Panel Statement: 760.46 requires compliance with both 300.17 for raceway fill and other appropriate articles in Chapter 3. Most wiring methods in Chapter 3 require compliance with Table 1, Chapter 9, therefore, non-power-limited fire alarm cables must comply with any raceway fill requirements where the raceway is used for enclosing non-power-limited fire alarm cables. Chapter 9, Table 1, Note 9 permits a multiconductor cable to be treated as a single conductor for calculation purposes.

There was no technical substantiation provided to justify exempting the raceway fill tables.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: The Panel's substantiation is correct and incomplete. There is an exception to 760.46 that permits installation of non-power-limited cable (760.53). The purpose of the proposal was to assure that non-power-limited cable that used short lengths of raceway would not have to meet the raceway fill requirements. While it makes sense to meet the raceway fill requirements, the NEC appears to be silent on the requirements for non-power-limited cable (760.53) installed in a complete raceway system.

SEPULVEDA, M.: The Panel's substantiation is correct and incomplete. There is an exception to 760.46 that permits installation of non-power-limited cable (760.53). The purpose of the proposal was to assure that non-power-limited cable that used short lengths of raceway would not have to meet the raceway fill requirements. While it makes sense to meet the raceway fill requirements, the NEC appears to be silent on the requirements for non-power-limited cable (760.53) installed in a complete raceway system.

3-274 Log #4083 NEC-P03 **Final Action: Accept in Principle**
(760.53(A))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.53(A) as follows:

760.53 Multiconductor NPLFA Cables.

Multiconductor non–power-limited fire alarm cables that meet the requirements of 760.176 shall be permitted to be used on fire alarm circuits operating at 150 volts or less and shall be installed in accordance with 760.53(A) and (B).

(A) NPLFA Wiring Method. Multiconductor non–power-limited fire alarm circuit cables shall be installed in accordance with 760.53(A)(1), (A)(2), and (A)(3).

(1) <u>In Raceway or</u> Exposed or Fished in Concealed Spaces. ~~In raceway or exposed on surface of ceiling and sidewalls or fished in concealed spaces.~~ Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall. <u>Cables shall be installed in</u> ~~In~~ metal raceway or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor unless adequate protection can be afforded by building construction such as detailed in 760.53(A)(1) or unless an equivalent solid guard is provided.

(3) In Hoistways. <u>Cables shall be installed in</u> ~~In~~ rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

Substantiation: This proposal is editorial.

Panel Meeting Action: Accept in Principle

In the proposed wording, add an "s" to Raceway in the title of (A)(1) and add "on Ceilings or Sidewalls" to the title of (A)(1) to read as follows:

"760.53 Multiconductor NPLFA Cables.

(A) NPLFA Wiring Method. Multiconductor non–power-limited fire alarm circuit cables shall be installed in accordance with 760.53(A)(1), (A)(2), and (A)(3).

(1) In Raceways, Exposed on Ceilings or Sidewalls, or Fished in Concealed Spaces. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.)."

(All other changes in the proposal accepted as submitted.)

Panel Statement: An "s" was added to make the raceway plural and the phrase "on ceilings and sidewalls" was added to ensure that the exposed cable installation only applies to exposed ceiling and sidewalls, not the floor or other areas of a building.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-275 Log #1423 NEC-P03 **Final Action: Reject**
(760.53(A)(1) and (A)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (A)(1) and (A)(2) and substitute with the following:

(A)(1) In identified raceways, Type MI cable, auxiliary gutters, or exposed and not in raceways. Splices and terminations shall be made in identified boxes, fire alarm system devices, or other identified enclosures. Exposed conductors and cables not in raceways shall be securely supported and fastened at intervals not to exceed 1.4 m (4 1/2 ft). Where likely to be exposed to physical damage or where installed less than 2.1 m (7 ft) above a floor, platform or other standing surface exposed conductors and cables not in raceways shall be protected by identified means.

Exception: Fire alarm conductors and cables shall not be required to be installed in raceways or supported at intermediate points where fished between access points in finished buildings and structures where supporting is impractical provided support and fastening is provided where conductors and cable become accessible.

(A)(2) Where exposed, identified metal raceways or rigid nonmetallic conduit where passing through a floor, platform, ceiling, wall, or other partition at a height less than 2.1 m (7 ft) above the standing surface.

Substantiation: Raceways should be identified for the use so as not to imply "not permitted" use is not amended. Type MI cable is as suitable as nonmetallic covered conductors. The "exposed" provisions should apply to conductors and cables not in raceways since raceways installed on the surface are exposed. "Adequately" and "equivalent" are subjective and terms to be avoided. Per the Style Manual, support should be defined by specific methods. "Maximum" protection is not defined. The proposed exception for the conductors and cables not in raceways to permit fished installation may not be acceptable since these spaces are generally concealed and conductors that are not exposed are required to be installed in raceways.

Panel Meeting Action: Reject

Panel Statement: 760.53 deals with multiconductor non-power-limited fire alarm cables, not individual conductors as proposed in the rewrite of the text.

Adding MI cable to the text is not applicable since non-power-limited fire alarm cable is a specific listed cable based on 760.176.

The term "exposed" does not apply to conductors since the installation is dealing with fire alarm cables.

"Adequately supported," "adequately protected," and "equivalent" all provide requirements that an AHJ can use to make a determination of compliance based on the installation. The proposed exception is not required since the existing text in (A)(1) already covers fished cables in a concealed location.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-276 Log #4064 NEC-P03 **Final Action: Reject**
(760.53(B) and 760.53(C) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: 760.53(A) does not change.

760.53(B) Revise text as shown.

760.53(C).Add new text as shown.

760.53 Multiconductor NPLFA Cables.

Multiconductor non–power-limited fire alarm cables that meet the requirements of 760.176 shall be permitted to be used on fire alarm circuits operating at 150 volts or less and shall be installed in accordance with 760.53(A) and (B).

(B) Applications of Listed NPLFA Cables. The use of non–power-limited fire alarm circuit cables shall comply with 760.53(B)(1) through (B)(4) and shall be permitted to have suffixes in accordance with 760.53(C).

(1) Ducts and Plenums. Multiconductor non–power-limited fire alarm circuit cables, Types NPLFP, NPLFR, and NPLF, shall not be installed exposed in ducts or plenums.

FPN: See 300.22(B).

(2) Other Spaces Used for Environmental Air. Cables installed in other spaces used for environmental air shall be Type NPLFP.

Exception No. 1: Types NPLFR and NPLF cables installed in compliance with 300.22(C).

Exception No. 2: Other wiring methods in accordance with 300.22(C) and conductors in compliance with 760.49(C).

~~Exception No. 3: Type NPLFP-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable~~.

(3) Riser. Cables installed in vertical runs and penetrating more than one floor or cables installed in vertical runs in a shaft shall be Type NPLFR. Floor penetrations requiring Type NPLFR shall contain only cables suitable for riser or plenum use.

Exception No. 1: Type NPLF or other cables that are specified in Chapter 3 and are in compliance with 760.49(C) and encased in metal raceway.

Exception No. 2: Type NPLF cables located in a fireproof shaft having firestops at each floor.

FPN: See 300.21 for firestop requirements for floor penetrations.

~~Exception No. 3: Type NPLF-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.~~

(4) Other Wiring Within Buildings. Cables installed in building locations other than the locations covered in 760.53(B)(1), (B)(2), and (B)(3) shall be Type NPLF.

Exception No. 1: Chapter 3 wiring methods with conductors in compliance with 760.49(C).

Exception No. 2: Type NPLFP or Type NPLFR cables shall be permitted.

~~Exception No. 3: Type NPLFR-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable~~.

(C) Non-Power-Limited Cables With Suffix Markings. Non-power-limited cables with single or multiple suffix markings shall be permitted where required to meet special applications.

(1) Non-Power-Limited Cables or Electrical Circuit Protective System. Non-power-Limited circuit integrity (CI) cables or a listed electrical circuit protective system shall be permitted for use in fire alarm systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. Non-power-limited circuit integrity cables shall be marked in accordance with 760.176(F).

(2) Non-Power-Limited Cables for Dry, Damp, or Wet Locations. Non-ower-limited cables installed in dry, damp, or wet locations shall be marked in accordance with 760.176.(I).

(3) Non-Power-Limited Cables Exposed to Direct Sunlight. Non-power-limited Cables installed exposed to direct sunlight shall be marked in accordance with 760.176(J).

(4) Non-Power-Limited Fire Hazard Cables. Non-power-limited fire hazard cables installed to provide low flame spread, very-low-smoke, and known potential heat release shall be marked in accordance with 760-176(M).

(5) Non-Power-Limited Very-Low-Smoke Producing Cables. Non-power-limited very-low-smoke producing cables installed to provide low flame spread and very-low-smoke emissions shall be marked in accordance with 760.176(L).

(6) Non-Power-Limited Cables in Corrosive Locations. Non-power-limited cables installed in corrosive locations shall be marked in accordance with 760.176(H).

Substantiation: This proposal adds text to the first paragraph of 760.53(B) to permit cables to have suffix markings.

This proposal establishes 760.53(C) for cables with suffixes for installation in locations requiring special cable characteristics.

This proposal removes the cable survivability requirement from 760.53(B)(2), (3), and (4), and establishes the requirements in 760.53(C) with text parallel to Article 725.

Panel Meeting Action: Reject

Panel Statement: The proposed text for 760.53(C)(1) through (C)(6) does not deal with applications of listed non-power-limited fire alarm cables, however is providing suffix markings for these cables; therefore, (C)(1) through (C)(6) were not accepted.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: While the intent of the proposal was to provide application requirements, the proposal should have included more specific text, as to applications. The installation requirements for non-power-limited cables are detailed in 760.53, so a proposal to these sections was unnecessary.

SEPULVEDA, M.: While the intent of the proposal was to provide application requirements, the proposal should have included more specific text, as to applications. The installation requirements for non-power-limited cables are detailed in 760.53, so a proposal to these sections was unnecessary.

3-277 Log #4077 NEC-P03 **Final Action: Reject**
(760.53(B)(1))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.53(B)(1) as follows:

(1) Ducts and Plenums.

(a) Multiconductor non–power-limited fire alarm circuit cables, Types NPLFP, NPLFR, and NPLF, shall not be installed exposed in ducts or plenums.

FPN: See 300.22(B).

(b) Type NPLFP cables shall be permitted installed exposed in ducts or plenums where used as a wiring material for power-limited circuits.

Substantiation: This proposal eliminates and inconsistence between 760.53(B)(1) and 760.130(A) Exception No. 2.

Exception No. 2 below permits power-limited circuits to be installed using non-power-limited multiconductor cable.

[NFPA 70-2008] 760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source.

Fire alarm circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with 760.130(A), (B), or a combination of (A) and (B).

(A) NPLFA Wiring Methods and Materials. Installation shall be in accordance with 760.46, and conductors shall be solid or stranded copper.

Exception No. 1: The derating factors given in 310.15(B)(2)(a) shall not apply.

Exception No. 2: Conductors and multiconductor cables described in and installed in accordance with 760.49 and 760.53 shall be permitted.

Panel Meeting Action: Reject

Panel Statement: 760.130(A), Exception No. 2 does not permit non-power-limited fire alarm cable to be installed exposed in ducts or plenums. 760.53(B)(1) very clearly states that these exposed cables shall not be installed in ducts or plenums.

Exposed cables in a fabricated duct results in numerous problems.

Duct dampers cannot operate properly to control the air movement where cables may be installed through the dampers. Deflecting hardware (vanes) can have sharp edges with resulting damage to the cable. 300.22(B) only permits metal wiring methods internal to a fabricated duct and then only long enough to connect to electrical equipment that has direct action on or sensing of the environmental air.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 12 Negative: 3

Explanation of Negative:

AYER, L.: The proposal should have been accept in principle. Proposals have been submitted and accepted by Code Panel 3 to change the term While I agree with the panel action, this proposal along with Proposal 3-280 will add the same requirements in two sections of Article 760. It would be more appropriate to add branch circuit "ducts or plenums" found in 300.22(B). The term "ducts or plenums" is being changed to "ducts specifically fabricated for environmental air". This change will help the user of the code have a clear delineation that 300.22(B) is sheet metal ducts used to transport air and 300.22(C) covers areas traditionally defined and understood by trades people as plenums. The proposed wording is as follows:

(B) Applications of Listed NPLFA Cables. The use of non–power-limited fire alarm circuit cables shall comply with 760.53(B)(1) through (B)(4).

(1) Ducts and Plenums**.** Multiconductor non–power-limited fire alarm circuit cables, Types NPLFP, NPLFR, and NPLF, shall not be installed exposed in ducts **specifically fabricated for environmental air** or plenums.

Exception to (1): As permitted in 760.154(A)

FPN: See 300.22(B).

(2) Other Spaces Used for Environmental AirÉÉ

Exception No. 1:

Exception No. 2:

Exception No. 3:

(3) Riser

Exception No. 1:

Exception No. 2:

Exception No. 3:

(4) Other Wiring Within Buildings

Exception No. 1:

760.154 Applications of Listed PLFA Cables. PLFA cables shall comply with the requirements described in either 760.154(A), (B), or (C) or where cable substitutions are made as shown in 760.154(D).

(A) Ducts. Cables shall be permitted to be installed in ducts specifically fabricated for environmental air if all of the following conditions are met:

(1) The cable shall be Type FPLP and

(2) The cable is directly associated with the air distribution system and

(3) The cable shall not exceed 1.22m (4 ft) in length.

~~(A) Plenums.~~ **(B) Other Spaces used for Environmental Air.** Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type FPLP. Types FPLP, FPLR, and FPL cables installed in compliance with 300.22 shall be permitted. Type FPLP-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity cable.

(A) Riser

(D) Other Wiring Within Buildings

EGESDAL, S.: The committee action fails to address the issue described in the submitter's substantiation. Power-limited cable is permitted in air ducts by 760.154(A). Power-limited circuits are permitted to use non-power-limited wiring methods and materials. This proposal detailed a requirement that would allow a permitted application (power-limited circuit in an air duct) to use a more robust cable (Type NPLFAP). The rejection of the proposal did not answer the proposed change to eliminate the conflict on permitted wiring methods and materials for power-limited circuits in an air duct.

SEPULVEDA, M.: The committee action fails to address the issue described in the submitter's substantiation. Power-limited cable is permitted in air ducts by 760.154(A). Power-limited circuits are permitted to use non-power-limited wiring methods and materials. This proposal detailed a requirement that would allow a permitted application (power-limited circuit in an air duct) to use a more robust cable (Type NPLFAP). The rejection of the proposal did not answer the proposed change to eliminate the conflict on permitted wiring methods and materials for power-limited circuits in an air duct.

3-278 Log #1605 NEC-P03 **Final Action: Reject**
(760.53(B)(3))

Submitter: Ray R. Keden, ERICO, Inc. / Rep. BICSI
Recommendation: Revise text to read as follows:

Cables installed in vertical runs and penetrating one or more floors ~~more than one floor~~ or cables installed in vertical runs in a shaft shall be Type NPLFR. Floor penetrations requiring Type NPLFR shall contain only cables suitable for riser or plenum use.

Exception No. 1: Type NPLF or other cables that are specified in Chapter 3 and are in compliance with 760.49(C) and encased in metal raceway.

Exception No. 2: Type NPLF cables located in a fireproof shaft having firestops at each floor.

FPN: See 300.21 for firestop requirements for floor penetrations.

Exception No. 3: Type NPLF-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.

Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel contends that the existing text does meet the panel's intention.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

KEDEN, R.: See 3-201.

3-279 Log #1431 NEC-P03 **Final Action: Reject**
(760.53(N))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete third sentence and substitute: Cables shall be securely fastened and supported by approved methods, and protected by approved methods were likely to be exposed to physical damage.

Revise last sentence: Where exposed and located within less than 2.1 m (7 ft) above a floor or other standing surface cables shall be securely fastened and supported in an approved manner at intervals of not more than 450 mm (18 in.)

Add: Where fished between access points through concealed spaces in finished buildings or structures and supporting is impractical, supporting and fastening shall be provided where the cable is accessible.

Substantiation: "Maximum" protection is subjective and not defined. "Adequately" is a term to be avoided per the Style Manual. Protection by building construction implies other means are not suitable, such as raceways. The last sentence should specify "exposed" to correlate with the heading, and include standing surfaces other than floors, such as platforms and catwalks. Provision for fishing should be included.

Panel Meeting Action: Reject

Panel Statement: The text in the existing third sentence is more clear than the recommended text.

Adding "exposed and located within less than 7 ft" to the text in place of the existing text of "where installed exposed" introduces more complexity into the application than is necessary.

Cables can be installed in building construction where the building construction provides protection for the cables. The existing text is dealing with non-power-limited fire alarm cable that is acceptable in exposed applications, and by careful placement of the cables, the building construction can protect the cables from damage.

The submitter uses the phrase "or other standing surface" without providing any information in the mandatory text on what a "standing surface" is.

The submitter has stated in the substantiation that a standing surface is a platform and a catwalk but has given no technical reason to indicate the necessity of this proposed requirement.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-280 Log #4080 NEC-P03 **Final Action: Accept in Principle in Part**
(760.121)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.121 as follows:

760.121 Power Sources for PLFA Circuits.

(A) Power Source. The power source for a power-limited fire alarm circuit shall be as specified in 760.121(A)(1), (A)(2), or (A)(3).

FPN ~~No. 1~~: Tables 12(A) and 12(B) in Chapter 9 provide the listing requirements for power-limited fire alarm circuit sources.

(1) A listed PLFA or Class 3 transformer.

(2) A listed PLFA or Class 3 power supply.

(3) Listed equipment marked to identify the PLFA power source.

FPN: Examples of listed equipment are a fire alarm control panel with integral power source; a circuit card listed for use as a PLFA source, where used as part of a listed assembly; a current-limiting impedance, listed for the purpose or part of a listed product, used in conjunction with a non–power-limited transformer or a stored energy source, for example, storage battery, to limit the output current.

(B) Branch Circuit.

(1) A~~n individual~~ dedicated branch circuit shall be required for the supply of the power source.

Exception: The dedicated branch circuit shall be permitted to connect to multiple pieces of fire alarm equipment.

(2) The~~is~~ dedicated branch circuit shall not be supplied through ground-fault circuit interrupters or arc-fault circuit interrupters.

FPN ~~No. 2~~: See 210.8(A)(5), Exception, for receptacles in dwelling-unit unfinished basements that supply power for fire alarm systems.

(3) The dedicated branch circuit(s) and connections shall be mechanically protected.

(4) The circuit disconnecting means shall have a red marking, shall be accessible only to authorized personnel, and shall be identified as "FIRE ALARM CIRCUIT."

(5) The location of the circuit disconnecting means shall be permanently identified at the fire alarm control unit.

Substantiation: This proposal provides correlation with NFPA 72-2007, National Fire Alarm Code. NFPA 72 uses the term "dedicated branch circuit" rather than the generic "individual branch circuit." It is important for continued fire alarm system operation that the fire alarm system, and only the fire alarm system, be connected to a branch circuit.

The proposed changes are from NFPA 72-2007, 4.4.1.4.2.

Panel Meeting Action: Accept in Principle in Part

Add an additional sentence after the existing first sentence in the current NEC to read as follows:

"**(B) Branch Circuit.** An individual branch circuit shall be required for the supply of the power source. The location of the branch circuit overcurrent protective device shall be permanently identified at the fire alarm control panel."

The remainder of the proposed text is Rejected.

Panel Statement: "Dedicated branch circuit" is not defined in Article 100 of the NEC, whereas "individual branch circuit" is defined as "a branch circuit that supplies only one utilization equipment." The use of individual branch circuits in 760.41 determines that this branch circuit can supply only fire alarm equipment (can consist of multiple pieces of the same equipment); therefore, the suggested changes are not consistent with the NEC style.

The branch circuit must be installed based on the wiring methods in Chapter 3, and if there is a possibility for physical damage, then an appropriate wiring method must be used; therefore, mechanically protecting the circuit is not consistent with any requirements in Chapter 3 wiring methods.

Painting circuit breakers or other types of branch circuit disconnecting means may impede operation of the breaker or disconnect, therefore, this method of identification is discouraged. Identification of the branch circuit is already a requirement in 110.22 and 408.4 for the specific purpose of the branch circuit, therefore, further identification should not be required.

A new sentence was added as a second sentence to 760.121(B) to read as follows: "The location of the branch circuit overcurrent protective device shall be permanently identified at the fire alarm control panel." This added sentence provides marking of the location of the overcurrent protective device on the fire alarm panel so a maintenance person can quickly determine where to locate the overcurrent device.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

Comment on Affirmative:

AYER, L.: See Statement on Proposal 3-259.

3-281 Log #3763 NEC-P03 **Final Action: Reject**
(760.121(B))

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.

Submitter: Jebediah J. Novak, Cedar Rapids Electrical JATC / Rep. Int'l Brotherhood of Electrical Workers

Recommendation: Delete text to read as follows:

(B) Branch Circuit. An individual branch circuit shall be required for the supply of the power source. ~~This branch circuit shall not be supplied through ground fault circuit interrupters or arc fault circuit interrupters.~~

Substantiation: This requirement should be deleted. Both AFCI and GFCI devices are intended to protect people and property from fire and shock hazards. The substantiation used in the past to justify this requirement was that de-energizing the fire alarm control panel (FACP) would result in the system ceasing to function with no indication of the loss of power,or that nuisance tripping would be an issue. This requirement seems to imply that is better to have an arcing condition persist and grow into a fire scenario, because the FACP will be able to notify the building occupants of the fire that was started by it's own branch-circuit. Similar arguments could be made in regards to a ground-fault that could result in shock or electrocution.

However, the building occupants will be aware of the loss of power if the fire alarm is installed in accordance with NFPA 72, the National Fire Alarm Code. Section 4.4.1.5.3 of NFPA 72 requires that fire alarm systems be provided with a minimum of 24 hours of standby power, with enough power available at the end of the 24 hour period for the system to go into full alarm for 5 minutes (15 minutes of maximum connected load for emergency voice communications systems). Section 4.4.7.3.1 of NFPA 72 requires that failure of either the primary or secondary power supplies to be annunciated with a trouble signal in accordance with Section 4.4.3.5, that requires the trouble condition to be annunciated within 200 seconds at a location where it is likely to be heard.

The loss of primary power is also required to be transmitted to any supervising station that is monitoring the system. Unless prohibited by the AHJ, loss of power trouble signals may have a delayed transmission to the remote stations communications equipment. This is still well within the time-frame of the 24 hours required standby capacity. Upon receipt of the power supply failure transmission, Chapter 8 of NFPA 72 gives specific instructions to the personnel in the supervising stations to ensure appropriate action is taken.

As I read through the past proposals and comments addressing this issue, it became very apparent that there is a lack of understanding when differentiating between single/multiple station smoke alarms and smoke detectors. As a panel member of NFPA 72, it is important to distinguish that single/multiple station smoke alarms do not meet the criteria of a fire alarm system as defined by Chapter 3 of NFPA 72, and therefore are still subject to the GFCI requirements of 210.8 and the AFCI requirements of 210.12. Household fire alarm systems are defined by 3.3.67.3 as having a fire alarm control unit (panel) that is interconnected to the devices that are used for initiation and notification.

Another substantiation used in past revision cycles was that often times the batteries are not provided, are missing, are dead, or smoke detectors are "rendered inoperable by, e.g., a shower cap. This quoted material was proposal 3-236, Log #1598 in the Report on Proposals from May of 2004. The CMP-accepted this proposal at that time. This substantiation implies that since the systems may not be properly installed, inspected or tested that the NEC will allow other potentially dangerous conditions to exist as well.

Again, loss of the secondary power supply is required to be annunciated with a trouble signal within 200 seconds of the condition occurring. Furthermore, Chapter 10 of NFPA 72 details specific inspection and testing procedures that are to be performed at required intervals. A visual inspection of the primary and secondary power supplies is required to be performed at the time of initial acceptance or during any reacceptance of the system. Batteries, depending on the type, are required to be visually inspected at either monthly or semiannual intervals, depending on the type. The primary and secondary power supplies are required to be tested at regular intervals as well, the Table 10.4.2.2 detailing how those tests are to be performed. For a system to be up and running, the batteries would have to be in place and operating correctly.

To summarize my position on this proposal:

1. Building occupants will be notified of a loss of power
2. GFCI's and AFCI's have been shown to increase safety for personnel and property from hazards arising from the use of electricity, as evidenced by each type of protection being applied to increasing locations in 210.8 and 210.12, respectively
3. It is the building owner's responsibility to properly maintain the fire alarm system
4. If the AFCI or GFCI is tripping the branch-circuit supplying the FACP, it is because a potentially hazardous condition exists and the situation needs to be corrected.

Panel Meeting Action: Accept

Panel Statement: The panel understands that the action taken on this proposal modifies the panel action taken on Proposal 3-280.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 9 Negative: 6

Explanation of Negative:

CONNAUGHTON, T.: A Local Fire Alarm System could be rendered useless with the tripping of a GFCI device

EGESDAL, S.: This proposal should have been rejected to correlate with the action on 3-280.

The submitter did not identify specific job problems. The submitter did not show that a GFCI would not trip when a fire alarm circuit (initiating, notification, signaling line) was grounded. The submitter did not show that an AFCI would not trip when the contacts of a fire alarm relay "arc" when being connected or disconnected to a highly inductive load.

Connecting a Local Fire Alarm System to a GFCI or an AFCI creates a potential life safety situation. A Local Fire Alarm System that receives standby power from an emergency generator will have 4 hours of battery power. If this type of fire alarm system is connected to a GFCI or an AFCI that has an inadvertent trip, here's the probably outcome: (1) The FA panel, which is probably locked in a remote electrical room, will sound a trouble signal until the battery is depleted; (2) The emergency generator will not start, as it starts when power to the build is lost; (3) The building, such as a condo, will be without a fire alarm system, and nobody may be aware.

KAHN, S.: This proposal should have been rejected to correlate with the panel's action on 3-280.

OWEN, S.: The submitter's strikethrough of the present 2008 NEC second sentence has the effect of deleting the present requirement to prohibit arc-fault circuit interrupters or ground-fault circuit interrupters on power-limited fire alarm circuits without technical substantiation or documentation. This proposal should be rejected.

SEPULVEDA, M.: This proposal should have been rejected to correlate with the action on 3-280.

The submitter did not identify specific job problems. The submitter did not show that a GFCI would not trip when a fire alarm circuit (initiating, notification, signaling line) was grounded. The submitter did not show that an AFCI would not trip when the contacts of a fire alarm relay "arc" when being connected or disconnected to a highly inductive load.

Connecting a Local Fire Alarm System to a GFCI or an AFCI creates a potential life safety situation. A Local Fire Alarm System that receives standby power from an emergency generator will have 4 hours of battery power. If this type of fire alarm system is connected to a GFCI or an AFCI that has an inadvertent trip, here's the probably outcome: (1) The FA panel, which is probably locked in a remote electrical room, will sound a trouble signal until the battery is depleted; (2) The emergency generator will not start, as it starts when power to the build is lost; (3) The building, such as a condo, will be without a fire alarm system, and nobody may be aware.

SLEIGHTS, J.: The required annunciation of a trouble signal from the fire alarm in response to the loss of primary power is often effective in calling attention to the condition. However, in practice it sometimes is not. The signal may be ignored or there may not be anyone on-premises during the duration the secondary power supply (typically battery) is capable of operating the signal. Since it is the intent of CMP-3 to coordinate with the National Fire Alarm Code and require the fire alarm equipment to be supplied by an 'individual branch circuit' it is not likely that the nonfunctionality of some other equipment or lighting will in any way call attention to the loss of primary power to the specific circuit for the fire alarm system. In some situations the signal is transmitted off-premises, but not in all cases. Thus the detection of the loss of power falls to inspection or in the worse case scene investigation after a loss has occurred. Inspection is by nature periodic with some duration of time expected where the system is left to itself. The 2007 edition of NFPA 72 National Fire Alarm Code, Table 10.3.1 Visual Inspection Frequencies indicates that a 'Weekly' visual inspection is required of 'Fire Alarm Control Unit Trouble Signals'. If inspections were actually performed at that interval it could still leave a 5-6 day window of questionable performance for a system with a 24 hour secondary power supply.

Notwithstanding what may be added or removed in this Code cycle, Article 210 in the 2008 edition permits GFCI protection be omitted only for a dedicated receptacle in an unfinished basement supplying a permanent fire alarm system (210.8(A)(5) Exception) with an FPN referencing the Article 760 sections we are currently pondering. 210.12 currently requires AFCI protection for some branch circuits only in the dwelling unit areas listed in 210.12(B). It does however permit AFCI protection to be omitted from the branch circuit supplying a fire alarm system in 210.12(B) Exception 2 where the branch circuit is installed with the specific wiring methods listed. A FPN is also included referencing the Article 760 sections we are currently pondering.

What is not discussed until Article 760 is the permission to use a GFCI or AFCI on any circuit supplying a fire alarm system in other than a dwelling unit. Without the prohibition in Article 760 it will be permitted and likely required if the circuit location falls under one requiring such protection in Article 210 (absent the specific wiring methods in the Exception) or is specified above minimum Code requirements by a designer. Also, it needs to be kept in mind that the branch circuit ultimately used MAY predate the fire alarm installation and as such may have older GFCI or AFCI equipment installed. Simple circuit breaker 'locks' will not protect against tripping via the test button on most circuit breakers.

The argument that NFPA 72 does not specifically prohibit a fire alarm system from being supplied by a branch circuit protected by a GFCI or AFCI and is therefore permits it is hollow. That document was able to look to the NEC and read the requirements in Article 760 that specifically prohibits the devices.

Finally, if the fire alarm system is located within a dwelling unit the scope of coverage is usually limited to the unit. On a larger scale, the 'fire alarm system' may be installed in a common space to provide service to sections or floors of a building, an entire building, complex or larger entity. These installations are not likely covered by the Article 210 sections.

The submitter of the proposals did not provide any technical substantiation that the current arrangement presents any increased hazard in locations where the Code currently requires GFCI or AFCI protection. It also does not examine in detail the increased risk of power loss to fire alarm systems that may arise from inadvertent tripping of these devices, nor the compatibility of the vast array of fire alarm equipment that may be required to function on a circuit so protected.

Based on my experience and evaluation of this issue I vote to REJECT proposals ROP 3-260 and 3-281 that remove the prohibition of GFCI and AFCI protection on fire alarm system branch circuits.

Comment on Affirmative:

AYER, L.: See Statement on Proposal 3-260.

KEDEN, R.: See 3-260.

3-282 Log #3878 NEC-P03 **Final Action: Reject**
(760.124(A))

Submitter: Joe Diehl, E Light Electric Services

Recommendation: Add new text as follows:

<u>PFLA conductor's insulation shall be color coded to clearly designate its system. All signaling loop conductors (SLC) shall be solid red in color. Notification loop conductors shall be Red with a white stripe for A riser and Red with a black stripe for B riser. All power supply cables shall be Red with a different colored stripe.</u>

Substantiation: Identifying the conductors will allow maintenance personnel to more readily recognize systems and allow for repair and troubleshooting without disabling the system.

Panel Meeting Action: Reject

Panel Statement: The proposed text uses terms that are not adequately defined in Article 760 or in the NEC. This color coding of conductors is more appropriately addressed by the NFPA 72 Committee. Color coding these circuits is already permissible by the NEC and NFPA 72.

The submitter did not provide technical substantiation that there were safety issues involved, just that the color of conductors would permit easier identification.

The systems can be troubleshot and repaired in an energized condition without disabling the system.

The intent of 760.124 is to require marking of the circuits to indicate that the circuits are power limited so the installer can determine that the conductors and cables must comply with Parts I and III of Article 760 and should not be mixed with non-power-limited or power cables or conductors.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-283 Log #3089 NEC-P03 **Final Action: Reject**
(760.127)

Submitter: Mike Holt, Leesburg, FL

Recommendation: Revise text as follows:

760.127 Wiring Methods on Supply Side of the PLFA Power Source. Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Part II and Chapters 1 through 4. Transformers or other devices supplied from power-supply conductors shall be protected by an overcurrent device rated not over 20 amperes.<u> Where power-limited fire alarm systems contain outlets in areas requiring AFCI protection, the circuit(s) shall be installed in RMC, IMC, EMT, or steel armored cable, Type AC, meeting the requirements of 250.118, with metal outlet and junction boxes.</u>

Exception: The input leads of a transformer or other power source supplying power-limited fire alarm circuits shall be permitted to be smaller than 14 AWG, but not smaller than 18 AWG, if they are not over 300 mm (12 in.) long and if they have insulation that complies with 760.49(B).

Substantiation: This proposal is intended to clarify that compliance with 210.12(B) Ex. No 2 is not optional. The code user that installs fire alarm systems is often not aware of Article 210 requirements, such as Ex No 2 to 210.12(B).

Panel Meeting Action: Reject

Panel Statement: This text is already provided in 210.12, and, since Chapters 1 through 4 apply, unless supplemented or modified by Article 760, the proposed text is unnecessary.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-284 Log #2972 NEC-P03 **Final Action: Accept in Principle**
(760.130(A) Exception No. 1)

Submitter: Ryan Jackson, West Valley City, UT

Recommendation: Revise text to read as follows:

(A) NPLFA Wiring Methods and Materials. Installation shall be in accordance with 760.46, and conductors shall be solid or stranded copper.

Exception No. 1: The <u>adjustment</u> ~~derating~~ factors given in 310.15(B)(2)(a) shall not apply.

Substantiation: The term "adjustment factor" is the term used in 310.15(B)(2)(a).

Panel Meeting Action: Accept in Principle

Revise Exception No. 1 of the proposed text to read as follows:

"*Exception No. 1: The ampacity adjustment factors given in 310.15(B)(2)(a) shall not apply."*

Panel Statement: The word "ampacity" was added to make the wording technically correct and to provide consistency with other sections in the NEC that use this phrase.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-285 Log #4491 NEC-P03 **Final Action: Accept in Principle**
(760.130(A) Exception No. 1)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Revise text to read as follows:

760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source.

Fire alarm circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with 760.130(A), (B), or a combination of (A) and (B).

(A) NPLFA Wiring Methods and Materials. Installation shall be in accordance with 760.46, and conductors shall be solid or stranded copper.

Exception No. 1: The ~~derating~~ <u>adjustment</u> factors given in 310.15(B)(2)(a) shall not apply.

[remainder of 760.130 unchanged by this Proposal]

Substantiation: Correlation issue. Also to improve *Code* readability. Table 310.15(B)(2)(a) referenced from here uses the specific term "adjustment factors", not the unspecific generalization "derating factors".

366.23(A) and 376.22(B) for the 2008 *NEC*® had been revised [Proposal 8-127/Log #2243 and Proposal 8-157/Log #2754, respectively] from the inconsistent term "correction factors" and imprecise term "derating factors", respectively, to "adjustment factors", the term specifically used in Table 310.15(B)(2)(a). Per the Substantiation of Proposal 8-157, Accepted In Principle by Code Panel 8, trade persons were being confused by the designation inconsistency with other ampacity-modifying factors used elsewhere in the *Code*.

A companion Proposal for 310.15(B)(2)(a) revises its Exceptions to use terminology consistent with its title and Table 310.15(B)(2)(a).

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel action and statement on Proposal 3-284.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-286 Log #4072 NEC-P03 **Final Action: Reject**
(760.130(B))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 760.130(B).

(B) PLFA Wiring Methods and Materials. Power-limited fire alarm conductors and cables described in 760.179 shall be installed as detailed in 760.130(B)(1), (B)(2), ~~or~~ (B)(3)<u>, or (B)(4)</u> of this section and 300.7. Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15.

(1) Exposed or Fished in Concealed Spaces. In raceway or exposed on the surface of ceiling and sidewalls or fished in concealed spaces. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall. In metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction such as detailed in 760.130(B)(1) or unless an equivalent solid guard is provided.

(3) In Hoistways. In rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

Bushing. A bushing shall be installed where cables emerge from a conduit or other raceway used for mechanical support or protection.

<u>(4) Bushing. A bushing shall be installed where cables emerge from raceway used for mechanical support or protection in accordance with 300.15(C).</u>

Substantiation: Conduits and other raceways are often used for mechanical support or protection of cables. A bushing is needed to protect cables from damage. Article 300 does not apply unless referenced.

Panel Meeting Action: Reject

Panel Statement: Since 300.15(C) applies to wiring methods, adding this as a new (4) is unnecessary.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: The reason for the proposal is that the text in 760.130(B) seems to address devices: "Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15." The purpose of the proposal is to provide protection of cable as it emerges from a section of raceway of tubing used for mechanical support…hence a reference to 300.15(C). For example, a power-limited circuit could be installed in a complete raceway system, and then emerge from a short section of raceway (no box). This is where cables can be damaged, due to sharp edges from a field cut section of raceway.

SEPULVEDA, M.: The reason for the proposal is that the text in 760.130(B) seems to address devices: "Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15." The purpose of the proposal is to provide protection of cable as it emerges from a section of raceway of tubing used for mechanical support…hence a reference to 300.15(C). For example, a power-limited circuit could be installed in a complete raceway system, and then emerge from a short section of raceway (no box). This is where cables can be damaged, due to sharp edges from a field cut section of raceway.

3-287 Log #4074 NEC-P03 **Final Action: Reject**
(760.130(B))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new text to 760.130(B).

(B) PLFA Wiring Methods and Materials. Power-limited fire alarm conductors and cables described in 760.179 shall be installed as detailed in 760.130(B)(1), (B)(2), or (B)(3) of this section, and 300.7. Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15. The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.

(1) Exposed or Fished in Concealed Spaces. In raceway or exposed on the surface of ceiling and sidewalls or fished in concealed spaces. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall. In metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction such as detailed in 760.130(B)(1) or unless an equivalent solid guard is provided.

(3) In Hoistways. In rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

Substantiation: Part III of Article 760 is silent on whether power-limited conductors and cables have to meet the conduit fill requirements of Chapter 3 and Chapter 9. Communications cables are not required to meet the raceway fill requirements [800.110, The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.]. Communications cables are permitted to substitute for fire alarm power-limited cables, so this proposal provides parallel requirements to 800.110.

Panel Meeting Action: Reject

Panel Statement: 760.46 requires compliance with both 300.17 for raceway fill and other appropriate articles in Chapter 3. Most wiring methods in Chapter 3 require compliance with Table 1, Chapter 9, therefore, power-limited fire alarm cables must comply with any raceway fill requirements where the raceway is used for enclosing power-limited fire alarm cables. Chapter 9; Table 1, Note 9 permits a multiconductor cable to be treated as a single conductor for calculation purposes.

There was no technical substantiation provided to justify exempting the raceway fill tables.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: The Panel's substantiation, while correct, is incomplete. There is an exception to 760.46 that permits installation of non-power-limited cable (760.53), which exempts the 760.46 requirement. Power-limited circuits may be installed using non-power-limited cable or power-limited cable. Short lengths of raceway used for mechanical support should not have to meet the fill requirement.

SEPULVEDA, M.: The Panel's substantiation, while correct, is incomplete. There is an exception to 760.46 that permits installation of non-power-limited cable (760.53), which exempts the 760.46 requirement. Power-limited circuits may be installed using non-power-limited cable or power-limited cable. Short lengths of raceway used for mechanical support should not have to meet the fill requirement.

3-288 Log #4084 NEC-P03 **Final Action: Accept in Principle**
(760.130(B))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.130(B) as follows:

(B) PLFA Wiring Methods and Materials. Power-limited fire alarm conductors and cables described in 760.179 shall be installed as detailed in 760.130(B)(1), (B)(2), or (B)(3) of this section and 300.7. Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15.

(1) In Raceway or Exposed or Fished in Concealed Spaces. ~~In raceway or exposed on the surface of ceiling and sidewalls or fished in concealed spaces.~~ Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

(2) Passing Through a Floor or Wall. Cables shall be installed in ~~In~~ metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction such as detailed in 760.130(B)(1) or unless an equivalent solid guard is provided.

(3) In Hoistways. Cables shall be installed in ~~In~~ rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

Substantiation: This proposal is editorial.

Panel Meeting Action: Accept in Principle

Revise the wording in proposed (1) to read as follows:

"(1) In Raceways, Exposed on Ceilings or Sidewalls, or Fished in Concealed Spaces. Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, and ledges. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).

The panel "accepts" the remainder of the proposed text.

Panel Statement: An "s" was added to make the raceway plural, and the phrase "on ceilings and sidewalls" was added to ensure that the exposed cable installation only applies to exposed "ceilings and sidewalls", not floor or other areas of a building.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-289 Log #1424 NEC-P03 **Final Action: Reject**
(760.130(B)(1) and (B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text of (B)(1) and (B)(2) and substitute:

(B)(1) In identified raceways, Type MI cable, auxiliary gutters, or exposed and not in raceways. Splices and terminations shall be made in identified fittings, boxes, fire alarm system devices, or other identified enclosures. Exposed conductors and cables not in raceways shall be securely supported and fastened by identified means at intervals not to exceed 1.4 m (4 1/2 ft). Where likely to be subject to physical damage or where installed less than 2.1 m (7 ft) above a floor, platform or other standing surface exposed conductors and cables shall not in raceways shall be protected by identified means.

Exception: Fire alarm conductors and cables shall not be required to be installed in raceways or supported at intermediate points where fished between access points in finished buildings or structures and supporting is impractical provided support and fastening is provided where conductors and cables become accessible.

(B)(2) Where exposed, identified metal raceways or rigid nonmetallic conduit where passing through a floor, platform, ceiling, wall, or other partition at a height less than 2.1 m (7 ft) above the standing surface.

Substantiation: Raceways should be identified for the use so as not to imply "not permitted use" is not amended. Type MI cable is as sutiable as nonmetallic covered conductors. The "exposed" provisions should apply to conductors and cables not in raceways since raceways installed on the surface are exposed. "Adequately" and "equivalent" are subjective and terms to be avoided per the Style Manual. Support should be defined by specific methods. "Maximum" protection is not defined.

Panel Meeting Action: Reject

Panel Statement: Adding MI cable to the text in (B) is not necessary since MI cable is a wiring method in Chapter 3 and, based on 760.130(A), is already permitted.

"Exposed" does not apply to individual conductors, only to cables; therefore, the proposed change is inappropriate for the application of individual conductors and cables are already covered.

"Adequately supported," "adequately protected," and "equivalent" are all providing requirements that an AHJ can use to make a determination of compliance based on the installation.

The proposed exception is not required since the existing text in (B)(1) already covers fished cables in a concealed location and fishing individual conductors would not be acceptable.

There was no technical substantiation provided for the suggested changes in (B)(2), and standing surface is not explained in the mandatory text or in the substantiation.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-290 Log #3125 NEC-P03 **Final Action: Reject**

(760.133)

Submitter: Sanford E. Egesdal, Egesdal Associates PLC

Recommendation: Revise 760.133

760.133 Installation of Cables and Conductors, and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, **and Raceways for Class 2 and Class 3 Circuits.**

Conductors, and equipment, and raceways for non-power limited circuits shall be installed in accordance with 725,133(A) through (C) and 760.136 through 760.143.

(A) Listing. Non-power limited cables and conductors shall be listed.

(B) Air Ducts and Plenums. The following cables shall be permitted in air ducts and plenums as described in 300.22(B).

(1) Type FPLP or FPLP-CI

(2) Types FPLP, FPLR, and FPL installed in raceways in compliance with 300.22(B)

(C) Other Spaces Used For Environmental Air. The following cables shall be permitted in other spaces used for environmental air as described in 300.22(C).

(1) Type FPLP or FPLP-CI

(2) Types FPLP, FPLR, and FPL installed in raceways that are installed in compliance with 300.22(C)

(D) Risers-Wires and Cables in Vertical Runs. The following cables shall be permitted in vertical runs penetrating more than one floor and in vertical runs in a shaft:

(1) Types FPLR or FPLR-CI

(2) Plenum and riser signaling raceways

(3) Types FPLP, FPLR, and FPL installed in plenum or riser signaling raceway

(E) Risers-Cables in Metal Raceways, Fireproof Shafts, and One- and Two-Family Dwellings. The following cables and raceways shall be permitted in metal raceway, in a fireproof shaft with firestops at each floor, and in one- and two-family dwellings:

(1) Types FPLR or FPLR-CI

(2) Non-power limited cables installed in metal raceways or located in a fireproof shaft

(3) Type FPL installed in one- and two-family dwellings

(F) Other Wiring Within Buildings. The following cables installed in building locations, other than those covered in 760.133(B) through (E), shall be permitted to be any of (F)(1) through (H)(4).

(1) Types FPL or FLP-CI

(2) Non-power limited cables installed in a raceway

(3) Cables specified in Chapter 3 and meeting the requirements of 760.179(A) and (B) shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).

(4) Portable fire alarm system provided to protect a stage or set when not in use shall be permitted to use wiring methods in accordance with 530.12.

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 725, 760, 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 760.133.

A companion proposal for section 760.154 greatly simplifies the statement of the applications of communications cables and raceways by using a table.

This proposal and its companion proposal for section 760.154 need to be considered together as a package.

Panel Meeting Action: Reject

Panel Statement: There was no technical substantiation provided for this rewrite of 760.133 and the companion proposal for 760.154.

As it is presently written, 760.133 provides a requirement that power-limited fire alarm circuits must be installed in accordance with 760.136 through 760.143. These referenced sections are definitely installation requirements. For example, 760.136 provides installation requirements for separation of power-limited fire alarm circuits from power, light, and similar higher voltage circuits.

In 760.133(A) of the proposed text, the submitter is requiring listing of power-limited fire alarm cables, conductors, and raceways. This is a 760.179 issue since existing Part IV deals with listing issues.

Existing Section 300.22(B) restricts installation of wiring methods to metal raceways and then for connection to equipment necessary for direct action on or sensing of the contained air within the fabricated duct.

There was no technical substantiation provided for proposed 760.133(E) for Risers-Cables in Metal Raceways, Fire-Proof Shafts, and One- and Two-Family Dwellings. There was no rationale provided on why these three installations were in the same subsection together since one- and two-family dwellings seldom deal with risers and fireproof shafts.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

CONNAUGHTON, T.: Remove installation rules from the applications section 725.154 and relocate them in the installation section 725.133. Simplify cable applications by using a table.

Comment on Affirmative:

EGESDAL, S.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

KAHN, S.: This is one of a series of proposals that would separate installation rules and cable applications. I participated in the Task Group that worked on the simplification of the installation rules, cable applications and correlation with NFPA 90A (as directed by the Standards Council). CMP-16 improved on the series of proposals in their meeting the week following the CMP-3 meeting. This proposal, along with 3-298, was intended to remove installation rules from the applications section 760.154 and relocate them in the installation section 760.133 and to simplify cable applications by using a table. The Proposal should be reconsidered.

SEPULVEDA, M.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

3-291 Log #1430 NEC-P03 **Final Action: Reject**

(760.136)

Submitter: Dan Leaf, Seneca, SC

Recommendation: In (A) delete “similar” and substitute “other”. In (B) insert “fixed identified” ahead of “barrier”.

Substantiation: Present wording implies that a cable is a fitting. A barrier should be suitable for the use; unless fixed a 1/4 in. separation is not likely to be maintained.

Panel Meeting Action: Reject

Panel Statement: The use of “fitting” in the existing text does not imply that a cable is a fitting as stated in the substantiation.

300.15(F) and 760.136(A) use the term “fitting” that can be used rather than a box or similar enclosure. Fittings and connectors can be used with the specific wiring methods for which they are designed and listed.

For example, where a rigid metal conduit is stubbed out of the ground, a threaded coupling can be installed on the end of the rigid metal conduit with a liquidtight flexible connector screwed into the rigid coupling.

There are also transition fittings that are specifically listed for transitioning from one wiring method to another.

There was no technical substantiation provided to require fixed identified barriers or a definition of “fixed identified barriers.”

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-292 Log #4524 NEC-P03 **Final Action: Reject**

(760.136(B))

Submitter: Justin B. Biller, Roanoke County Office of Building Safety / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

760.136(B) Separated by Barriers. Power-limited fire alarm circuit cables shall be permitted to be installed together with Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are separated by an approved barrier.

Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee’s endorsement.

As written, anything can be used as a barrier. There may be cases where barriers are considered inappropriate by the AHJ. This will give the AHJ the authority to approve barriers. Consideration should be given to clarifying what type of barrier could or could not be used.

Panel Meeting Action: Reject

Panel Statement: 110.2 already requires the installation to be approved; therefore, adding “approved” to “barrier” is unnecessary.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-293 Log #1428 NEC-P03 **Final Action: Reject**
(760.136(F))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise first sentence: In hoistways power-limited fire alarm circuit conductors shall be installed in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible nonmetallic conduit, liquidtight flexible metal conduit, flexible metal conduit, electrical metallic tubing or wireways. *All wiring methods shall be identified for the use.*
Substantiation: The additional proposed methods are as substantial as liquidtight flexible nonmetallic conduit if identified for the use.
Panel Meeting Action: Reject
Panel Statement: There was no technical substantiation provided to add the wiring methods into hoistways. Most wiring methods covered in Chapter 3 are listed wiring methods.
110.3(A), as well as the individual articles within Chapter 3, already require wiring methods to be suitable for the installation.
"For the use" is a phrase that the NEC Technical Correlating Committee has targeted as vague. The specific use must be provided rather than "listed for the use" or "identified for the use."
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-294 Log #4690 NEC-P03 **Final Action: Reject**
(760.136(G)(3) (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add a third condition as follows:
(3) All of the electric light, power, Class 1, non-power limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated within a listed cable assembly from all of the power-limited fire alarm circuit conductors through the use of sheathing that provides for system separation that does not rely on conductor or cable insulation alone.
Substantiation: There is not and has never been any express permission to include power-limited fire alarm conductors within a common cable assembly with power conductors. Para (2) here comes the closest, because it recognizes a "continuous and firmly fixed nonconductor." This is crucial to the production of hybrid cables, where additional separation beyond the conductor insulation is applied to the power-limited conductors in accordance with the spirit of these principles. For example, 334.116(C) expressly recognizes this type of construction for Type NMS cable, and UL has been listing such constructions for many years. This topic must be addressed in the limited-power wiring articles, and this proposal is designed to raise the issue.
Panel Meeting Action: Reject
Panel Statement: The purpose of 760.136(G)(2) is to permit flexible tubing inside of a wiring harness where the Class 2 or Class 3 conductors are enclosed by the flexible tubing and separated from the power conductors by more than just the insulation on the conductors.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-295 Log #2917 NEC-P03 **Final Action: Reject**
(760.142)

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise text to read as follows:
760.142 Conductor Size. Conductors of 26 AWG shall be permitted only where spliced with a connector listed as suitable for 26 AWG to 24 AWG or larger conductors that are terminated on equipment or where the 26 AWG conductors are terminated on equipment listed as suitable for 26 AWG conductors. Single conductors shall not be smaller than 18 AWG. For circuit integrity (CI) cable and electrical circuit protective systems minimum conductor size shall be 16 AWG.
Substantiation: The strength of copper decreases under a fire. UL 2196 has added a strength test to determine the maximum distance between supports in a vertical run. Only 2 manufacturers have achieved a listing for vertical use on an 18 AWG, one is 16 feet and the other is 27 feet. This distance is not practical for most vertical installations. The vertical limit for 16 AWG is 53 feet for one manufacturer and 100 feet for the other. The other manufacturers' 18 AWG cannot be used in a vertical run. The majority of the fire rated cable is used vertically and is 18 AWG. Since the limits are not practical, the concern is that it will be used beyond its limits.
Panel Meeting Action: Reject
Panel Statement: 300.19 and the accompanying Table 300.19 permit 18 AWG copper conductors installed in vertical raceways to be supported at 100 feet or greater.
There was no technical substantiation provided in the proposal for the exclusion of 18 AWG conductors and to require all circuit integrity cable and electrical circuit protective systems to be 16 AWG conductor size.
Many installations using 18 AWG conductors may never be installed in a vertical distance in excess of 10 or 15 ft in a raceway.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-296 Log #1462 NEC-P03 **Final Action: Reject**
(760.143)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Power-limited fire alarm circuit conductors shall not be ~~strapped, taped, or~~ attached by any means to the exterior of any ~~conduit or other~~ raceway, cable, or conductor as a means of support, except a raceway mast shall be permitted to support aerial spans.
Substantiation: Edit. "Strapped or taped" is superfluous, as is "conduit". Cables and open individual conductors should be included. The provision should permit support and attachment to a raceway mast.
Panel Meeting Action: Reject
Panel Statement: Deleting the phrase "conduit or other" provides the restriction to not attach power-limited fire alarm cables to any raceway.
There was no technical substantiation to delete strapped or taped to a raceway.
There was no technical substantiation to also include cables and conductors to the prohibition.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-297 Log #2918 NEC-P03 **Final Action: Accept in Principle**
(760.143)

Submitter: Thomas Guida, TJG Services, Inc.
Recommendation: Revise text to read as follows:
760.143 Support of Conductors. Power-limited fire alarm circuit conductors shall not be strapped, taped, or attached by any means to the exterior of any conduit or other raceway as a means of support. For circuit integrity (CI) cable and electrical circuit protective systems the vertical support requirements in 300.19(B) shall apply.
Substantiation: The strength of copper decreases with heat. Cables may break if not properly supported in a fire situation.
Panel Meeting Action: Accept in Principle
Panel Statement: See the panel action and statement on Proposal 3-242.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type FPLR-CI NPLFR-CI). Section 300.19(B) Circuit integrity (CI) cable is not an electrical circuit protective system, such as CIC in raceway or Type MI. While both are tested using UL 2196, the tests are not identical. The difference is recognized in Section 760.154(G), where the title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."
Further information, as to the differences, is described in The National Fire Alarm Code: NFPA 72-2007, 6.9.10.4.2 differentiates between a "(1) A 2-hour fire rated circuit integrity (CI) cable" and a "(2) A 2-hour fire rated cable system (electrical circuit protective system)."
SEPULVEDA, M.: Section 300.19(B) does not apply to circuit integrity cable (e.g., Type FPLR-CI NPLFR-CI). Section 300.19(B) Circuit integrity (CI) cable is not an electrical circuit protective system, such as CIC in raceway or Type MI. While both are tested using UL 2196, the tests are not identical. The difference is recognized in Section 760.154(G), where the title is "Circuit Integrity (CI) Cable or Electrical Circuit Protective System."
Further information, as to the differences, is described in The National Fire Alarm Code: NFPA 72-2007, 6.9.10.4.2 differentiates between a "(1) A 2-hour fire rated circuit integrity (CI) cable" and a "(2) A 2-hour fire rated cable system (electrical circuit protective system)."

3-298 Log #3126 NEC-P03 **Final Action: Reject**
(760.154)

Submitter: Sanford E. Egesdal, Egesdal Associates PLC
Recommendation: Revise 760.154
Add new Table 760.154(A)
Delete 760.154(A) through (C).
Renumber Table 760.154(D) to 760.154(B)
Renumber Figure 760.154(D) to 760.154(B)
~~760.154 Applications of Listed PLFA Cables.~~
~~PLFA cables shall comply with the requirements described in either 760.154(A), (B), or (C) or where cable substitutions are made as shown in 760.154(D).~~
~~(A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type FPLP. Types FPLP, FPLR, and FPL cables installed in compliance with 300.22 shall be permitted. Type FPLP-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.~~
~~(B) Riser. Cables installed in risers shall be as described in either (1), (2), or (3):~~

~~(1) Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type FPLR. Floor penetrations requiring Type FPLR shall contain only cables suitable for riser or plenum use. Type FPLR-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.~~
~~(2) Other cables shall be installed in metal raceways or located in a fireproof shaft having firestops at each floor.~~
~~(3) Type FPL cable shall be permitted in one- and two-family dwellings.~~
~~FPN: See 300.21 for firestop requirements for floor penetrations.~~
~~(C) Other Wiring Within Buildings. Cables installed in building locations other than those covered in 760.154(A) or (B) shall be as described in either (C)(1), (C)(2), (C)(3), or (C)(4). Type FPL-CI cable shall be permitted to be installed as described in either (C)(1), (C)(2), (C)(3), or (C)(4) to provide a 2-hour circuit integrity rated cable.~~
~~(1) General. Type FPL shall be permitted.~~
~~(2) In Raceways. Cables shall be permitted to be installed in raceways.~~
~~(3) Nonconcealed Spaces. Cables specified in Chapter 3 and meeting the requirements of 760.179(A) and (B) shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).~~
~~(4) Portable Fire Alarm System. A portable fire alarm system provided to protect a stage or set when not in use shall be permitted to use wiring methods in accordance with 530.12.~~

760.154 Applications of Listed PLFA Cables.

~~**PLFA cables shall comply with the requirements described in either 760.154(A), (B), or (C) or where cable substitutions are made as shown in 760.154(D)**~~**)**

Permitted and non-permitted applications of PLFA cables shall be as indicated in Table 760.154(A). The substitutions for cables listed in Table 760.154(B) and illustrated in Figure 725shall be permitted.

(B~~D~~) Fire Alarm Cable Substitutions. The substitutions for fire alarm cables listed in Table 760.154(B~~D~~) and illustrated in Figure 760.154(B~~D~~) shall be permitted. Where substitute cables are installed, the wiring requirements of Article 760, Parts I and III, shall apply.

FPN: For information on communications cables (CMP, CMR, CMG, CM), see 800.179.

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 725, 760, 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal for section 760.154 greatly simplifies the statement of the applications of fiber cables and raceways by using a table where the permitted applications are indicated by a "Y" and the applications that are not permitted are indicted by an "x". A companion proposal moves the installation rules to section 760.113 Installation of cables and signaling raceways.

This proposal makes no changes to the existing permitted and not permitted applications of cables and raceways.

This proposal and its companion proposal for section 760.113 need to be considered together as a package.

Table 760.154(A), Applications of Listed Non-Power Limited Fire Alarm Cables

Cable or Raceway Type	Applications												
	In air ducts and plenums as described in 300.22(B)	In other spaces used for environmental air as described in 300.22(C)	In risers	In building locations other than air ducts, plenums, other spaces used for environmental air and, risers	In one- and two-family dwellings	In multifamily dwellings	In nonconcealed spaces	In cable trays	In any Chapter 3 raceway				
FPLP and FPLP-CI	Y	Y	Y	Y	Y	Y	Y	N	Y				
FPLR and FPLR-CI	N	N	Y	Y	Y	Y	Y	N	Y				
FPL and FPL-CI	N	N	Y	Y	Y	Y	Y	N	Y				
	N	N	Y	Y	Y	Y	Y	N	Y				

Note. Applications indicated by "Y" shall be permitted. Applications indicated by an "N" shall not be permitted. Applications with a "–" are not addressed.

This proposal provides parallel requirements to a group of Proposals prepared by the CMP 16 Special Editorial Task Group for articles 770, 800, 820, and 830 for the 2011 NEC. The goals of the Panel 16 task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Panel 16 Task Group members were Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson, Stan Kahn, Stan Kaufman, and Harry Odhe.

Panel Meeting Action: Reject

Panel Statement: 760.133 is an installation section dealing with power-limited fire alarm circuits, whereas 760.154 is an application section.

By following the requirements in 725.154, the proper fire alarm cabling can be applied within the various areas of a building.

For example, where "an other space for environmental air (plenum)" is installed, 760.154 provides wiring method applications, such as plenum cables, and requires compliance with 300.22 for the wiring methods that are permitted to be applied within the other space.

The proposed table does not provide the same critical application information already located within 760.154.

There was no technical substantiation provided in the proposal to justify the changes found in the proposed Table 760.154(A), such as unlimited lengths and use of plenum cable in a fabricated duct in 300.22(B).

Permitting FPL cable for a riser is an incorrect application.

The table loses much of the application information provided in the existing written text.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

CONNAUGHTON, T.: Remove installation rules from the applications section 725.154 and relocate them in the installation section 725.133. Simplify cable applications by using a table.

Comment on Affirmative:

EGESDAL, S.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

KAHN, S.: This is one of a series of proposals that would separate installation rules and cable applications. I participated in the Task Group that worked on the simplification of the installation rules, cable applications and correlation with NFPA 90A (as directed by the Standards Council). CMP-16 improved on the series of proposals in their meeting the week following the CMP-3 meeting. This proposal, along with 3-290, was intended to remove installation rules form the applicaitons section 760.154 and relocate them in the installation section 760.133 and to simplify cable applications by using a table. The Proposal should be reconsidered.

SEPULVEDA, M.: This vote is a head-ups for the NEC TCC. Panel 16 accepted in principal the text and tables in proposals to Article 770, 800, and 820 that are very similar to the text and tables in Proposals 3-192, 3-198, 3-290, and 3-298.

3-299 Log #127 NEC-P03 **Final Action: Accept in Principle**
(760.154(A))

Submitter: Gerald Lee Dorna, Belden

Recommendation: Add the following text at the end of 760.154(A):

<u>Metallic cable trays and metallic cable tray systems shall be permitted to be installed in other spaces used for environmental air. Type FPLP cables shall be permitted to be installed in these cable trays and cable tray systems. Types FPLR and FPL cables shall not be permitted to be installed in these cable trays and cable tray systems.</u>

Substantiation: Article 392, Cable Trays, has requirements for cable trays in air handling spaces in section 392.4.

392.4 Uses Not Permitted.

Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

Section 300.22 has provisions for cable trays in 300.22(C), Other Space Used For Environmental Air.

(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.

Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.

(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

Section 300.22(C)(1) permits only solid bottom metal cable tray with solid metal covers. Optical fiber, communications, CATV, signaling and fire-alarm plenum cables, and plenum raceways are often installed in metal cable trays and metal cable tray systems in plenums (other spaces used for environmental air). These installations are "neat and workmanlike" and safe. They should be permitted.

Panel Meeting Action: Accept in Principle

Panel Statement: See the panel actions and statements on Proposals 3-97 and 3-199.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-300 Log #4065 NEC-P03 **Final Action: Reject**
(760.154(A), (B), (C), and 760.154(E) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Delete text from 760.154(A), 760.154(B), and 760.154(C).

Add new 760.154(E).

760.154(D) does not change.

760.154 Applications of Listed PLFA Cables.

PLFA cables shall comply with the requirements described in either 760.154(A), (B), or (C) or where cable substitutions are made as shown in 760.154(D) <u>or have suffixes in accordance with 760.154(E) requirements</u>.

(A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type FPLP. Types FPLP, FPLR, and FPL cables installed in compliance with 300.22 shall be permitted. ~~Type FPLP-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.~~

(B) Riser. Cables installed in risers shall be as described in either (1), (2), or (3):

(1) Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type FPLR. Floor penetrations requiring Type FPLR shall contain only cables suitable for riser or plenum use. ~~Type FPLR-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.~~

(2) Other cables shall be installed in metal raceways or located in a fireproof shaft having firestops at each floor.

(3) Type FPL cable shall be permitted in one- and two-family dwellings.

FPN: See 300.21 for firestop requirements for floor penetrations.

(C) Other Wiring Within Buildings. Cables installed in building locations other than those covered in 760.154(A) or (B) shall be as described in either (C)(1), (C)(2), (C)(3), or (C)(4). ~~Type FPL-CI cable shall be permitted to be installed as described in either (C)(1), (C)(2), (C)(3), or (C)(4) to provide a 2-hour circuit integrity rated cable.~~

(1) General. Type FPL shall be permitted.

(2) In Raceways. Cables shall be permitted to be installed in raceways.

(3) Nonconcealed Spaces. Cables specified in Chapter 3 and meeting the requirements of 760.179(A) and (B) shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).

(4) Portable Fire Alarm System. A portable fire alarm system provided to protect a stage or set when not in use shall be permitted to use wiring methods in accordance with 530.12.

<u>(E) Power-Limited Cables With Suffix Markings. Power-limited cables with single or multiple suffix markings shall be permitted where required to meet special applications.</u>

<u>(1) Power-Limited Cables or Electrical Circuit Protective System. Power-Limited circuit integrity (CI) cables or a listed electrical circuit protective system shall be permitted for use in fire alarm systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. Power-limited circuit integrity cables shall be marked in accordance with 760.179(G).</u>

<u>(2) Power-Limited Cables for Dry, Damp, or Wet Locations. Power-limited cables installed in dry, damp, or wet locations shall be marked in accordance with 760.179.(L).</u>

<u>(3) Power-Limited Cables Exposed to Direct Sunlight. Power-limited Cables installed exposed to direct sunlight shall be marked in accordance with 760.179(M).</u>

<u>(4) Power-Limited Fire Hazard Cables. Power-limited fire hazard cables installed to provide low flame spread, very-low-smoke, and known potential heat release shall be marked in accordance with 760-179(P).</u>

<u>(5) Power-Limited Very-Low-Smoke Producing Cables. Power-limited very-low-smoke producing cables installed to provide low flame spread and very-low-smoke emissions shall be marked in accordance with 760.179(O).</u>

<u>(6) Power-Limited Cables in Corrosive Locations. Power-limited cables installed in corrosive locations shall be marked in accordance with 760.179(K).</u>

Substantiation: This proposal adds text to the first paragraph of 760.154 to permit cables to have suffix markings.

This proposal establishes 760.154(E) for cables with suffixes for installation in locations requiring special cable characteristics.

This proposal removes the cable survivability requirement from 760.154(A), (B), and (C), and establishes the requirements in 760.154(E)(1) with text parallel to Article 725.

Panel Meeting Action: Reject

Panel Statement: The proposed text for 760.154 does not deal with applications of listed power-limited fire alarm cables, however is providing suffix markings for these cables; therefore, 760.154 is an incorrect location for this information.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: While the intent of the proposal was to provide application requirements, the proposal should have included more specific text, as to applications. The installation requirements for power-limited cables are detailed in 760.130(B), so a proposal to these sections was unnecessary.

SEPULVEDA, M.: While the intent of the proposal was to provide application requirements, the proposal should have included more specific text, as to applications. The installation requirements for power-limited cables are detailed in 760.130(B), so a proposal to these sections was unnecessary.

3-301 Log #1606 NEC-P03 **Final Action: Reject**
(760.154(B)(1))

Submitter: Ray R. Keden, ERICO, Inc. / Rep. BICSI

Recommendation: Revise text to read as follows:

Cables installed in vertical runs and penetrating one or more floors ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type FPLR. Floor penetrations requiring Type FPLR shall contain only cables suitable for riser or plenum use. Type FPLR-CI cable shall be permitted to be installed to provide a 2-hour circuit integrity rated cable.

Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The panel contends that the existing text does meet the panel's intention.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

KEDEN, R.: See 3-201.

3-302 Log #4066 NEC-P03 **Final Action: Reject**
(760.176)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 760.176 1st paragraph.

760.176 Listing and Marking of NPLFA Cables.

Non–power-limited fire alarm cables installed as wiring within buildings shall be listed in accordance with 760.176(A) and (B) and as being resistant to the spread of fire in accordance with 760.176(C) through (F) and (H) through (M), and shall be marked in accordance with 760.176(G). ~~Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.~~

Substantiation: The revision to 760.179 accommodates new cable listing requirements in 760.176(H) through (M). Requirements for cables installed in wet locations are in the companion proposal to establish new 760.176(I).

Panel Meeting Action: Reject

Panel Statement: 760.53(B) does not provide an application for the proposed various types of non-power-limited fire alarm cables that the submitter is attempting to place into 760.176.

Since there are no applications for these cables, inserting listing and marking text is inappropriate.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: This proposal was primarily editorial to correlated with the new cable suffix markings in companion proposals to 760.176.

SEPULVEDA, M.: This proposal was primarily editorial to correlated with the new cable suffix markings in companion proposals to 760.176.

3-303 Log #1445 NEC-P03 **Final Action: Accept in Principle**
(760.176(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise first sentence: Insulated conductors shall be ~~suitable for~~ rated not less than 600 volts.

Substantiation: Edit. "suitable" is subjective and a term to be avoided per the Style Manual.

Panel Meeting Action: Accept in Principle

The panel revised the proposed wording to read as follows:

"760.176 Listing and Marking of NPLFA Cables.

(B) Insulated Conductors. Insulated conductors shall be rated for 600 volts. Insulated conductors 14 AWG and larger shall be one of the types listed in Table 310.13(A) or one that is identified for this use. Insulated conductors 18 AWG and 16 AWG shall be in accordance with 760.49."

Panel Statement: The submitter is correct that the NEC Manual of Style includes "suitable" in Table 3.2.1

"Possibly Unenforceable and Vague Terms," and the suggested wording needs to be modified.

The term "suitable" was changed to "rated" rather than the suggested text in the proposal, since the conductor insulation must be rated for 600 volts, not 600 volts or greater as would be implied by the suggested change.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-304 Log #1655 NEC-P03 **Final Action: Reject**
(760.176(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 760.176(C) FPN as follows:

FPN: One method of ~~defining~~ determining fire resistance and low smoke-producing characteristics is testing in accordance ~~low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested in accordance~~ with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces. ~~, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text.

Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current.

For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.

These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced NFPA 262 document. This FPN is giving information on various methods of defining smoke-producing cables or fire-resistant cables.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-305 Log #4559 NEC-P03 **Final Action: Accept in Principle**
(760.176(C), FPN)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council

Recommendation: Revise text as follows:

760.176 Listing and Marking of NPLFA Cables.

Non–power-limited fire alarm cables installed as wiring within buildings shall be listed in accordance with 760.176(A) and 760.176(B) and as being resistant to the spread of fire in accordance with 760.176(C) through 760.176(F), and shall be marked in accordance with 760.176(G).

(A) NPLFA Conductor Materials. Conductors shall be 18 AWG or larger solid or stranded copper.

(B) Insulated Conductors. Insulated conductors shall be suitable for 600 volts. Insulated conductors 14 AWG and larger shall be one of the types listed in Table 310.13 or one that is identified for this use. Insulated conductors 18 AWG and 16 AWG shall be in accordance with 760.27.

(C) Type NPLFP. Type NPLFP non–power-limited fire alarm cable for use in other space used for environmental air shall be listed as being suitable for use in other space used for environmental air as described in 300.22(C) and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.

FPN: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces. ~~is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-1999, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~

No change for 760.176 (D) through 760.176 (G)

Substantiation: This comment recommends a slight change in wording for the existing Fine Print Note, by recognizing that listing of plenum cable by NFPA 262 represents listing to both low smoke and low flame spread, and that cables cannot be listed separately to either property. This is basically an editorial change, as a clarification, to the existing Fine Print Note.

The same change is being proposed to the other corresponding Fine Print Note in article 760 and to that in article 725. The new language is consistent with the language in the corresponding fine print notes in articles 770, 800, 820 and 830, all of which deal with the same type of cables.

This has been proposed before but was caught in the NEC moratorium associated with plenum cables.

Panel Meeting Action: Accept in Principle

Revise the proposed fine print note to read as follows:

"FPN: One method of defining low smoke-producing and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

Panel Statement: The revised language clarifies the intent of the panel and meets the intent of the submitter.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

AYER, L.: See statement on Proposal 3-208.

Comment on Affirmative:

EGESDAL, S.: The submitter's text is consistent with the text in 770, 800, 820, and 830. If the CMP 3 "tweaking" of the submitter's text is better grammar, hopefully, the NEC TCC will direct CMP 16 to revise the corresponding 770, 800, 820, and 830 FPN's.

KAHN, S.: The submitted text is identical to the corresponding FPNs in 770, 800, 820, and 830. If the revised text is better, it should be incorporated into the other Articles.

SEPULVEDA, M.: The submitter's text is consistent with the text in 770, 800, 820, and 830. If the CMP 3 "tweaking" of the submitter's text is better grammar, hopefully, the NEC TCC will direct CMP 16 to revise the corresponding 770, 800, 820, and 830 FPN's.

3-306 Log #4845 NEC-P03 **Final Action: Reject**
(760.176(C), FPN)

Submitter: T. David Mills, T. David Mills Associates

Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~ <u>See {3}, Annex I.</u>

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-72.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-307 Log #1656 NEC-P03 **Final Action: Reject**
(760.176(D), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 760.176(D) FPN as follows:

FPN: One method of ~~defining~~ <u>determining</u> fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is <u>testing in accordance with</u> ~~that the cables pass~~ ANSI/UL 1666-2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text, however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.

These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 1666 document. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-308 Log #4846 NEC-P03 **Final Action: Reject**
(760.176(D), FPN)

Submitter: T. David Mills, T. David Mills Associates

Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass ANSI/UL 1666-2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.~~<u>See {11}, Annex I.</u>

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-72.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-309 Log #1657 NEC-P03 **Final Action: Reject**
(760.176(E), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 760.176(E) FPN as follows:

FPN: One method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ <u>testing in accordance with</u> "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ <u>testing in accordance with</u> CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.

These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 1685 and CSA 22.2 documents. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-310 Log #4847 NEC-P03 **Final Action: Reject**
(760.176(E), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~
~~Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {5} and {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-311 Log #4848 NEC-P03 **Final Action: Reject**
(760.176(F), FPN 1)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN No. 1: ~~Fire alarm circuit integrity (CI) cable and electrical circuit protective systems may be used for fire alarm circuits to comply with the survivability requirements of NFPA 72®-2007, National Fire Alarm Code®, 6.9.4.3 and 6.9.4.6, that the circuit maintain its electrical function during fire conditions for a defined period of time.~~ See {10}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-312 Log #1658 NEC-P03 **Final Action: Reject**
(760.176(F), FPN 2)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 760.176(F) FPN No. 2 as follows:
FPN No. 2: One method of ~~defining~~ determining circuit integrity (CI) cable is by ~~establishing a minimum 2-hour fire resistance rating for the cable when tested~~ testing in accordance with UL 2196-1995, Standard for Tests of Fire Resistive Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.
These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 2196 document. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-313 Log #4849 NEC-P03 **Final Action: Reject**
(760.176(F), FPN 2)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN No. 2: ~~One method of defining circuit integrity (CI) cable is by establishing a minimum 2-hour fire resistance rating for the cable when tested in accordance with UL 2196-1995, Standard for Tests of Fire Resistive Cables.~~ See {8}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-314 Log #4047 NEC-P03 **Final Action: Reject**
(760.176(G))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.176(G)
(G) NPLFA Cable Markings.
(1) Multiconductor non–power-limited fire alarm cables shall be marked in accordance with Table 760.176(G).
(2) Non–power-limited fire alarm circuit cables shall be permitted to be marked with a maximum usage voltage rating of 150 volts.
~~Cables that are listed for circuit integrity shall be identified with the suffix "CI" as defined in 760.176(F).~~
(3) Temperature ratings greater than 60ºC shall be marked on the cable.
(4) Cables suitable for installation at temperatures lower than 60ºC shall have the lowest permitted temperature marked on the cable.
(5) Cables listed as meeting the requirements of 760.179(C), (D), and (E) shall be permitted to have additional suffixes identified in other subsections of 760.176.
Substantiation: There is no marking on cables rated at 60ºC (140ºF). There is no indication in this article as to the temperature rating for cables. Article 310 does an excellent job of identifying temperature ratings for conductors. The goal of this proposal is to provide equivalent requirements.
See companion proposal to add new 760.176(K).
The circuit integrity marking requirement is covered in 760.179(F). Cables with additional suffixes are permitted by proposal 760.176(G)(5).
Panel Meeting Action: Reject
Panel Statement: Based on the lack of any applications provided in proposals for 760.53(B), other than marking requirements, listing requirements for these cables cannot be accepted in 760.176.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The purpose of this proposal is to establish requirements in Article 760 for cable; requirements that provide equivalency to Chapter 3 conductor marking requirements. The requirements in this proposal match what is in the UL standard. Cables listed to the requirements in the UL standard have provided the industry with a reliable product. The specific marking would not have a financial impact on manufacturers.
Article 760 circuits are sometimes installed in harsh environments (e.g., wet locations, exposed to sunlight, walk-in freezers, rooftops). It is important that the NEC establish requirements that are needed for application and installation of Article 760 cables, and not rely on whatever a testing organization somewhere in the world decides is appropriate for the application. Specific marking requirements would be useful to designers, buyers, installers, and AHJ's.
SEPULVEDA, M.: The purpose of this proposal is to establish requirements in Article 760 for cable; requirements that provide equivalency to Chapter 3 conductor marking requirements. The requirements in this proposal match what is in the UL standard. Cables listed to the requirements in the UL standard have provided the industry with a reliable product. The specific marking would not have a financial impact on manufacturers.
Article 760 circuits are sometimes installed in harsh environments (e.g., wet locations, exposed to sunlight, walk-in freezers, rooftops). It is important that the NEC establish requirements that are needed for application and installation of Article 760 cables, and not rely on whatever a testing organization somewhere in the world decides is appropriate for the application. Specific marking requirements would be useful to designers, buyers, installers, and AHJ's.

3-315 Log #4049 NEC-P03 **Final Action: Reject**
(760.176(H) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.176(H)
(H) Non-Power-Limited Fire Alarm Cables Installed in Corrosive Locations. Non-power-limited fire alarm cables installed in corrosive locations shall be listed as suitable for corrosive locations. Cables specified in 760.154(A), (B), and (C), and used for installation in corrosive locations shall have the additional classification using the following suffixes: "-PR" for oil resistant, and "-GR" for gasoline and oil resistant.
Substantiation: Presently, there is no marking that identifies non-power-limited fire alarm cables as being suitable for installation in corrosive locations. Corrosive locations have the potential to degrade cable and conductor insulation and cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-314.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-314.
SEPULVEDA, M.: See my explanation of negativevote on Proposal 3-314.

3-316 Log #4052 NEC-P03 **Final Action: Reject**
(760.176(I) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.176(I).
(I) Conductors and Cables in Dry, Damp, or Wet Locations. Cables specified in 760.176(C, (D), and (E) shall be listed for installation in dry, damp, or wet locations or shall have a moisture-impervious metal sheath and shall be marked with a suffix as required in 760.176(a), (b), or (c).
(a) Conductors and cables installed in dry location shall not be required to have an additional suffix marking.
(b) Conductors and cables suitable for installation in damp locations shall be identified with the suffix "-DAMP". Conductors and cables listed for damp locations shall be suitable for installation in dry locations.
FPN: One method of defining suitability for installation in damp locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
(c) Conductors and cables suitable for installation in wet locations shall be identified with the suffix "-WET". Conductors and cables listed for damp locations shall be suitable for installation in dry or damp locations.
FPN: One method of defining suitability for installation in wet locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies Class 2, Class 3, and PLTC cables as being suitable for dry, damp, or wet locations. Cables suitable for installation in dry locations that are installed in damp or wet locations have the potential to cause system malfunction
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-314.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-314.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-314.

3-317 Log #4057 NEC-P03 **Final Action: Reject**
(760.176(J) and FPN (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.176(J).
(J) Cables Exposed to Direct Sunlight. Cables specified in 760.176(C, (D), and (E) installed exposed to direct sunlight shall be listed and shall be marked with the suffix "-SR".
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies fire alarm cables as being suitable for installation exposed to direct sunlight. Cables that are not listed for exposure to direct sunlight and are installed exposed to direct sunlight have the potential to cause system malfunction. There are knows job failures where cables supported by an aerial messenger wire failed due to sunlight exposure.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-314.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-314.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-314.

3-318 Log #4060 NEC-P03 **Final Action: Reject**
(760.176(K) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.176(K).
(K) Non-Power-Limited Fire Alarm Cable Temperature Ratings. Non-power-limited fire alarm cables shall be listed for a temperature rating of not less than 60ºC (140ºF). Non-power-limited fire alarm cables shall be permitted to have an additional temperature rating for the lowest permitted temperature.
Substantiation: Fire alarm cables are often installed in areas where the temperature exceeds the 60ºC (140ºF) rating, which is not marked on the cable. For example, cable installed in conduit on a rooftop could have an temperature internal to the conduit in excess of 160 ºF. NFPA 90A permits the temperature in a HVAC system to be as high as 250ºF. Additionally, fire alarm cables are sometimes installed in cold areas (e.g., walk-in freezer), so an indication of the minimum permitted temperature is important.
There is a companion proposal to revise 760.176 to add temperature marking requirements.
Panel Meeting Action: Reject
Panel Statement: Marking requirements for cable temperatures in excess of 60 degrees C is already covered by the UL product standard UL 1425, covering non-power-limited fire alarm cables. These cables are available based on the standard requirements for temperatures up to 250 degrees C or 482 degrees F.
Where an application occurs with a temperature in excess of 140 degrees F, a corresponding cable requirement would be to install a cable with a high enough temperature rating for the ambient temperature. Non-power-limited fire alarm cables would have very limited exposure to higher than normal ambient temperature and would certainly be installed in a very limited length in a metal wiring method within a fabricated duct based on 300.22(B)
Non-power-limited fire alarm cables are intended for use and tested for an operating temperature of 60 degrees C, unless a higher temperature rating is marked on the cable. Section 1.1 of UL 1425 reads as follows:
"This Standard states the construction, test, and marking requirements covering the safety of electrical and electrical/optical-fiber cables rated 60 degrees C to 250 degrees C and intended for 150-volt and lower-potential non-power-limited circuits that are controlled and powered by a fire-alarm system."
Where a high ambient temperature is encountered in the installation of non-power-limited fire alarm cables and conductors, higher temperature cables can be required, obtained, and installed.
There was no technical substantiation provided to justify adding this requirement to the NEC.
Where a low ambient temperature is encountered, non-power-limited fire alarm cables can be purchased that have been subjected to a cold bend test to ensure bending capability for cold temperatures down to minus 70 degrees C; however, this is not an installation temperature; it is an application temperature.
Once the cable has been installed and connected, there would not normally be any bending of the conductor insulation. Again, the standard provides testing for this; however, there has been no substantiation provided to insert this into the NEC.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-314.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-314.

3-319 Log #4062 NEC-P03 **Final Action: Reject**
(760.176(L) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.176(L) very low smoke cables.
(L) Very-Low-Smoke Producing Cables. Non-power-limited cables used to provide very-low-smoke producing characteristics shall be listed as very-low-smoke producing (50) and shall be listed as having low flame spread characteristics and very-low-smoke producing characteristics. Cables specified in 760.53(B)(2), (3), and (4) shall have the additional classification using the suffix "-50".
FPN: One method of defining a very-low-smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core.
Substantiation: This proposal establishes a listing and marking for cable for installation where minimal smoke generation is required. This cable meets the requirement for installation in concealed spaces that permit a maximum flame spread index of 25 and a maximum smoke developed index of 50. The proposed cable has low flame spread characteristics and very-low-smoke-producing characteristics. Presently, a number of manufacturers have cables listed as meeting the proposed requirements, but do not have a unique marking permitted by the NEC.
The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.

Establishing a listing and marking for cables listed for a "-50" suffix provides cables with physical parameters (flame spread index, smoke developed index) that is consistent with requirements in other codes.

Panel Meeting Action: Reject

Panel Statement: Based on the lack of any applications provided in proposals for 760.53(B), other than marking requirements, acceptance of listing requirements for these cables cannot be Accepted in 760.176.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials.

SEPULVEDA, M.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials.

3-320 Log #4054 NEC-P03 **Final Action: Reject**
(760.176(M) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 760.176(M)

<u>(M) Fire Hazard Cables. Non-power-limited cables used to provide low combustible loading shall be listed as fire hazard cable (FHC) and shall be listed as having low flame spread characteristics, very-low-smoke producing characteristics, and a low potential heat release value. Cables specified in 760.53(B)(2), (3), and (4) shall have the additional classification using the suffix " -FHC".</u>

<u>FPN No. 1: One method of defining a low flame spread and very low smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials* with the cable unslit (intact) and cut through to expose the cable core. One method of defining a low potential heat cable is that the cable exhibits a maximum potential heat value of exceeding 8141 kJ/kg (3500 BTU/lb) when tested in accordance with NFPA 259, *Standard Test Method for Potential Heat of Building Materials.*</u>

Substantiation: This proposal establishes a listing and marking for cable permitted as an electrical wiring option in concealed spaces where a smoke developed index no greater than 50 is required or large quantities of cable may cause combustible loading. The proposed cable has <u>low flame spread characteristics, very-low-smoke-producing characteristics,</u> and <u>a low potential heat release value.</u>

The testing criteria are based on the requirements found in NFPA 13 and the International Mechanical Code, as revised.

NFPA 13, Section 8.14.1.2.1 follows: "Noncombustible and limited combustible concealed spaces with no combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum." The proposed cable has a very low heat of combustion. While the term "combustible loading" is not defined, the fuel load can be calculated to determine the potential hazard from large quantities of cable.

The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.

Establishing a listing and marking for cables listed for a "FHC" suffix provides cables with physical parameters (flame spread index, smoke developed index, potential heat release) that is consistent with requirements in other codes.

NFPA 13-2007

8.15 Special Situations.

8.15.1 Concealed Spaces.

8.15.1.1 Concealed Spaces Requiring Sprinkler Protection. All concealed spaces enclosed wholly or partly by exposed combustible construction shall be protected by sprinklers except in concealed spaces where sprinklers are not required to be installed by 8.15.1.2.1 through 8.15.1.2.16 and 8.15.6.

8.15.1.2* Concealed Spaces Not Requiring Sprinkler Protection.

8.15.1.2.1* Concealed spaces of noncombustible and limited-combustible construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. (For additional information on combustible loading, see A.8.15.1.2.1.)

8.15.1.2.2 Concealed spaces of noncombustible and limited-combustible construction with limited access and not permitting occupancy or storage of combustibles shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

8.15.1.2.3 Concealed spaces formed by studs or joists with less than 6 in. (152 mm) between the inside or near edges of the studs or joists shall not require sprinkler protection. (See Figure 8.6.4.1.5.1.)

8.15.1.2.4 Concealed spaces formed by bar joists with less than 6 in. (152 mm) between the roof or floor deck and ceiling shall not require sprinkler protection.

8.15.1.2.5 Concealed spaces formed by ceilings attached directly to or within 6 in. (152 mm) of wood joist construction shall not require sprinkler protection.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-319.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials; and a low potential heat release not greater than 8141 kJ/kg (3500 BTU/lb), as tested in accordance with UL 2424, Standard Test Method of Potential Heat of Building Materials. A number of manufacturers have products that meet this criteria. The NEC does not provide a marking requirement for this robust cable.

SEPULVEDA, M.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials; and a low potential heat release not greater than 8141 kJ/kg (3500 BTU/lb), as tested in accordance with UL 2424, Standard Test Method of Potential Heat of Building Materials. A number of manufacturers have products that meet this criteria. The NEC does not provide a marking requirement for this robust cable.

3-321 Log #4067 NEC-P03 **Final Action: Accept**
(760.179)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 760.179.

760.179 Listing and Marking of PLFA Cables and Insulated Continuous Line-Type Fire Detectors.

~~Type FPL~~ <u>PLFA</u> cables installed as wiring within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 760.179(A) through (H) and shall be marked in accordance with 760.179(I). Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(J). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.

Substantiation: This proposal is primarily editorial. The first sentence of 760.170 applies to all power-limited cables, not just Type FPL cables.

Panel Meeting Action: Accept

Panel Statement: The panel notes that the reference to 760.170 in the substantiation is incorrect. The correct reference is 760.179.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 15

3-322 Log #4068 NEC-P03 **Final Action: Reject**
(760.179)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Revise 760.179 first paragraph.

60.179 Listing and Marking of PLFA Cables and Insulated Continuous Line-Type Fire Detectors.

Type FPL cables installed as wiring within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 760.179(A) through (H) <u>and (K) through (P)</u> and shall be marked in accordance with 760.179(I). Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(J). ~~Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.~~

Substantiation: The revision to 760.179 accommodates new cable listing requirements in 760.179(K) through (P). Requirements for cables installed in wet locations are in the companion proposal to establish new 760.179(L).

Panel Meeting Action: Reject

Panel Statement: Based on the lack of any applications provided in proposals for 760.154, other than marking requirements, acceptance of listing requirements for these cables cannot be accepted in 760.179.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 14 Negative: 1

Explanation of Negative:

EGESDAL, S.: This proposal was primarily editorial to correlated with the new cable suffix markings in companion proposals to 760.179.

3-323 Log #1659 NEC-P03 **Final Action: Reject**
(760.179(D), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 760.179(D) FPN as follows:

FPN: One method of ~~defining~~ determining fire resistance and low smoke-producing characteristics is testing ~~low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested~~ in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces. ~~, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.

These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced NFPA 262 document. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-324 Log #4560 NEC-P03 **Final Action: Accept in Principle**
(760.179(D), FPN)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
760.179 Listing and Marking of PLFA Cables and Insulated Continuous Line-Type Fire Detectors.

Type FPL cables installed as wiring within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 760.179(A) through 760.179(H) and shall be marked in accordance with 760.179(I). Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(J).

(A) Conductor Materials. Conductors shall be solid or stranded copper.

(B) Conductor Size. The size of conductors in a multiconductor cable shall not be smaller than 26 AWG. Single conductors shall not be smaller than 18 AWG.

(C) Ratings. The cable shall have a voltage rating of not less than 300 volts.

(D) Type FPLP. Type FPLP power-limited fire alarm plenum cable shall be listed as being suitable for use in ducts, plenums, and other space used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.

FPN: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces. ~~is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-1999, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~

No change for 760.179 (E) through 760.179 (J)

Substantiation: This comment recommends a slight change in wording for the existing Fine Print Note, by recognizing that listing of plenum cable by NFPA 262 represents listing to both low smoke and low flame spread, and that cables cannot be listed separately to either property. This is basically an editorial change, as a clarification, to the existing Fine Print Note.

The same change is being proposed to the other corresponding Fine Print Note in article 760 and to that in article 725. The new language is consistent with the language in the corresponding fine print notes in articles 770, 800, 820 and 830, all of which deal with the same type of cables.

This has been proposed before but was caught in the NEC moratorium associated with plenum cables.
Panel Meeting Action: Accept in Principle
Revise the proposed fine print note to read as follows:

"FPN: One method of defining low smoke-producing and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."
Panel Statement: The revised language clarifies the intent of the panel and meets the intent of the submitter.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15
Comment on Affirmative:

EGESDAL, S.: The submitter's text is consistent with the text in 770, 800, 820, and 830. If the CMP 3 "tweaking" of the submitter's text is better grammar, hopefully, the NEC TCC will direct CMP 16 to revise the corresponding 770, 800, 820, and 830 FPN's.

KAHN, S.: The submitted text is identical to the corresponding FPNs in 770, 800, 820, and 830. If the revised text is better, it should be incorporated into the other Articles.

SEPULVEDA, M.: The submitter's text is consistent with the text in 770, 800, 820, and 830. If the CMP 3 "tweaking" of the submitter's text is better grammar, hopefully, the NEC TCC will direct CMP 16 to revise the corresponding 770, 800, 820, and 830 FPN's.

3-325 Log #4850 NEC-P03 **Final Action: Reject**
(760.179(D), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining low smoke-producing cable is by establishing an acceptable value of the smoke produced when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces, to a maximum peak optical density of 0.5 and a maximum average optical density of 0.15. Similarly, one method of defining fire-resistant cables is by establishing a maximum allowable flame travel distance of 1.52 m (5 ft) when tested in accordance with the same test.~~ See {3}, Annex I.

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:

SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-326 Log #1660 NEC-P03 **Final Action: Reject**
(760.179(E), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 760.179(E) FPN as follows:

FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the cables pass the requirements of~~ testing the cable in accordance with ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: Use of the phrase "determining resistance" rather than "defining resistance" and "testing in accordance with" provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.

These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 1666 document. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-327 Log #4851 NEC-P03 **Final Action: Reject**
(760.179(E), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666- 2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~ See {11}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-328 Log #1661 NEC-P03 **Final Action: Reject**
(760.179(F), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 760.179(F) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: Use of the phrase “determining resistance” rather than “defining resistance” and “testing in accordance with” provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.
These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 1685 and CSA C22.2 documents. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-329 Log #4852 NEC-P03 **Final Action: Reject**
(760.179(F), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the “UL Flame Exposure, Vertical Tray Flame Test” in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~
~~Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA “Vertical Flame Test — Cables in Cable Trays,” as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {5} and {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-330 Log #4853 NEC-P03 **Final Action: Reject**
(760.179(G), FPN 1)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN No. 1: ~~Fire alarm circuit integrity (CI) cable and electrical circuit protective systems may be used for fire alarm circuits to comply with the survivability requirements of NFPA 72-2007, National Fire Alarm Code, 6.9.4.3 and 6.9.4.6, that the circuit maintain its electrical function during fire conditions for a defined period of time.~~ See {10}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-331 Log #1662 NEC-P03 **Final Action: Reject**
(760.179(G), FPN 2)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 760.179(G) FPN No. 2 as follows:
FPN No. 2: One method of ~~defining~~ determining circuit integrity (CI) cable is by ~~establishing a minimum 2-hour fire resistance rating for the cable when tested~~ testing in accordance with UL 2196-1995, Standard for Tests of Fire Resistive Cables.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: Use of the phrase “determining resistance” rather than “defining resistance” and “testing in accordance with” provides text that could be interpreted as mandatory more than the existing text. Definitions cannot contain mandatory text; however, the FPN for the definition can provide dimensions and amounts of materials or current. For example, GFCI protection in Article 100 has defined values of trip current provided for a Class A GFCI device.
These fine print notes are not written in mandatory language and are simply expressing some of the maximum flame spread provided in the referenced UL 2196 document. This FPN is providing information on various methods of defining smoke-producing cables or fire-resistant cables.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

3-332 Log #4854 NEC-P03 **Final Action: Reject**
(760.179(G), FPN 2)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN No. 2: ~~One method of defining circuit integrity (CI) cable is by establishing a minimum 2-hour fire resistance rating for the cable when tested in accordance with UL 2196-1995, Standard for Tests of Fire Resistive Cables.~~ See {8}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 14 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

3-333 Log #4069 NEC-P03 **Final Action: Reject**
(760.179(I))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 760.179(I).
(I) Cable Marking.
(1) The cable shall be marked in accordance with Table 760.179(I).
(2) The voltage rating shall not be marked on the cable.
~~Cables that are listed for circuit integrity shall be identified with the suffix CI as defined in 760.179(G).~~
FPN: Voltage ratings on cables may be misinterpreted to suggest that the cables may be suitable for Class 1, electric light, and power applications.
Exception: Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.
(3) Temperature ratings greater than 60ºC shall be marked on the cable.
(4) Cables suitable for installation at temperatures lower than 60ºC shall have the lowest permitted temperature marked on the cable.
(5) Cables listed as meeting the requirements of 760.179(C), (D), and (E) shall be permitted to have additional suffixes identified in other subsections of 760.179.
Substantiation: There is no marking on cables rated at 60ºC (140ºF). There is no indication in this article as to the temperature rating for cables. Article 310 does an excellent job of identifying temperature ratings for conductors. The goal of this proposal is to provide equivalent requirements.
See companion proposal to add new 760.179(N).
The circuit integrity marking requirement is covered in 760.179(G). Cables with additional suffixes are permitted by proposal 760.179(I)(5).
Panel Meeting Action: Reject
Panel Statement: Marking requirements for cable temperatures in excess of 60 degrees C is already covered by the UL product standard UL 1424, covering power-limited fire alarm cables. These cables are available based on the standard requirements for temperatures up to 250 degrees C or 482 degrees F. Where an application occurs with a temperature in excess of 140 degrees F, a corresponding cable requirement would be to install a cable with a high enough temperature rating for the ambient temperature. Power-limited fire alarm cables would have very limited exposure to higher than normal ambient temperature and would certainly be installed in a very limited length in a metal wiring method within a fabricated duct based on 300.22(B)
Power-limited fire alarm cables are intended for use and tested for an operating temperature of 60 degrees C, unless a higher temperature rating is marked on the cable. Section 1.1 of UL 1424 reads as follows: "These requirements cover 60 - 250°C (140 - 482°F) single- and multiple-conductor cables for use as fixed wiring within buildings (some are also marked for direct burial) principally for power-limited fire-alarm circuits as described in Article 760 and other applicable parts of the National Electrical Code (NEC)."
Where a high ambient temperature is encountered in the installation of power-limited fire alarm cables and conductors, higher temperature cables can be required, obtained, and installed. There was no technical substantiation provided to justify adding this requirement to the NEC.
Where a low ambient temperature is encountered, power-limited fire alarm cables can be purchased that have been subjected to a cold bend test to ensure bending capability for cold temperatures down to minus 70 degrees C; however, this is not an installation temperature, it is an application temperature. Once the cable has been installed and connected, there would not normally be any bending of the conductor insulation. Again, the standard provides testing for this but there has been no substantiation provided to insert this into the NEC.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: The purpose of this proposal is to establish requirements in Article 760 for cable; requirements that provide equivalency to Chapter 3 conductor marking requirements. The requirements in this proposal match what is in the UL standard. Cables listed to the requirements in the UL standard have provided the industry with a reliable product. The specific marking would not have a financial impact on manufacturers.
Article 760 circuits are sometimes installed in harsh environments (e.g., wet locations, exposed to sunlight, walk-in freezers, rooftops). It is important that the NEC establish requirements that are needed for application and installation of Article 760 cables, and not rely on whatever a testing organization somewhere in the world decides is appropriate for the application. Specific marking requirements would be useful to designers, buyers, installers, and AHJ's.
SEPULVEDA, M.: The purpose of this proposal is to establish requirements in Article 760 for cable; requirements that provide equivalency to Chapter 3 conductor marking requirements. The requirements in this proposal match what is in the UL standard. Cables listed to the requirements in the UL standard have provided the industry with a reliable product. The specific marking would not have a financial impact on manufacturers.
Article 760 circuits are sometimes installed in harsh environments (e.g., wet locations, exposed to sunlight, walk-in freezers, rooftops). It is important that the NEC establish requirements that are needed for application and installation of Article 760 cables, and not rely on whatever a testing organization somewhere in the world decides is appropriate for the application. Specific marking requirements would be useful to designers, buyers, installers, and AHJ's.

3-334 Log #4050 NEC-P03 **Final Action: Reject**
(760.179(K) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.179(K)
(K) Power-Limited Fire Alarm Cables Installed in Corrosive Locations. Power-limited fire alarm cables installed in corrosive locations shall be listed as suitable for corrosive locations. Cables specified in 760.154(A), (B), and (C) and used for installation in corrosive locations shall have the additional classification using the following suffixes "-PR" for oil resistant, and "-GR" for gasoline and oil resistant.
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies power-limited fire alarm cables as being suitable for installation in corrosive locations. Corrosive locations have the potential to degrade cable and conductor insulation and cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: Based on the lack of any applications provided in proposals for 760.154, other than marking requirements, acceptance of listing requirements for these cables cannot be accepted in 760.179.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-333.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-333.

3-335 Log #4053 NEC-P03 **Final Action: Reject**
(760.179(L) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.179(L).
(L) Conductors and Cables in Dry, Damp, or Wet Locations. Cables specified in 760.(179)(D), (E), and (F) shall be listed for installation in dry, damp, or wet locations or shall have a moisture-impervious metal sheath and shall be marked with a suffix as required in 760.179(a), (b), or (c).
(a) Conductors and cables installed in dry location shall not be required to have an additional suffix marking.
(b) Conductors and cables suitable for installation in damp locations shall be identified with the suffix "-DAMP". Conductors and cables listed for damp locations shall be suitable for installation in dry locations.
FPN: One method of defining suitability for installation in damp locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
(c) Conductors and cables suitable for installation in wet locations shall be identified with the suffix "-WET". Conductors and cables listed for damp locations shall be suitable for installation in dry or damp locations.
FPN: One method of defining suitability for installation in wet locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies which power-limited cables are suitable for dry, damp, or wet locations. Cables suitable for installation in dry locations that are installed in damp or wet locations have the potential to cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-334.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-333.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-333.

3-336 Log #4058 NEC-P03 **Final Action: Reject**
(760.179(M) and FPN (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.179(M).
(M) Conductors and Cables Exposed to Direct Sunlight. Cables specified in 760.179(D), (E), and (F) installed exposed to direct sunlight shall be listed and shall be marked with the suffix "-SUNLIGHT".
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies fire alarm cables as being suitable for installation exposed to direct sunlight. Cables that are not listed for exposure to direct sunlight and are installed exposed to direct sunlight have the potential to cause system malfunction. There are knows job failures where cables supported by an aerial messenger wire failed due to sunlight exposure.
Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-334.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-333.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-333.

3-337 Log #4061 NEC-P03 **Final Action: Reject**
(760.179(N) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new text to read as follows:
(N) Power-Limited Fire Alarm Cable Temperature Ratings. Power-limited fire alarm cables shall be listed for a temperature rating of not less than 60ºC (140ºF). Power-limited fire alarm cables shall be permitted to have an additional temperature rating for the lowest permitted temperature.
Substantiation: Fire alarm cables are often installed in areas where the temperature exceeds the 60ºC (140ºF) rating, which is not marked on the cable. For example, cable installed in conduit on a rooftop could have an temperature internal to the conduit in excess of 160 ºF. NFPA 90A permits the temperature in a HVAC system to be as high as 250ºF. Additionally, fire alarm cables are sometimes installed in cold areas (e.g., walk-in freezer), so an indication of the minimum permitted temperature is important.
There is a companion proposal to revise 760.179 to add temperature marking requirements.
Panel Meeting Action: Reject
Panel Statement: Marking requirements for cable temperatures in excess of 60 degrees C is already covered by the UL product standard UL 1424, covering power-limited fire alarm cables. These cables are available based on the standard requirements for temperatures up to 250 degrees C or 482 degrees F. Where an application occurs with a temperature in excess of 140 degrees F, a corresponding cable requirement would be to install a cable with a high enough temperature rating for the ambient temperature. Power-limited fire alarm cables would have very limited exposure to higher than normal ambient temperature and would certainly be installed in a very limited length in a metal wiring method within a fabricated duct based on 300.22(B)
Power-limited fire alarm cables are intended for use and tested for an operating temperature of 60 degrees C, unless a higher temperature rating is marked on the cable. Section 1.1 of UL 1424 reads as follows: “These requirements cover 60 - 250°C (140 - 482°F) single- and multiple-conductor cables for use as fixed wiring within buildings (some are also marked for direct burial) principally for power-limited fire-alarm circuits as described in Article 760 and other applicable parts of the National Electrical Code (NEC).” Where a high ambient temperature is encountered in the installation of power-limited fire alarm cables and conductors, higher temperature cables can be required, obtained, and installed. There was no technical substantiation provided to justify adding this requirement to the NEC.
Where a low ambient temperature is encountered, power-limited fire alarm cables can be purchased that have been subjected to a cold bend test to ensure bending capability for cold temperatures down to minus 70 degrees C; however, this is not an installation temperature, it is an application temperature. Once the cable has been installed and connected, there would not normally be any bending of the conductor insulation. Again, the standard provides testing for this but there has been no substantiation provided to insert this into the NEC.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: See My Explanation of Negative on 3-333.
SEPULVEDA, M.: See my explanation of negative vote on Proposal 3-333.

3-338 Log #4063 NEC-P03 **Final Action: Reject**
(760.179(O) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.179(O).
(O) Very-Low-Smoke Producing Cables. Power-limited cables used to provide very-low-smoke producing characteristics shall be listed as very-low-smoke producing (50) and shall be listed as having low flame spread characteristics and very-low-smoke producing characteristics. Cables specified in 760.154(A), (B), and (C) shall have the additional classification using the suffix “-50”..
FPN No. 1: One method of defining a low flame spread and very low smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials* with the cable unslit (intact) and cut through to expose the cable core.
Substantiation: This proposal establishes a listing and marking for cable for installation where minimal smoke generations is required. This cable meets the requirement for installation in concealed spaces that permit a maximum flame spread index of 25 and a maximum smoke developed index of 50. The proposed cable has low flame spread characteristics and very-low-smoke-producing characteristics. Presently, a number of manufacturers have cables listed as meeting the proposed requirements, but do not have a unique marking permitted by the NEC.
The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.
Establishing a listing and marking for cables listed for a “-50” suffix provides cables with physical parameters (flame spread index, smoke developed index) that is consistent with requirements in other codes.
Panel Meeting Action: Reject
Panel Statement: Based on the lack of any applications provided in proposals for 760.53(B), other than marking requirements, acceptance of listing requirements for these cables cannot be accepted in 760.179.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 13 Negative: 2
Explanation of Negative:
EGESDAL, S.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials.
SEPULVEDA, M.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials.

3-339 Log #4055 NEC-P03 **Final Action: Reject**
(760.179(P) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 760.179(P).
(P) Fire Hazard Cables. Power-limited cables used to provide low combustible loading shall be listed as fire hazard cable (FHC) and shall be listed as having low flame spread characteristics, very-low-smoke producing characteristics, and a low potential heat release value. Cables specified in 760.154(A), (B), and (C) shall have the additional classification using the suffix “-FHC”..
FPN No. 1: One method of defining a low flame spread and very low smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials* with the cable unslit (intact) and cut through to expose the cable core. One method of defining a low potential heat cable is that the cable exhibits a maximum potential heat value of exceeding 8141 kJ/kg (3500 BTU/lb) when tested in accordance with NFPA 259, *Standard Test Method for Potential Heat of Building Materials.*
Substantiation: This proposal establishes a listing and marking for cable permitted as an electrical wiring option in concealed spaces where a smoke developed index no greater than 50 is required or large quantities of cable may cause combustible loading. The proposed cable has low flame spread characteristics, very-low-smoke-producing characteristics, and a low potential heat release value. Presently, a number of manufacturers have cables listed to the proposed requirements.
A number of cable manufacturers have product listed that meets the testing criteria, but have no marking permitted by the NEC.
The testing criteria are based on the requirements found in NFPA 13 and the International Mechanical Code, as revised.
NFPA 13, Section 8.14.1.2.1 follows: “Noncombustible and limited combustible concealed spaces with no combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.” The proposed cable has a very low heat of combustion. While the term “combustible loading” is not defined, the fuel load can be calculated to determine the potential hazard from large quantities of cable.
The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.
Establishing a listing and marking for cables listed for a “FHC” suffix provides cables with physical parameters (flame spread index, smoke developed index, potential heat release) that is consistent with requirements in other codes.
NFPA 13-2007
8.15 Special Situations.
8.15.1 Concealed Spaces.
8.15.1.1 Concealed Spaces Requiring Sprinkler Protection. All concealed spaces enclosed wholly or partly by exposed combustible construction shall be protected by sprinklers except in concealed spaces where sprinklers are not required to be installed by 8.15.1.2.1 through 8.15.1.2.16 and 8.15.6.
8.15.1.2* Concealed Spaces Not Requiring Sprinkler Protection.
8.15.1.2.1* Concealed spaces of noncombustible and limited-combustible construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. (For additional information on combustible loading, see A.8.15.1.2.1.)

8.15.1.2.2 Concealed spaces of noncombustible and limited-combustible construction with limited access and not permitting occupancy or storage of combustibles shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

8.15.1.2.3 Concealed spaces formed by studs or joists with less than 6 in. (152 mm) between the inside or near edges of the studs or joists shall not require sprinkler protection. (See Figure 8.6.4.1.5.1.)

8.15.1.2.4 Concealed spaces formed by bar joists with less than 6 in. (152 mm) between the roof or floor deck and ceiling shall not require sprinkler protection.

8.15.1.2.5 Concealed spaces formed by ceilings attached directly to or within 6 in. (152 mm) of wood joist construction shall not require sprinkler protection.

Panel Meeting Action: Reject

Panel Statement: See the panel statement on Proposal 3-338.

Number Eligible to Vote: 15

Ballot Results: Affirmative: 13 Negative: 2

Explanation of Negative:

EGESDAL, S.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials; and a low potential heat release not greater than 8141 kJ/kg (3500 BTU/lb), as tested in accordance with UL 2424, Standard Test Method of Potential Heat of Building Materials. A number of manufacturers have products that meet this criteria. The NEC does not provide a marking requirement for this robust cable.

SEPULVEDA, M.: This listing provides a cable that matches the base requirement for installation in HVAC systems: flame spread index no greater than 25 and a smoke-developed index no greater than 50, as tested in accordance with UL 723, Test for Surface Burning Characteristics of Building Materials; and a low potential heat release not greater than 8141 kJ/kg (3500 BTU/lb), as tested in accordance with UL 2424, Standard Test Method of Potential Heat of Building Materials. A number of manufacturers have products that meet this criteria. The NEC does not provide a marking requirement for this robust cable.

ARTICLE 770 — OPTICAL FIBER CABLES AND RACEWAYS

16-3 Log #2282 NEC-P16 **Final Action: Reject**
(770)

Submitter: David H. Kendall, Thomas & Betts Corp.

Recommendation: Revise the indicated Sections in Article 770 to read as follows:

770.2 Definitions.

Optical Fiber Raceway **(OFCR).** ~~A raceway for enclosing and routing optical fiber cables.~~ A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of optical-fiber cables.

FPN: See Article 100 for a definition of Raceway.

770.3 Other Articles. Circuits and equipment shall comply with 770.3(A) and (B). Only those sections of Chapter 2, ~~and~~ Articles 300 and 862 referenced in this article shall apply to optical fiber cables and raceways.

(A) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.

(B) Ducts, Plenums, and Other Air-Handling Spaces. The requirements of 300.22 for electric wiring shall also apply to installations of optical fiber cables and raceways where they are installed in ducts or plenums or other space used for environmental air.

Exception: As permitted in ~~770.154(A).~~ 862.10(D) and (E).

(C) Optical Fiber Raceways (OFCR). Article 862 applies to the selection and installation of Optical Fiber Raceways (OFCR).

~~**770.12 Innerduct for Optical Fiber Cables.** Listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway selected in accordance with the provisions of 770.154 shall be permitted to be installed as innerduct in any type of listed raceway permitted in Chapter 3.~~

770.110 Raceways for Optical Fiber Cables. Where optical fiber cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or Optical Fiber/Communication Raceway (OFCR) selected and installed per Article 862. The number of Optical Fiber Cables shall comply with 862.22. ~~listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway selected in accordance with the provisions of 770.154, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply. Where optical fiber cables are installed in raceway without current-carrying conductors, the raceway fill tables of Chapter 3 and Chapter 9 shall not apply.~~ Where nonconductive optical fiber cables are installed with electric conductors in a raceway, the raceway fill tables of Chapter 3 and Chapter 9 shall apply.

770.154 Applications of Listed Optical Fiber Cables and Raceways. Nonconductive and conductive optical fiber cables shall comply with any of the requirements given in 770.154(A) through (D) and 770.154(F), or where cable substitutions are made as shown in 770.154(E).

(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type OFNP or OFCP. Abandoned cables shall not be permitted to remain. Types OFNR, OFCR, OFNG, OFN, OFCG, and OFC cables installed in compliance with 300.22 shall be permitted. Listed plenum optical fiber raceways shall be permitted to be installed in ducts and plenums as described in ~~300.22(B)~~ 862.10(D) and in other spaces used for environmental air as described in ~~300.22(C)~~ 862.10(E). Only Type OFNP and OFCP cables shall be permitted to be installed in these raceways.

(B) Riser. Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3).

(1) Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type OFNR or OFCR. Floor penetrations requiring Type OFNR or OFCR shall contain only cables suitable for riser or plenum use. Listed riser optical fiber raceways and listed plenum optical fiber raceways shall also be permitted to be installed in vertical riser runs in a shaft from floor to floor as described in 862.10(F). Only Type OFNP, OFCP, OFNR, and OFCR cables shall be permitted to be installed in these raceways.

(2) Metal Raceways or Fireproof Shafts. Type OFNG, OFN, OFCG, and OFC cables shall be permitted to be encased in a metal raceway or located in a fireproof shaft having firestops at each floor.

(3) One- and Two-Family Dwellings. Type OFNG, OFN, OFCG, and OFC cables shall be permitted in one- and two-family dwellings. Listed general-purpose optical fiber raceways, listed riser optical fiber raceways, and listed plenum optical fiber raceways shall be permitted for use as described in 862.10(G) with Type OFNG, OFN, OFCG, and OFC cables.

FPN: See 300.21 for firestop requirements for floor penetrations.

(C) Other Cabling Within Buildings. Cables installed in building locations other than the locations covered in 770.154(A) and (B) shall be Type OFNG, OFN, OFCG, or OFC. Such cables shall be permitted to be installed in listed general-purpose optical fiber raceways, listed riser optical fiber raceways, and listed plenum optical fiber raceways as described in 862.10(G).

(D) Cable Trays. Optical fiber cables of the types listed in Table 770.179 shall be permitted to be installed in cable trays.

FPN: It is not the intent to require that these optical fiber cables be listed specifically for use in cable trays.

(E) Cable Substitutions. The substitutions for optical fiber cables listed in Table 770.154(E) and illustrated in Figure 770.154(E) shall be permitted.

Table 770.154(E) Cable Substitutions (existing, not shown)

770.182 ~~**Optical Fiber Raceways.** Optical fiber raceways shall be listed in accordance with 770.182(A) through (C).~~ **Nonmetallic Optical-Fiber Raceways (OFCR).** Nonmetallic Optical-Fiber Raceways (OFCR) shall be listed in accordance to Article 862.6.

~~**(A) Plenum Optical Fiber Raceway.** Plenum optical fiber raceways shall be listed as having adequate fire-resistant and low smoke-producing characteristics.~~

~~FPN: One method of defining that an optical fiber raceway is a low smoke producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with the plenum test in UL 2024, Standard for Optical Fiber Cable Raceway.~~

~~**(B) Riser Optical Fiber Raceway.** Riser optical fiber raceways shall be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.~~

~~FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, Standard for Optical Fiber Cable Raceway.~~

~~**(C) General-Purpose Optical Fiber Cable Raceway.** General-purpose optical fiber cable raceway shall be listed as being resistant to the spread of fire.~~

~~FPN: One method of defining resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, Standard for Optical Fiber Cable Raceway.~~

Substantiation: This is a companion proposal to correlate with the proposal for a new optical fiber/communication raceway article. The new optical fiber/communication raceway article was proposed to Panel 16 as Article 862.

Optical fiber/communication raceways (Type OFCR) are currently listed raceways for use in plenums, risers or general purpose applications for the management of signaling, optical fiber, communication and CATV cables. This new Article and the companion proposals will clarify the selection, and installation optical fiber/communication raceways including the construction specifications. It is not the intent of the submitter to revise or change any of the currently permitted uses by this proposal, but only to enhance the usability of the Code.

Panel Meeting Action: Reject

Panel Statement: This proposal was submitted in companion with Proposal 16-350, which was rejected. The submitter of this proposal assumes the acceptance of Proposal 16-350, which was rejected.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-4 Log #2270 NEC-P16 **Final Action: Accept in Principle**
(770.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:
770.1 Scope.
The provisions of this article apply to the installation of optical fiber cables, ~~and~~ raceways and optical fiber /communications cable routing assemblies. This article does not cover the construction of optical fiber cables and raceways.
Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways.. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber /communications cable routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)
For further information see the attached application guide from one of the manufacturers or got to http://www.storage-expo.com/ExhibitorLibrary/302/FiberRunner_6.pdf on the web.
The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
We have submitted companion proposals to provide for the listing and applications of optical fiber /communications cable routing assemblies.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
770.1 Scope.
The provisions of this article apply to the installation of optical fiber cables, raceways, and cable routing assemblies. This article does not cover the construction of optical fiber cables and raceways.
Panel Statement: The panel recognizes that the TCC is responsible for the scope. The panel recommends that the TCC accept this proposal. The panel changed the name from "optical fiber/communications cable routing assemblies" to "cable routing assemblies". See panel action on Proposal 16-12.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-5 Log #1443 NEC-P16 **Final Action: Reject**
(770.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "may result" to "is likely".
Substantiation: Edit. "May" is subjective and a term to be avoided per the Style Manual. Likely is defined as such a nature or circumstance as to make something probabe, and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitters recommendation is not editorial. The term "may" connotes "a possibility"; the term "likely" connotes "is probable". The panel does not agree that these are probable events.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-6 Log #813 NEC-P16 **Final Action: Reject**
(770.2.Abandoned Optical Fiber Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Optical Fiber Cable. Installed optical fiber cable that is not terminated at equipment other than a connector and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-7 Log #2087 NEC-P16 **Final Action: Reject**
(770.2.Air Duct)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Add a definition of air duct:
Air Duct. A conduit or passageway for conveying air to or from heating, cooling, air conditioning, or ventilating equipment, but not including the plenum. [**90A:**3.3.5]
Substantiation: The term "air duct" is used in the task group's proposal for 770.154. It should be defined. It is defined in Articles 800 and 820. The task group is also proposing to define it in Article 830. A proposal has been submitted to define air duct in Article 100. If the proposal for Article 100 is accepted, the panel or the TCC can act to remove the definitions from panel sixteen's articles.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Reject
Panel Statement: The term "air duct" is not used in Article 770 and should not be defined in the article, in accordance with the NEC Style Manual.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-8 Log #2088 NEC-P16 **Final Action: Accept**
(770.2.Composite Optical Fiber Cable)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
Composite Optical Fiber Cable. ~~These~~ A cables containing optical fibers and current-carrying electrical conductors.
Substantiation: This is an editorial proposal to change the style of the definition to the format typically used for definitions.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Revise text to read as follows:
Composite Optical Fiber Cable. A cable containing optical fibers and current-carrying electrical conductors.
Panel Statement: The panel notes that the original submittal had the plural "cables" changed to "cable".
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BRUNSSEN, J.: The Panel modified the submitter's text. Hence, the proper Panel Action should be 'Accept in Principle'.

16-9 Log #2089 NEC-P16 **Final Action: Accept**
(770.2.Conductive Optical Fiber Cable)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with the NEC Style Manual so that the definition does not contain the term being defined.
This action will be considered by the panel as a public comment.
Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
Conductive Optical Fiber Cable. ~~These~~ An optical fiber cable~~s~~ containing non–current-carrying conductive members such as metallic strength members, metallic vapor barriers, and metallic armor or sheath.
Substantiation: This is an editorial proposal to change the style of the definition to the format typically used for definitions.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-10 Log #213 NEC-P16 **Final Action: Accept**
(770.2.General-Purpose Optical Fiber Raceway)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with 2.2.2 of the NEC Style Manual to not contain mandatory text, such as "listed" and not contain the defined term.

This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise text to read as follows:

Optical Fiber Raceway. A raceway ~~for enclosing and routing optical fiber cables.~~ listed as a Plenum Optical Fiber Raceway, or a Riser Optical Fiber Raceway, or a General-Purpose Optical Fiber Raceway.
FPN: See Article 100 for a definition of Raceway.
Substantiation: The current definition "Optical Fiber Raceway" is wrong. It could be misinterpreted to be any raceway used for routing optical fiber cables; that is not the way the term "optical fiber raceway" is used in Article 770. The proposed definition is precise. Companion proposals have been submitted for Articles 800 and 820.
Panel Meeting Action: Accept
Panel Statement: The panel notes that the print line should be "Definitions" not "General-Purpose Optical Fiber".
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
GUBISCH, R.: The proposed definition contains a requirement which conflicts with 2.2.2 of the NEC Style Manual.

16-11 Log #2090 NEC-P16 **Final Action: Accept**
(770.2.Nonconductive Optical Fiber Cable)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with the NEC Style Manual with respect to the use of mandatory language.

This action will be considered by the panel as a public comment.
Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:

Nonconductive Optical Fiber Cable. ~~These~~ An optical fiber cable~~s~~ containing no metallic members and no other electrically conductive materials.
Substantiation: This is an editorial proposal to change the style of the definition to the format typically used for definitions.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-12 Log #3594 NEC-P16 **Final Action: Accept in Principle**
(770.2.Optical fiber /communications cable routing assembly)

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with the NEC Style Manual with respect to the use of mandatory language.

The Technical Correlating Committee further directs that the Chairs of Code-Making Panels 3 and 16 form a Task Group to correlate the actions taken on this proposal and Proposal 3-196.

This action will be considered by the panel as a public comment.
Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Add new text to read as follows:
Optical fiber /communications cable routing assembly. A flame retardant, nonmetallic assembly of pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings used to support and protect optical fiber, communications and data cables in applications with a high density of cabling such a information technology (computer) rooms, broadcast stations and telecommunications offices. Parts of the assembly may have hinged or removable covers. The assembly is designed for cables be laid or set in place after the enclosures have been installed as a complete system.
Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, Optical Fiber and Communication Cable Raceway. UL lists optical fiber /communications cable routing assemblies to UL2024a, Outline of Investigation for Optical Fiber Cable Routing Assemblies. Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)

For further information see the attached application guide from one of the manufacturers or got to http://www.storage-expo.com/ExhibitorLibrary/302/FiberRunner_6.pdf on the web.

The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.

Since users of the code may not be familiar with optical fiber / communications cable routing assemblies we are submitting this proposal to define them. We have submitted companion proposals to provide for a change of the scope of Article 770 to include optical fiber /communications cable routing assemblies and to provide listing and application for requirements for them. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Cable Routing Assembly. A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support listed cables.
Panel Statement: The panel action meets the submitters intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
GUBISCH, R.: The proposed definition contains a requirement which conflicts with 2.2.2 of the NEC Style Manual.
Comment on Affirmative:
BRUNSSEN, J.: The definition as stated in the Panel Meeting Action is incomplete as it fails to identify the types of cable to be supported and protected. Revise the Panel Meeting Action as follows: "**Cable Routing Assembly.** A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support and protect optical fiber, communications and data listed cables."
DORNA, G.: The panel action over-simplified the proposed definition. The submitter recommended:
Optical fiber /communications cable routing assembly. A flame retardant, nonmetallic assembly of pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings used to support and protect optical fiber, communications and data cables in applications with a high density of cabling such a information technology (computer) rooms, broadcast stations and telecommunications offices. Parts of the assembly may have hinged or removable covers. The assembly is designed for cables be laid or set in place after the enclosures have been installed as a complete system.
The panel action simplified the text to:
Routing Assembly. A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support listed cables.
Routing assemblies are listed for use with optical fiber and data/com cables, not any listed cable. The panel action should be changed to:
Routing Assembly. A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support listed optical fiber, communications and data cables.

16-13 Log #2091 NEC-P16 **Final Action: Accept in Principle**
(770.2.Optical Fiber Cable)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise 770.2 Optical Fiber Cable as follows:
770.2 **Optical Fiber Cable.** A factory-assembly of one or more optical fibers having an overall covering. Optical fiber cables transmit light for control, signaling, and communications through an optical fiber.
Substantiation: This additional text, editorially relocated from 770.6, appropriately belongs in a definition and more fully defines an optical fiber cable. (See companion proposal to delete 770.6.) The proposed revision is editorial.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle
Revise 770.2 Optical Fiber Cable as follows:
770.2 Optical Fiber Cable. A factory-assembly of one or more optical fibers, having an overall covering, which transmit light for control, signaling, and communications.
Panel Statement: The panel revised the definition to meet the NEC Style Manual. The revised recommendation wording meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-14 Log #2092 NEC-P16 **Final Action: Accept in Principle**
(770.2.Optical Fiber Raceway)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise 770.2, Optical Fiber Raceway, as follows:
Optical Fiber Raceway: A raceway for enclosing and routing optical fiber cables. <u>, and identified as a Plenum Optical Fiber Raceway, a Riser Optical Fiber Raceway, or a General-Purpose Optical Fiber Raceway.</u>
Substantiation: The current definition is too broad and could possibly be interpreted as including all types of metallic and nonmetallic conduit and ducts. The proposed editorial clarification associates the raceway with specific application to optical fiber cables.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-10.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-15 Log #118 NEC-P16 **Final Action: Reject**
(770.3)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
Optical Fiber Raceway. ~~A raceway for enclosing and routing listed optical fiber cables.~~ <u>A raceway listed as a Plenum Optical Fiber Raceway, or a Riser Optical Fiber Raceway, or a General-Purpose Optical Fiber Raceway.</u>
Substantiation: The current definition Optical Fiber Raceway is confusing. The definition of Optical Fiber Raceway in the 2005 NEC is:
Optical Fiber Raceway. A raceway designed for enclosing and routing listed optical fiber cables.
The 2008 NEC changed the definition to:
Optical Fiber Raceway. A raceway ~~designed for~~ enclosing and routing listed optical fiber cables.
The 2008 NEC definition is confusing because any raceway used for routing optical fiber cables could be considered an "optical fiber raceway" and that is not the way the term "optical fiber raceway" is used throughout Article 770. The proposed definition is precise. Companion proposals have been submitted for Articles 800 and 820.
Panel Meeting Action: Reject
Panel Statement: This text does not appear in 770.3.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-16 Log #2093 NEC-P16 **Final Action: Accept in Principle**
(770.3)

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 14 for comment.
Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Make the following changes:
770.3 Other Articles.
<u>Installations of optical fiber cables and raceways</u> ~~Circuits and equipment~~ shall comply with 770.3(A) and 770.3(B). Only those sections of Chapter 2 and Article 300 referenced in this article shall apply to optical fiber cables and raceways.
<u>**(A) Hazardous (Classified) Locations.** Listed optical fiber cables shall be permitted to be installed in hazardous (classified) locations. The cables shall be sealed in accordance with the requirements of 501.15, 502.15, 505.16, or 506.16, as applicable.</u>
(<u>B</u>~~A~~) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.
~~(B) Ducts, Plenums, and Other Air-Handling Spaces. The requirements of 300.22 for electric wiring shall also apply to installations of optical fiber cables and raceways where they are installed in ducts or plenums or other space used for environmental air.~~
~~Exception: As permitted in 770.154(A).~~
Substantiation: This proposal is a clarification.
There are no circuits and equipment in Article 770 which only covers optical fiber cables and raceways. The proposed wording is more accurate. The current section 770.3(B) provides no additional guidance or requirements that are not already in 770.154(A). It's redundant and perhaps confusing. Section 800.3 does not have a similar requirement.
The task group has also submitted proposals to delete 820.3(B) and 830.3(B) in order to remove conflicts within Articles 820 and 830. If these proposals are accepted there will be no "Ducts, Plenums and Other Air Handling Spaces" in the "Other Articles" sections of Articles 770, 800, 820 and 830.
The hazardous locations requirements from 770.154(F) have been moved to this section to improve the parallelism with Articles 800 and 820.
This proposal to delete "circuits and equipment" and the provisions for "Ducts, Plenums, and Other Air Handling Spaces" was submitted by the CMP 16 Special Editorial Task Group during the development of the 2008 NEC. The proposal was rejected in order to comply with the NFPA Standards Council Decision 05-24 (SC #05-7-4) dated 29 July 2005. The Standards Council Decision does not apply to the current NEC code cycle.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson, Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle
Revise proposed recommendation text to read as follows.
770.3 Other Articles.
Installations of optical fiber cables and raceways shall comply with 770.3(A) and 770.3(B). Only those sections of Chapter 2 and Article 300 referenced in this article shall apply to optical fiber cables and raceways.
(A) Hazardous (Classified) Locations.
Listed optical fiber cables and raceways shall be permitted to be installed in hazardous (classified) locations. The optical fiber cables and raceways shall be sealed in accordance with the requirements of 501.15, 502.15, 505.16, or 506.16, as applicable.
(B) Composite Cables. Composite optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.
Panel Statement: The panel modified the recommendation to include "optical fiber cables and raceways" in 770.3(A). This action accomplishes the "accept in principle" action of Proposal 16-63.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-17 Log #2094 NEC-P16 **Final Action: Accept in Principle**
(770.3 and 770.3(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Delete the following:
~~**(B) Ducts, Plenums, and Other Air-Handling Spaces.** The requirements of 300.22 for electric wiring shall also apply to installations of optical fiber cables and raceways where they are installed in ducts or plenums or other space used for environmental air.~~
~~*Exception: As permitted in 770.154(A).*~~
Revise 770.3 Other Articles as follows:
770.3 Other Articles. Circuits and equipment shall comply with 770.3(A) ~~and (B)~~. Only those sections of Chapter 2 and Article 300 referenced in this article shall apply to optical fiber cables and raceways.
Substantiation: This proposal is editorial.
Section 770.3(B) provides no additional guidance or requirements that are not already in 770.154(A). It's redundant and perhaps confusing. Section 800.3 does not have a similar requirement.
Acceptance of this proposal, as well as companion proposals for 820.3 and 830.3, will make Articles 770, 800, 820 and 830 consistent and in compliance with section 3.3.5 of the NEC Style Manual, shown below:
3.3.5 Parallel Construction. Parallel construction means stating similar requirements in similar ways for greater consistency. This helps makes the *NEC* clear for users. Lack of consistency often creates confusion, causing users to ask: *Does this difference in wording represent a different requirement? Or is it simply two different ways of trying to say the same thing?* There are several kinds of parallel construction:
Organization and Numbering. If practicable, the subsections of similar articles should be numbered in the same order (see 2.4.1).
Sections. Different sections, within the same article, that reflect similar or closely related subjects, should have similar structures.
Lists. All items in a list should be parallel (that is, singular or plural, written in the same verb tense, using phrases or sentences but not a mix).

This proposal was submitted by the CMP 16 Special Editorial Task Group during the development of the 2008 NEC. This proposal was rejected in order to comply with the NFPA Standards Council Decision 05-24 (SC #05-7-4) dated 29 July 2005. The Standards Council Decision does not apply to the current NEC code cycle.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 16-16. The panel action meets the intent of the submitter by deleting the existing 770.3(B).

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-18 Log #116 NEC-P16 **Final Action: Accept**

(770.3(B))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Deleted text:

~~**(B) Ducts, Plenums, and Other Air-Handling Spaces**. The requirements of 300.22 for electric wiring shall also apply to installations of optical fiber cables and raceways where they are installed in ducts or plenums or other space used for environmental air.~~

~~*Exception: As permitted in 770.154(A).*~~

Substantiation: Section 770.3(B) provides no additional guidance or requirements that are not already in 770.154(A). It's redundant and perhaps confusing to send an optical fiber cable installer to section 300.22 to look for requirements that are already in Article 770. Section 800.3 does not have a similar requirement. Elimination of 770.3(B) will improve the parallelism between the articles.

Panel Meeting Action: Accept

Panel Statement: See panel action on Proposal 16-16.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-19 Log #2097 NEC-P16 **Final Action: Accept**

(770.6)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Delete 770.6 as follows:

~~770.6 **Optical Fiber Cables.** Optical fiber cables transmit light for control, signaling, and communications through an optical fiber.~~

Substantiation: The information contained in 770.6 more appropriate as a definition and has been incorporated in 770.2, Optical Fiber Cable. (See companion proposal for 770.2, Optical Fiber Cable.) The proposed revision is editorial.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-20 Log #30 NEC-P16 **Final Action: Accept in Principle**

(770.12 and 770.110 (New))

NOTE: This proposal appeared as Comment 16-26 on Proposal 16-38 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-38 was:

Make the following changes:

770.12 ~~Raceways~~ Innerduct for Optical Fiber Cables.

~~**Installations of raceways shall comply with 770.12(A) through 770.12(D).**~~

~~**770.12(A) Listed Chapter 3 Raceways. Listed optical fiber cable shall be permitted to be installed in any type of listed raceway permitted in Chapter 3 where that listed raceway is installed in accordance with Chapter 3. Where optical fiber cables are installed within raceway without current-carrying conductors, the raceway fill tables of Chapter 3 and Chapter 9 shall not apply. Where nonconductive optical fiber cables are installed with electric conductors in a raceway, the raceway fill tables of Chapter 3 and Chapter 9 shall apply**~~**.**

~~**770.12(B) Optical Fiber Raceways. Listed optical fiber cable shall be permitted to be installed in listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway installed in accordance with 770.154 and 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing shall apply.**~~

~~**(C) Innerduct.**~~ **Listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway installed in accordance with 770.154 shall be permitted to be installed as innerduct in any type of listed raceway permitted in Chapter 3.**

~~**(D) Entering Buildings. Unlisted underground or outside plant construction plastic innerduct entering the building from the outside shall be terminated and firestopped at the point of entrance**~~

770.110 Raceways for Communications Wires and Cables. Where optical fiber cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway installed in accordance with 770.154, and with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.ÊWhere optical fiber cables are installed in raceway without current-carrying conductors, the raceway fill tables of Chapter 3 and Chapter 9 shall not apply. Where nonconductive optical fiber cables are installed with electric conductors in a raceway, the raceway fill tables of Chapter 3 and Chapter 9 shall apply.

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: The panel action on the Proposal should continue to be Accept in Principle, however, the following additional changes should be made to the panel action:

Revise 770.12 as shown:

770.12 ~~Innerduct for~~ Optical Fiber Cables Installed in Raceways. Listed ~~plenum~~ optical fiber raceways~~, listed riser optical fiber raceway, or listed general purpose optical fiber raceway~~ selected in accordance with the provisions of 770.154 shall be permitted to be installed ~~as innerduct~~ in any type of listed raceway permitted in Chapter 3.

Revise the new 770.110 as follows:

770.110 Raceways for Optical Fiber Cables. Where optical fiber cables are installed in a raceway, the raceway shall be either of a type ~~either~~ permitted in Chapter 3 and installed in accordance with Chapter 3 or a listed ~~plenum~~ optical fiber raceway~~, listed riser optical fiber raceway, or listed general purpose optical fiber raceway~~ selected in accordance with the provisions of 770.154, and installed in accordance with ~~362.24~~ 362.22 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply. ~~Where optical fiber cables are installed in raceway without current carrying conductors, the raceway fill tables of Chapter 3 and Chapter 9 shall not apply. Where nonconductive optical fiber cables are installed with electric conductors in a raceway, the raceway fill tables of Chapter 3 and Chapter 9 shall apply.~~

Substantiation: "Innerduct" is not defined in the Code and is only used in 770.12. Changing the text as proposed will still permit the installation of listed optical fiber raceways (plenum, riser, or general-purpose) in any type of listed raceway permitted in Chapter 3 without adding an undefined term to the Code. Addition of the term "innerduct" is not necessary to permit the installations proposed, may be confusing to the user since it is not used anywhere else in the Code, and does not add clarity nor enhance usability of the Code.

Relocation of the word "either" provides the consistency between Articles 770, 800, and 820 that the proposer indicated as one of the objectives in the substantiation.

Using the term "listed optical fiber raceways" will also permit the installation of other types of listed optical fiber raceways that may be included in future Codes without having to revise 770.12.

The first sentence in the submitter's substantiation states that "This is an editorial proposal." Deletion of the maximum percentage fill requirements for Chapter 3 raceways is not editorial.

No substantiation was submitted to support the deletion of the maximum percentage fill requirements of Chapters 3 and 9. The fill requirements are based on the physical limitations of being able to pull conductors or cables into raceways without damaging the conductors or cables, particularly when there are bends in the run, and avoiding conductor/cable jamming. The maximum percentage fill requirements are independent of whether they are electrical conductors or not.

The maximum percentage fill requirements in Chapters 3 and 9 are an integral part of the permitted uses of the raceways contained in Chapter 3 and if conductors or cables are to be installed in a Chapter 3 raceway, then the maximum percentage fill requirements must also apply.

The first sentence in proposed 770.10 already states that "installed in accordance with Chapter 3" which would include all of Chapter 3 requirements pertaining to raceways including the maximum percentage fill limitations in Chapter 9. The proposal introduces conflicting requirements between the first and second sentences.

Chapter 9, Table 1 permits 53 percent fill when one conductor or cable is installed in a raceway; 31 percent for two; and 40 percent for three or more.

When electrical conductors are installed in raceways, with or without nonmetallic optical fiber cable or nonmetallic optical fiber raceways, then 310.15 applies and the ampacity adjustment factors in Table 310.15(B)(2)(a) for more than three current-carrying conductors in a raceway or cable would also apply, if applicable.

Panel Meeting Action: Accept in Principle
Panel Statement: The panel accepts in principle the revision of 770.110. See panel action on Proposal 16-47, which addresses 770.110. The panel rejects the revision to 770.12 because the term "innerduct" is well known and understood by installers of optical fiber cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-21 Log #946 NEC-P16 **Final Action: Reject**
(770.24)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Cables shall be securely supported and fastened in place except where installed in raceways, cable trays or fished between access points in existing buildings and structures and intermediate support is not practical. Such cables shall be secured to supports by straps, staples, cable ties, hangers or other fittings identified for the purpose. The installation shall also comply with applicable provisions of 400.4 and 300.1.
Substantiation: "Neat" and "workmanlike" are subjective and terms to be avoided per the Style Manual, and "will" is a term that is not to be used, per the Style Manual. The manner of support does not necessarily prevent damage. See 110.13(A).
Panel Meeting Action: Reject
Panel Statement: The proposed text provides no improvement or clarification over the existing text. The proposal refers to 400.4 and 300.1 which are not applicable.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-22 Log #3090 NEC-P16 **Final Action: Reject**
(770.24)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
770.24 Mechanical Execution of Work.
Optical fiber cables shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform with 300.4~~(D)~~ and 300.11.
FPN: Text to remain unchanged.
Substantiation: This is one of a series of proposals intended to provide correlation with sections 640.6(B), 725.24, 760.24, 770.24, 800.24, 820.24 and 830.24. Due to the power limitations of these circuits, there is no reason that the requirements should be different.
Panel Meeting Action: Reject
Panel Statement: Optical fiber cables contain no power and do not present a potential electrical safety hazard. There is insufficient substantiation to justify a major increase in physical protection requirements for optical fiber cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-23 Log #3721 NEC-P16 **Final Action: Accept in Principle**
(770.24, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add the following Fine Print Note:
<u>FPN: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in air-handling plenums in accordance with 300.22.</u>
Substantiation: This proposal addresses new requirements in NFPA 90A having an influence on installations in NEC Section 770.24, as well as held comments from the 2008 NEC Cycle, ROC 16-29 and 16-30.
Imposing the requirement that such products be "listed" in this section of the NEC would result in additional requirements not included in NFPA 90A. The implication of requiring listing in this section of the NEC would impose the full scope of requirements in UL 1565 for cable ties and UL 2239 for other support hardware. This effort to correlate with NFPA 90A would create big correlation issues within NFPA 70 for the same products used for supporting all other cables and conduits outside of the jurisdiction of code-making panel 16, for no good reason. It is not necessary to repeat requirements from NFPA 90A in NFPA 70 especially when doing so imposes unsubstantiated additional requirements.
The NFPA 90A requirements are focused on smoke and heat generated from a fire in an air-handling plenum. The NFPA 90A-2009 requirement is as follows for discrete combustible components installed in air-handling spaces in accordance with NEC 300.22 (C) and (D): (The actual clause numbers in NFPA 90A-2009 may vary editorially)
NFPA clause 4.3.10.2.6.5 Loudspeakers, recessed lighting fixtures and other electrical equipment with combustible enclosures, including their assemblies and accessories, cable ties and other discrete products shall be permitted in the ceiling cavity plenum where listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with UL2043, *Standard for Safety Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.*
And very similar requirements in 4.3.10.6.5.6 apply in NFPA 90A for discrete <u>combustible</u> products installed in a "raised floor plenum".
Importantly, none of these requirements pertain to noncombustible products. There are many metallic products, including metallic cable ties, used to support power, data and communications conduits and cables and there has been no substantiation offered that these be required to be "listed".
Panel Meeting Action: Accept in Principle
Revise Fine Print Note text to read as follows:
FPN No. 2: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in accordance with 300.22(B) and (C).
Panel Statement: The panel removed the vague term "air-handling plenums" and added the references to 300.22(B) and (C). This meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-24 Log #4551 NEC-P16 **Final Action: Reject**
(770.25)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
770.25 Abandoned Cables.
The accessible portion of abandoned optical fiber cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. <u>Removal of abandoned cables shall be performed in a neat and workmanlike manner.</u>
Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 770.24. It is important to point out that similar care must be taken when removing cables.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Consistent wording is being proposed for other sections in the code.
For information, see relevant definitions in the NEC.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.
Panel Meeting Action: Reject
Panel Statement: This is an unenforceable requirement. Removing abandoned cable involves pulling unused cable and wiring from conduit, raceways, ducts, shafts and drop ceilings. The objective of the original text is directed at the final installation, that it be "neat and workmanlike", not necessarily the installation (in this case, removal) process. The submitter has provided no substantiation for additional requirements during the removal process.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-25 Log #1596 NEC-P16 **Final Action: Reject**
(770.26)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Add a third sentence to 770.26: <u>Conduits or raceways entering enclosures of the ventilated type, shall be sealed or plugged with an approved fire stopping material at the point of entrance to the enclosure to prevent fire, smoke, or other products of combustion from passing through the raceway into other areas of the building or structure.</u>
Substantiation: A fire in the area where the enclosure is located will produce smoke, poison gases, and other products of combustion which can easily be carried through the enclosure's vents and these unsealed raceways to other areas in the building. Essentially defeating any firewalls. I have not seen this particular problem addressed in building codes or fire resistance directories since these raceways are not "sleeves" which ARE required to be fire stopped, but rather they are complete raceway systems which generally require only sealing up around the OUTSIDE of the pipe where it penetrates a firewall. In this particular installation smoke could easily pass right through the INSIDE of the raceway because of the ventilation openings in the enclosure.

I have witnessed the results of this "chimney-effect" problem when the smoke from a fire in a basement electric room spread throughout the upper floors of a high rise building because the raceways leaving the switch gear acted like chimneys and transported heavy smoke from the basement directly to panelboards and switchboards on the upper floors of the building thus bypassing and defeating any fire walls that the raceways penetrated and completely filling the UPPER floors with smoke. Luckily nobody was injured. If the ends of the raceways were simply filled with some fire-stopping type caulk or similar material this situation would probably never have happened.

Once a fire starts to produce toxic fumes we almost have to think of that area as a Hazardous (classified) location similar to those in Article 500. We must try to prevent those hazardous gases passing from one area in a building to another.

Just as other sealing requirements throughout the code prevent moisture, condensation, dusts, gases or vapors from traveling through raceways, this requirement for some simple fire proof putty could prevent toxic fumes from spreading throughout the building. The seals required by this proposal are equally as important as any other seals required by the NEC such as 230.8, 300.5(G), 300.7(A), 300.50(E), 312.5(C) exception to (D), 324.40(A), 332.40(A), 368, 238, 372.7, 501.15, 502.15, 504.70, 505.16, 506.16, 680.24(B) and any other seals that may be required.

I am submitting companion proposals to sections 300.21, 770.26, 800.26, 820.26 and 830.26.

Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposed recommendation is impractical. The submitter has not supplied sufficient data for substantiation of a problem.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
IVANS, R.: The submitter is correct that vented enclosures connected via unsealed raceways and conduit can bypass fire breaks between floors. It would not be impractical to seal such raceways or conduit.

16-26 Log #2095 NEC-P16 **Final Action: Accept in Principle**
(770.48(A))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
(A) Conductive and Nonconductive Cables. Unlisted conductive and nonconductive outside plant optical fiber cables shall be permitted to be installed in <u>building spaces other than risers, air ducts, plenums and other spaces used for environmental air</u>, ~~locations as described in 770.154(C)~~, where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated in an enclosure.
Substantiation: This proposal is editorial clarification. It is clearer to specify the actual locations in 770.154(C) than to refer to section 770.154(C). The locations described in 770.154(C) are risers, air ducts, plenums and other spaces used for environmental air.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
770.48 Unlisted Cables and Raceways Entering Buildings.
(A) Conductive and Nonconductive Cables. Unlisted conductive and nonconductive outside plant optical fiber cables shall be permitted to be installed in building spaces other than risers, ducts used for environmental air, plenums used for environmental air, and other spaces used for environmental air, where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated in an enclosure.
Panel Statement: The revised text adds clarity and meets the intent of the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-27 Log #2096 NEC-P16 **Final Action: Accept**
(770.48(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
(B) Nonconductive Cables <u>In Raceway.</u> Unlisted nonconductive ~~optical fiber~~ outside plant optical fiber cables shall be permitted to enter the building from the outside and run in raceway systems installed in compliance with any of the following articles in Chapter 3: Article 342, Intermediate Metal Conduit: Type IMC; Article 344, Rigid Metal Conduit: Type RMC; Article 352, Rigid Polyvinyl Chloride Conduit: Type PVC; and Article 358, Electrical Metallic Tubing: Type EMT.
Substantiation: This is an editorial proposal.
770.48(B) deals with nonconductive cables in raceway. The revision of the title is an editorial clarification. Striking "optical fiber" removes a redundancy.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-28 Log #4492 NEC-P16 **Final Action: Reject**
(770.100)

Submitter: Steve Zugay, Alcatel-Lucent
Recommendation: Add new text as follows:
<u>(E) **Indoor Fiber.** Where a non-metallic fiber optic cable enters a structure through an outside wall and connects to a listed appliance acting as an indoor distribution network for communications cables, grounding of the appliance can be achieved by utilizing a flexible cord and 3-prong plug.</u>
Substantiation: Fiber optic network equipment designed to act as an indoor cable distribution network does not specifically require a connection to ground. However, this equipment may be connected to the building ground as required by the listing. If by definition it is not exposed to the outside plant, grounding with a flexible cord and 3-prong plug is sufficient to bring all devices it serves to the same potential. Since some devices in a home that would connect to a cable distribution network do not contain ground and the product standards used for such products may assume that a coax cable shield is grounded, this should not change that assumption.
Panel Meeting Action: Reject
Panel Statement: Equipment requirements are beyond the scope of Article 770 which addresses fiber optic cables and raceways only.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-29 Log #3091 NEC-P16 **Final Action: Accept in Principle**
(770.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(A) Grounding Conductor.
(1) <u>Listing</u> ~~Insulation~~. The grounding conductor ~~shall be insulated and~~ shall be listed.
Substantiation: There is no electrical reason that this conductor should be required to be insulated. This proposal provides consistency with nearly every other grounding/bonding related section of the code.
Panel Meeting Action: Accept in Principle
Revise 770.100(A)(1) to read as follows:
(1) Insulation. The grounding conductor shall be listed and shall be permitted to be insulated, covered or bare.

Panel Statement: The grounding conductor does not need to be insulated but for esthetic reasons, such as exposed grounding conductors routed within a premises, insulation or covering may be appropriate. Adding ‘covered’ accommodates proposal 16-30. Permitting all three, ‘insulated, covered or bare” will clarify that all three are now permitted since for many years only an insulated conductor was permitted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
GUBISCH, R.: There is no need to list a grounding conductor consisting of bare wire.

16-30 Log #4393 NEC-P16 **Final Action: Accept in Principle in Part**
(770.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Jake Killinger, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
770.100 Entrance Cable Grounding.
When grounded, the non-current-carrying metallic members of optical fiber cables entering buildings shall be grounded as specified in 770.100(A) through (D).
(A) Grounding Conductor.
(1) ~~Insulation~~Insulated or Covered Conductors. The grounding conductor shall be permitted to be insulated, or covered and shall be listed as Protector Grounding Conductors.
(remaining text remains unchanged)
Substantiation: This is a sister proposal to 800.100.
The existing text would require fully insulated and Listed conductors for cable and primary protector grounding whereas in most other cases, bare conductors are usually adequate for most grounding purposes. Prior to the 1990 NEC, protective grounding conductors were required to have 30 mil rubber insulation and be covered by a fibrous covering. It also permitted conductors Listed for this use having less than 30 mil rubber insulation or having other kinds of insulation. In 1990 the NEC removed the thickness statements so that it read the grounding conductor shall be insulated and shall be listed as suitable for the purpose. In 2008, the suitable for the purpose clause was removed.
Discussions with past members of this CMP revealed that the reason for specifying insulated conductors was only to combat theft of uncovered copper wire. That being the case, thinner insulated conductor was permitted so long as it gave the same illusion of a conductor carrying power.
Listed Protector Grounding Conductors having less than the full insulation of Listed and insulated conductors exist today. These are based on the past allowances for thinner insulations. The 2008NEC text would literally not permit the use of these thinner walled insulated conductors and would make their certification obsolete.
If the reason for using the term ‘insulated’ was merely to provide a theft deterrent, then fully insulated wire is unnecessary. By definition in Article 100, only a “covered” conductor would be more than adequate. Therefore propose changing the text to permit both “insulated as well as “covered” conductors.
Also propose adding “Protector Grounding Conductor” to help identify the type of Listed products suitable in this application. These “Protector Grounding Conductors” are surface marked with this terminology to make it clear that they are listed only for this purpose and are not intended for general use with other Articles in the Code. They are presently certified under UL’s KDER category, but may be relocated to the KDSH (Grounding and Bonding Equipment – Communication) category to make their restricted use more obvious.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: Accept in principle the part to add “covered”. See panel action and statement on Proposal 16-29 which now permits the use of listed insulated, covered or bare conductors. The title is left as “insulation” since the paragraph now deals with levels of insulation.
Reject the parts adding the phrases “permitted to be” and “as a protector grounding conductor”. The panel does not want to restrict the listed wire to only listed “protector grounding conductors”.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-30a Log #CP1603 NEC-P16 **Final Action: Accept**
(770.100(A)(3))

Submitter: Code-Making Panel 16,
Recommendation: Revise text to read as follows:
(3) Size. The grounding conductor shall not be smaller than 14 AWG. It shall have a current-carrying capacity ~~approximately equal to or greater~~ not less than that of the grounded metallic member(s). The grounding conductor shall not be required to exceed 6 AWG.
Substantiation: This change correlates 770.100(A)(3) with similar changes in 820.100(A)(3) and 830.100(A)(3). 770.93(A) and (B) permit metallic member(s) to be either grounded or interrupted. The phrase “approximately equal to” is vague and subjective. The word “grounded” is added as only those metallic members that are grounded need be considered when determining the size of the grounding conductor. See Panel Action on Proposals 16-255 and 16-322.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-31 Log #945 NEC-P16 **Final Action: Reject**
(770.100(A)(5))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Where ~~necessary~~ likely to be subject to physical damage the grounding conductor shall be protected by approved means. ~~Guarded from physical damage~~. (remainder unchanged)
Substantiation: Edit.
Panel Meeting Action: Reject
Panel Statement: The present wording is clear and the proposed revisions provide no improvement in clarity. The term “guarded” is a defined term while “protected” is undefined. The definition of “guarded” includes examples of appropriate guarding methods while the term “approved means” is ambiguous.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-32 Log #194 NEC-P16 **Final Action: Accept**
(770.100(B))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal as the existing numbering complies with the NEC Style Manual, and is consistent with other lists in the code.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Renumber 770.100(B) as shown.
(B) Electrode. The grounding conductor shall be connected in accordance with 770.100(B)(1), (B)(2), or (B)(3).
(1) In Buildings or Structures with an Intersystem Bonding Termination. If the building or structure served has an intersystem bonding termination, the grounding conductor shall be connected to the intersystem bonding termination.
(2) In Buildings or Structures with Grounding Means. If the building or structure served has no intersystem bonding termination, the grounding conductor shall be connected to the nearest accessible location on the following:
(~~1~~a) The building or structure grounding electrode system as covered in 250.50
(~~2~~b) The grounded interior metal water piping system, within 1.5 m (5 ft) from its point of entrance to the building, as covered in 250.52
(~~3~~c) The power service accessible means external to enclosures as covered in 250.94
(~~4~~d) The metallic power service raceway
(~~5~~e) The service equipment enclosure
(~~6~~f) The grounding electrode conductor or the grounding electrode conductor metal enclosure
(~~7~~g) The grounding conductor or the grounding electrode of a building or structure disconnecting means that is grounded to an electrode as covered in 250.32
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 770.100(B)(2), the grounding conductor shall be connected to either of the following:
(~~1~~a) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4).
(~~2~~b) If the building or structure served has no grounding means, as described in770.100(B)(2) or (B)(3)(1), to an effectively grounded metal structure or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in800.53and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.
Substantiation: The current numbering is not in compliance with the style manual. See section 2.1.5.3 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-32a Log #CP1606 NEC-P16 **Final Action: Accept**
(770.100(B)(1))

Submitter: Code-Making Panel 16,
Recommendation: Revise 770.100(B)(1) as follows:
“If the building or structure served has an intersystem bonding termination as required by 250.94, the grounding conductor shall...”.
Substantiation: This change provides correlation with the revision to 800.100(B)(1) accepted by the Panel. See Panel action on Proposal 16-147.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-33 Log #1120 NEC-P16 **Final Action: Accept**
(770.100(B)(1), FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Add the FPN following 770.100(B) (1):
FPN: See Article 100 for the definition of *Intersystem Bonding Termination*.
Substantiation: *Intersystem Bonding Termination* is a new and unfamiliar term introduced in the 2008 NEC. The FPN reference to Article 100 will help ensure that NEC users not only become familiar with the new terminology, but encourage application of this preferred intersystem bonding arrangement as well.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-34 Log #3092 NEC-P16 **Final Action: Reject**
(770.100(B)(2)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(2) Text to remain unchanged.
(1) Text to remain unchanged.
(2) Text to remain unchanged.
~~(3) The power service accessible means external to enclosures as covered in 250.94~~
~~(4)~~ (3) Text to remain unchanged.
~~(5)~~ (4) Text to remain unchanged.
~~(6)~~ (5) Text to remain unchanged.
~~(7)~~ (6) Text to remain unchanged.
Substantiation: The item being discussed in (3) is the item covered in 770.100(B)(1), so there is no reason for it to be in 770.100(B)(3).
Panel Meeting Action: Reject
Panel Statement: 770.100(B)(1) covers buildings or structures that have an intersystem bonding termination. 770.100(B)(2) covers buildings or structures that do NOT have an intersystem bonding termination. Accessible means other than the intersystem bonding termination are identified in the 250.94 Exception.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-35 Log #1444 NEC-P16 **Final Action: Accept in Principle in Part**
(770.100(B)(2)(4) and (D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise. (B)(2)(4): The nonflexible ~~power~~ service raceway. In (D) substitute "electric service" in lieu of "power".
Substantiation: Edit. Type MC cable and FMC permitted by 230.43 do not appear to be suitable for grounding conductor terminations. "Power" service may be inferred to exclude a "lighting" service.
Panel Meeting Action: Accept in Principle in Part
Revise existing 770.100(B)(2)(4) as follows:
(4) The nonflexible metallic power service raceway.
Reject the remainder of the proposal.
Panel Statement: The panel accepts in principle the part adding "nonflexible". The panel rejects the part replacing "power" with "electric".
While the term "service" may be correct based upon the definition in Article 100, use of the word "power" provides clarity and helps the reader to distinguish between "power" service and communications service, and between the communications grounding electrode and the "power" grounding electrode system. Adding the term "nonflexible" is consistent with 250.94 Exception (1). [Note: The Panel understands that the submitter intended to add "nonflexible".]
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-36 Log #3725 NEC-P16 **Final Action: Reject**
(770.100(B)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 770.100(B)(3) as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 770.100(B)(2), one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and comply with the requirements of 250.56 being applicable to rod, pipe, and plate electrode installations. ~~the grounding conductor shall be connected to either of the following:~~
~~(1) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4).~~
~~(2) If the building or structure served has no grounding means, as described in770.100(B)(2) or (B)(3)(1), to an effectively grounded metal structure or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.~~
Substantiation: The requirement in existing 770.100(B)(3)(1) to connect the grounding electrode conductor to either a metal underground water pipe, the metal frame of a building or structure, a concrete-encased electrode, or a ground ring seems to require these electrodes to be installed as the subject of this section is **"Buildings or Structures Without …. Grounding Means."** This is not consistent with 250.50 that only requires the use of such electrodes where they are "present at each building or structure served." In addition, the first sentence of 770.100(B)(3)(2) is not a complete sentence, is simply a list of references, and thus has no meaning. In addition, it allows either a rod or pipe electrode to be used that is only 1.5 m (5 ft) in length and 12.7 mm (½ in.) in diameter and driven where practicable into permanently damp earth. Into permanent damp earth is a good requirement but is doubtfully attained with a ½ in. rod or ½ in. pipe 5 ft in length.
The requirements of this section should state that where a building or structure is without grounding means, it is to have such reasonable grounding means installed such as a ground ring, rod, pipe, plate, or other underground metal structure that is recognized by Article 250 and more specifically 250.52(A)(4), (A)(5), (A)(6), (A)(7), and (A)(8). Also, 250.56 already requires that rod, pipe, and plate electrodes that do not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52(A)(4) through (A)(8), and that where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart. This revision would bring the grounding of optical fiber cable into line with the requirements of Article 250 for both consistency and for technical application.
In addition 250.60 already states, "Air terminal conductors and driven pipes, rods, or plate electrodes used for grounding air terminals shall not be used in lieu of the grounding electrodes required by 250.50 for grounding wiring systems and equipment." With the revisions being sought, these revisions would also prohibit other possible electrodes not recognized by 250.52.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for eliminating the 5-ft telecom ground rod, currently permitted by 770.100(B)(3)(2), that has been used successfully and safely by the telecom industry for decades. The tutorial, The ABCs of Grounding and Bonding, states: "Very little resistance change will result from using larger sizes of electrodes." The most important safety aspect is the bonding together of the power and telecom systems. When bonded together as specified in 770.100(D), intersystem voltages are equalized and the telecom grounding electrode, if separate, becomes part of the grounding electrode system at the premises.
The electrodes identified in 250.52(A)(4) through (A)(8), as proposed by the submitter, are intended for power system applications. Where power contact to conductive optical fiber cables is of concern (i.e., power fault) currents are limited by the equivalent small gauge of the metallic members, precluding the need for expansive and expensive grounding electrodes.
Finally, the title of 770.100(B)(3), "In Buildings or Structures Without …… Grounding Means" must be considered in context with the preceding Section 770.100(B)(2) where specific grounding means at the building or structure are identified.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-37 Log #1121 NEC-P16 **Final Action: Accept**
(770.100(B)(3)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text of 770.100(B)(3)(2) as follows:
"….. or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (1/2 in) in diameter, driven …".
Substantiation: The non-metric equivalent units were inadvertently omitted in the 2008 NEC text.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-38 Log #1122 NEC-P16 **Final Action: Accept**
(770.100(B)(3)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the last sentence of 770.100 (B)(3)(2) as follows:
Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for ~~protectors~~ non-current-carrying metallic members.
Substantiation: The word "protectors" should be deleted as protectors are not used with optical fiber cable. The proposed revision provides correlation with 830.100(B)(3)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-39 Log #3093 NEC-P16 **Final Action: Reject**
(770.100(B)(3)(2))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal since the phrase "effectively grounded" is no longer defined in the NEC.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(3) Text to remain unchanged
(1) Text to remain unchanged
(2) If the building or structure served has no grounding means, as described in 770.100(B)(2) or (B)(3)(1), to ~~an effectively grounded metal structure or to~~ a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.
Substantiation: The term "effectively grounded" is vague and unenforceable, as indicated by actions taken by the technical committees for the 2008 NEC. Furthermore, if this section is intending to address a metal building frame or underground metal structure, these items are already covered in 770.100(B)(2).
Panel Meeting Action: Reject
Panel Statement: The term "effectively grounded" is defined in the National Electrical Safety Code (NESC) as "Intentionally connected to earth through a ground connection ….", It is used extensively in that document and should remain. A metal building might itself be effectively grounded even though it does not have one of the identified grounding means in it. 770.100(B)(3)(2) permits connecting the grounding conductor to such a structure.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-40 Log #3940 NEC-P16 **Final Action: Accept in Principle**
(770.100(B)(3)(2))

Submitter: James Kelley, Sargent & Lundy
Recommendation: Revise text to read as follows:
(2) If the building or structure served has no grounding means, as described in 770.100(B)(2) or (B)(3)(1), to an effectively grounded metal structure or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (<u>0.5</u> in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.
Substantiation: Insert the value of the inch units for the standard conversion of the 12.7 mm size rod or pipe missing from within the parenthesis provided that this is not intended to be a trade size of rod or pipe in which case, according to the 2003 National Electrical Code Style Manual, amended January 15, 2003,3.2.7.3.1, the trade size designator shall be used instead of the metric and converted units of measurement.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-37.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-41 Log #1123 NEC-P16 **Final Action: Accept**
(770.101)

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Relocate 770.101 to 770.114 (New).
Revise text as follows:
Non-current-carrying conductive members of optical fiber cables shall be <u>bonded to a grounded equipment rack or enclosure, or</u> grounded according to the grounding methods specified by ~~770.100~~ <u>770.100(B)(2)</u>.
Substantiation: 770.101 is intended to apply to cables within the building [see 770.133(C) in the 2005 NEC] and hence is improperly located in the 2008 NEC. The grounding rules of 770.100 generally apply to cables entering or terminating on buildings. A more succinct and limited reference is appropriate for cables within buildings as contained in 770.100 (B)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-42 Log #1124 NEC-P16 **Final Action: Accept**
(770.106)

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
Where grounded as required by 770.100 at a mobile home, the non-current-carrying metallic members of optical fiber cables entering ~~buildings~~ <u>the mobile home</u> shall be grounded as specified in 770.106(A) and (B).
Substantiation: Section 770.106 is specific to mobile homes, not buildings. Hence, the term 'building' is inappropriate.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-43 Log #1125 NEC-P16 **Final Action: Accept**
(770.106(A))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
"… the ground for non-current-carrying metallic members of optical fiber cables entering ~~buildings~~ <u>the mobile home</u> shall be in accordance with 770.100(B)(3)."
Substantiation: Section 770.106 is specific to mobile homes, not buildings. Hence, the term 'building' is inappropriate.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-44 Log #1126 NEC-P16 **Final Action: Accept**
(770.106(A))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
<u>**(A) Grounding.** Grounding shall comply with 770.106(A)(1) and (A)(2).</u>
<u>(1) Where there is no mobile home service equipment located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, the ground for non-current-carrying metallic members of optical fiber cables entering the mobile home shall be in accordance with 770.100(B)(3).</u>
<u>(2) Where there is no mobile home disconnecting means grounded in accordance with 250.32 and located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, the ground for non-current-carrying metallic members of optical fiber cables entering the mobile home shall be in accordance with 770.100(B)(3).</u>
Substantiation: This proposed revision is intended to editorially correlate 770.106(A) with similar requirements in 800.106(A), 820.106(A) and 830.106(A). As part of this proposed change, the text "buildings" has been changed to "the mobile home" as 770.106 deals solely with mobile homes, not buildings. See companion change proposals for 770.106 and 770.106(A). Note also that the text "from" has been changed to "of" and a comma added after the word "serves".
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-45 Log #1127 NEC-P16 **Final Action: Accept**
(770.106(B))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
"(B) Bonding. The ~~primary protector grounding terminal or~~ grounding electrode shall be bonded to the metal frame or available grounding terminal of the mobile home …".
Substantiation: Protectors are not used with optical fiber cable and hence should be deleted. It is necessary to bond the electrode to the mobile home metal frame to minimize any potential difference between the mobile home and the non-current-carrying conductive members of the optical fiber cable (if present).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-46 Log #1442 NEC-P16 **Final Action: Reject**
(770.110)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: Where optical fiber cables are installed in a raceway, cable tray, or other enclosure the wiring method shall be identified for the purpose. Listed plenum optical fiber cable raceway, listed optical fiber cable riser raceway, or listed general purpose optical fiber cable raceway, selected in accordance with the provisions of 770.154, and installed in accordance with 362.24 through 362.56, where the provisions applicable to electrical nonmetallic tubing shall apply. Where only conductive fiber optic cables are installed in a raceway, box, or other enclosure, conductor fill limitations shall not apply. Where optical fiber cables are installed in a raceway or other enclosure with electric circuit conductors, applicable raceway and enclosure fill requirements shall also apply to the optical fiber cables.

Substantiation: All wiring methods, including boxes, cabinets, cable trays should be identified for the use. Auxiliary gutters are not noted in the definition of raceway. "Nonconductive" optical fiber cables are not defined. There are no raceway fill tables in Chapter 3. Maximum fill requirements should apply to all types of optical fiber cables to prevent damage to electrical circuit conductors and the optical fiber cables.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 16-47, which clarifies that raceway fill tables do not apply to installations without electrical conductors. Damaged optical fiber cables are not an electrical shock or fire safety issue.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-47 Log #2083 NEC-P16 **Final Action: Accept in Principle**
(770.110)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise 770.110 as follows:
770.110 Raceways for Optical Fiber Cables.
(A) Types of Raceways.
Optical fiber cables shall be permitted to be installed in any raceway that complies with either (A)(1) or (A)(2).
(1) Chapter 3 Raceways. ~~Where~~ Optical fiber cables shall be permitted to be ~~are~~ installed in ~~a~~ any raceway, ~~the raceway shall be either of a type~~ included ~~permitted~~ in Chapter 3. The raceways shall be ~~and~~ installed in accordance with the requirements of Chapter 3.
(2) Other Permitted Raceways. ~~or~~ Optical fiber cables shall be permitted to be installed in listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway selected in accordance with the provisions of ~~770.154~~ 770.113, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
(B) Raceway Fill for Optical Fiber Cables.
Raceway fill for optical fibers cables shall comply with either (B)(1) or (B)(2)
(1) Without Electric Light or Power Conductors. Where optical fiber cables are installed in raceway without electric light or power ~~current-carrying~~ conductors, the raceway fill ~~tables~~ requirements of Chapter 3 and Chapter 9 shall not apply.
(2) Nonconductive Optical Fiber Cables With Electric Light or Power Conductors. Where nonconductive optical fiber cables are installed with electric light or power conductors in a raceway, the raceway fill ~~tables~~ requirements of Chapter 3 and Chapter 9 shall apply.
Substantiation: This revision is both editorial and technical. The addition of the two first level subdivisions (A) Types of Raceways and (B) Raceway Fill for Optical Fiber Cables and their second level subdivisions provides more clarity and make the section as self-sufficient as possible. The deletion of word "tables" and replacing it with the word "requirements" is more appropriate as Chapter 3 has no raceway tables. However, Chapter 3 provides the raceway fill requirements which will direct the code user to Chapter 9 for the conduit fill tables. This proposal coordinates with the task group's proposal to move the cable and raceway installation requirements from 770.154 to 770.113.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept in Principle
Revise recommended 770.110 text as follows:
770.110 Raceways for Optical Fiber Cables.
(A) Types of Raceways.
Optical fiber cables shall be permitted to be installed in any raceway that complies with either (A)(1) or (A)(2).
(1) Chapter 3 Raceways. ~~Where~~ Optical fiber cables shall be permitted to be ~~are~~ installed in ~~a~~ any raceway, ~~the raceway shall be either of a type~~ included ~~permitted~~ in Chapter 3. The raceways shall be ~~and~~ installed in accordance with the requirements of Chapter 3.
(2) Other Permitted Raceways. ~~or~~ Optical fiber cables shall be permitted to be installed in listed plenum optical fiber raceway, listed plenum communications raceway, listed riser optical fiber raceway, listed riser communications raceway, listed general-purpose optical fiber raceway, or listed general purpose communications raceway selected in accordance with the provisions of ~~770.154~~ 770.113, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
(B) Raceway Fill for Optical Fiber Cables.
Raceway fill for optical fibers cables shall comply with either (B)(1) or (B)(2)
(1) Without Electric Light or Power Conductors. Where optical fiber cables are installed in raceway without electric light or power ~~current-carrying~~ conductors, the raceway fill ~~tables~~ requirements of Chapter 3 and Chapter 9 shall not apply.
(2) Nonconductive Optical Fiber Cables With Electric Light or Power Conductors. Where nonconductive optical fiber cables are installed with electric light or power conductors in a raceway, the raceway fill ~~tables~~ requirements of Chapter 3 and Chapter 9 shall apply.
Panel Statement: The panel added additional raceways for installation flexibility.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-48 Log #2084 NEC-P16 **Final Action: Accept in Principle**
(770.113)

TCC Action: The Technical Correlating Committee directs that this proposal be forwarded to Code-Making Panel 3 for comment.
Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Add new text to read as follows:
770.113 Installation of Optical Fiber Cables and Optical Fiber Raceways.
Installation of optical fiber cables and optical fiber raceways shall comply with 770.113 (A) through (H).
(A) Listing. Optical fiber cables installed in buildings shall be listed.
Exception: Optical fiber cables that comply with 770.48 shall not be required to be listed.
(B) Air Ducts and Plenums. The following cables and raceways shall be permitted in air ducts and plenums, as described in 300.22(B):
(1) Types OFNP and OFCP
(2) Plenum optical fiber raceway installed in compliance with 770.110
(3) Types OFNP and OFCP installed in plenum optical fiber raceway
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in raceways that are installed in compliance with 300.22(B).
(C) Other Spaces Used For Environmental Air. The following cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C):
(1) Types OFNP and OFCP
(2) Plenum optical fiber raceway installed in compliance with 770.110
(3) Types OFNP and OFCP installed in plenum optical fiber raceway
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in raceways that are installed in compliance with 300.22(C).
(D) Risers-Cables and Raceways in Vertical Runs. The following cables and raceways shall be permitted in vertical runs penetrating more than one floor and in vertical runs in a shaft:
(1) Types OFNP,OFCP, OFNR and OFCR
(2) Plenum and riser optical fiber raceways installed in compliance with 770.110
(3) Types OFNP, OFCP, OFNR and OFCR installed in plenum or riser optical fiber raceway.
FPN: See770.26 for firestop requirements for floor penetrations.
(E) Risers-Cables and Raceways in Metal Raceways, Fireproof Shafts and One- and Two-Family Dwellings. The following cables and raceways shall be permitted in metal raceway, in a fireproof shaft with firestops at each floor and in one- and two-family dwellings:
(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways installed in compliance with 770.110
(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in plenum, riser or general-purpose optical fiber raceway
(4) Plenum, riser and general-purpose optical fiber raceways installed as innerduct in the metal raceway.
FPN: See770.26 for firestop requirements for floor penetrations.
(F) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays:
(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways installed in compliance with 770.110
(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in plenum, riser or general-purpose optical fiber raceway.
(G) Distributing Frames and Cross-Connect Arrays. The following wires and cables shall be permitted to be installed in distributing frames and cross-connect arrays:
(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC.
(H) Other Building Locations. The following cables and raceways shall be permitted to be installed in building locations other than the locations covered in 770.113(B) through (G):
(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways installed in compliance with 770.110
(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in plenum, riser or general-purpose optical fiber raceway
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in a raceway of a type included in Chapter 3.

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 770.113. The hazardous locations section was moved to 770.3.

Optical fiber cables are used in optical cross connect applications, but Section 770.154 currently does not have a distributing frame and cross connect section. A new section for distributing frames and cross connects was added. Adding this section also improves parallelism with Article 800. No new requirements were added since all listed optical fiber cables are permitted in these applications. Section 800.154(C)(2) explicitly permits communications cables to be installed in chapter 3 raceway. A similar explicit permission to use raceway for optical fiber cable in included in this proposal.

A companion proposal for section 770.154 greatly simplifies the statement of the applications of optical fiber cables and raceways by using a table.

This proposal and its companion proposal for section 770.154 need to be considered together as a package.

Panel Meeting Action: Accept in Principle

Revise 770.113 text to read as follows:

770.113 Installation of Optical Fiber Cables, Optical Fiber Raceways, and Cable Routing Assemblies. Installation of optical fiber cables, optical fiber raceways, and cable routing assemblies shall comply with 770.113 (A) through (I).

(A) Listing. Optical fiber cables, optical fiber raceways, and cable routing assemblies installed in buildings shall be listed.

Exception: Optical fiber cables that comply with 770.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums Used for Environmental Air. The following cables shall be permitted in ducts and plenums, as described in 300.22(B), if they are directly associated with the air distribution system:

(1) Up to 1.22 m (4 ft) of Types OFNP and OFCP

(2) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC installed in raceways that are installed in compliance with 300.22(B)

FPN: See 4.3.4 and 4.3.11.3.3 of NFPA 90A-2009, *Standard for the Installation of Air-Conditioning and Ventilation Systems*, for information on wire and cables in air ducts and apparatus casings plenums. See 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C):

(1) Types OFNP and OFCP

(2) Plenum optical fiber raceway installed in compliance with 770.110

(3) Types OFNP and OFCP installed in plenum optical fiber raceway or plenum communications raceway

(4) Types OFNP and OFCP supported by metallic cable trays or cable tray systems

(5) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC installed in raceways that are installed in compliance with 300.22(C).

FPN: See 4.3.11.2, 4.3.11.4, and 4.3.11.5 of NFPA 90A-2009, *Standard for the Installation of Air-Conditioning and Ventilation Systems*, for information on wire, cables, and raceways in ceiling cavity, raised floor, and air-handling unit room plenums. See 3.3.22 for plenum definitions.

(D) Risers - Cables and Raceways in Vertical Runs. The following cables and raceways shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types OFNP, OFCP, OFNR, and OFCR

(2) Plenum and riser optical fiber raceways installed in compliance with 770.110 and listed riser cable routing assemblies

(3) Types OFNP, OFCP, OFNR, and OFCR installed in plenum optical fiber raceway, plenum communications raceway, riser optical fiber raceway, riser communications raceway or listed riser cable routing assemblies.

FPN: See 770.26 for firestop requirements for floor penetrations.

(E) Risers - Cables in Metal Raceways or Fireproof Shafts. Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC shall be permitted in metal raceways or in a fireproof shaft with firestops at each floor.

FPN: See 770.26 for firestop requirements for floor penetrations.

(F) Risers - One- and Two-Family Dwellings. The following cables and raceways shall be permitted in one- and two-family dwellings:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC

(2) Plenum, riser and general-purpose optical fiber raceways installed in compliance with 770.110

(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC installed in plenum, riser, or general-purpose optical fiber raceway or plenum, riser or general-purpose communications raceway

(G) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC

(2) Plenum, riser, and general-purpose optical fiber raceways installed in compliance with 770.110

(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC installed in plenum, riser, or general-purpose optical fiber raceway or plenum, riser, or general-purpose communications raceway

(H) Distributing Frames and Cross-Connect Arrays. Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC cables shall be permitted to be installed in distributing frames and cross-connect arrays.

(I) Other Building Locations. The following cables and raceways shall be permitted to be installed in building locations other than the locations covered in 770.113(B) through (H):

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC

(2) Plenum, riser, and general-purpose optical fiber raceways installed in compliance with 770.110

(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC installed in plenum, riser, or general-purpose optical fiber raceway or plenum, riser, or general-purpose communications raceway or listed riser or general-purpose cable routing assembly

(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC installed in a raceway of a type included in Chapter 3.

Panel Statement: See panel statement on Proposal 16-160.

The text is a combination of the text from Proposal 16-48, which has been modified to improve clarity, with text to incorporate panel actions to accept in principle Proposals 16-57 (cable routing assemblies), 16-59 (metallic cable tray), and 16-62 (requiring riser cable for penetration of one floor) and by modifications to correlate with NFPA 90A-2009.

The revised text relocates the wire, cable, and raceway installation rules from 770.154 and also includes installation rules from 770.110.

The panel recognizes that this proposal is a companion proposal to Proposal 16-56 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DORNA, G.:

This proposal is the first of a series of proposals prepared by the CMP 16 Special Editorial Task Group that were directed towards relocating installation requirements from the applications sections (770.154, 800.154, 820.154 and 830.154) to the installation sections (770.113, 800.113, 820.113 & 830.113) and simplifying the applications sections by utilizing a table of permitted and non-permitted applications. The panel also acted on other proposals (not from the task group) for changes to the applications sections, xxx.154, by taking accepting some in principle and integrating the actions into the installation sections xxx.113 and the new table in xxx.154. The maze of interlocking proposals is sufficiently complicated that a guide to the proposals should be useful. See the table on the next page.

Proposal	Sections	Purpose	Action
16-48 & 56	770.154 & 770.113	Remove installation rules from the applications section 770.154 and relocate them in the installations section 770.113. Simplify cable applications by using a table.	AIP by clarifying the permitted cable applications, permitting communications raceways to substitute for optical fiber raceways, and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts, 2) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 3) proposal 16-59 which permits metallic cable trays in plenums, 4) proposal 16-62 which simplifies the installation rules for risers and, 5) proposals 16-51, 52 & 57 which provide for the applications of cable routing assemblies.
16-160 & 172	800.154 & 800.113	Remove installation rules from the applications section 800.154 and relocate them in the installations section 800.113. Simplify cable applications by using a table.	AIP by clarifying the permitted cable applications and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts, 2) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 3) proposal 16-175 which permits metallic cable trays in plenums, 4) proposal 16-179 which simplifies the installation rules for risers and, 5) proposals 16-165, 166 & 173 which provide for the applications of cable routing assemblies.
16-267 & 278	820.154 & 820.113	Remove installation rules from the applications section 820.154 and relocate them in the installations section 820.113. Simplify cable applications by using a table.	AIP by clarifying the permitted wire and cable applications, permitting communications raceways to be used in place of CATV raceways, and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts and only provides for optical fiber raceways and communications raceways, 2) proposal 16-289a which deleted the listing section for CATV raceways, 3) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 4) proposal 16-280 which permits metallic cable trays in plenums, 5) proposal 16-282 which simplifies the installation rules for risers, and 6) proposals 16-272 & 273 which provide for the application of cable routing assemblies.
16-331, 339	830.151, 830.154 & 830.113	Remove installation rules from the applications sections 830.151 & 830.154 and relocate them in the installations section 830.113. Simplify cable applications by using a table.	AIP by clarifying the permitted cable applications and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts, 2) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 3) proposal 16-340 which permits metallic cable trays in plenums and, 4) proposals 16-338 & 341 which simplify the installation rules for risers.

The panel action on the revision of 770.113 changed the title and included several applications of cable routing assemblies, but a few applications were missed. Also the current text of 770.154(B)(2) permits all optical fiber cable types in fireproof shafts and metal raceways in shafts but it does not explicitly permit optical fiber raceways. If bare cables are permitted, then cables in optical fiber raceways should be also be permitted. Cable routing assemblies should be permitted in fireproof shafts, but are clearly not suitable for installation inside metal raceway. In order to accommodate both optical fiber raceways and cable routing assemblies, the riser section on metal raceways or fireproof shafts needs to be bifurcated. Repeated references to 770.110 can be replaced with a general requirement to install raceways in accordance with 770.110 and also 770.12.

The panel action text should be revised to read as follows:

770.113 Installation of Optical Fiber Cables, Raceways and Cable Routing Assemblies. Installation of optical fiber cables, raceways and cable routing assemblies shall comply with 770.113 (A) through (J). Installation of raceways shall also comply with 770.12 and 770.110.

(A) Listing. Optical fiber cables, raceways and cable routing assemblies installed in buildings shall be listed.

Exception: Optical fiber cables that comply with 770.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums Used for Environmental Air. The following cables shall be permitted in ducts and plenums, as described in 300.22(B) if they are directly associated with the air distribution system:

(1) Up to 1.22m (4 ft) of Types OFNP and OFCP

(2) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in raceways that are installed in compliance with 300.22(B).

FPN: See sections 4.3.4 & 4.3.11.3.3 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire and cables in air ducts and apparatus casings plenums. See section 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C):

(1) Types OFNP and OFCP

(2) Plenum optical fiber raceway

(3) Types OFNP and OFCP installed in plenum optical fiber raceway or plenum communications raceway

(4) Types OFNP and OFCP supported by metallic cable trays or cable tray systems

(5) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in raceways that are installed in compliance with 300.22(C).

FPN: See sections 4.3.11.2, 4.3.11.4 & 4.3.11.5 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire, cables and raceways in ceiling cavity, raised floor and air-handling unit room plenums. See section 3.3.22 for plenum definitions.

(D) Risers-Cables, Raceways and Cable Routing Assemblies in Vertical Runs. The following cables, raceways and cable routing assemblies shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types OFNP, OFCP, OFNR and OFCR

(2) Plenum and riser optical fiber raceways

(3) Riser cable routing assemblies

(4) Types OFNP, OFCP, OFNR and OFCR installed in:

a) plenum optical fiber raceway

b) plenum communications raceway

c) riser optical fiber raceway

d) riser communications raceway

e) riser cable routing assembly

FPN: See770.26 for firestop requirements for floor penetrations.

(E) Risers-Cables and Raceways in Metal Raceways. The following cables and raceways shall be permitted in metal raceways in a riser having firestops at each floor:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway

FPN: See 770.26 for firestop requirements for floor penetrations.

(F) Risers-Cables, Raceways and Cable Routing Assemblies in Fireproof Shafts. . The following cables, raceways and cable routing assemblies shall be permitted to be installed in fireproof riser shafts having firestops at each floor:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway
g) riser cable routing assembly
h) general-purpose cable routing assembly

FPN: See 770.26 for firestop requirements for floor penetrations.

(G) Risers-One- and Two-Family Dwellings. The following cables, raceways and cable routing assemblies shall be permitted in one- and two-family dwellings:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway
g) riser cable routing assembly
h) general-purpose cable routing assembly

(H) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway

(I) Distributing Frames and Cross-Connect Arrays. The following cables, raceways and cable routing assemblies shall be permitted to be installed in distributing frames and cross-connect arrays:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser or general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway
g) riser cable routing assembly
h) general-purpose cable routing assembly

(J) Other Building Locations. The following cables, raceways and cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 770.113(B) through (I):

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway
g) riser cable routing assembly
h) general-purpose cable routing assembly

IVANS, R.: We agree with the revision prepared by the CMP 16 Special Task Group.

This proposal is the first of a series of proposals prepared by the CMP 16 Special Editorial Task Group that were directed towards relocating installation requirements from the applications sections (770.154, 800.154, 820.154 and 830.154) to the installation sections (770.113, 800.113, 820.113 & 830.113) and simplifying the applications sections by utilizing a table of permitted and non-permitted applications. The panel also acted on other proposals (not from the task group) for changes to the applications sections, xxx.154, by taking accepting some in principle and integrating the actions into the installation sections xxx.113 and the new table in xxx.154. The maze of interlocking proposals is sufficiently complicated that a guide to the proposals should be useful. See table on the next page.

Proposal	Sections	Purpose	Action
16-48 & 56	770.154 & 770.113	Remove installation rules from the applications section 770.154 and relocate them in the installations section 770.113. Simplify cable applications by using a table.	AIP by clarifying the permitted cable applications, permitting communications raceways to substitute for optical fiber raceways, and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts, 2) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 3) proposal 16-59 which permits metallic cable trays in plenums, 4) proposal 16-62 which simplifies the installation rules for risers and, 5) proposals 16-51, 52 & 57 which provide for the applications of cable routing assemblies.
16-160 & 172	800.154 & 800.113	Remove installation rules from the applications section 800.154 and relocate them in the installations section 800.113. Simplify cable applications by using a table.	AIP by clarifying the permitted cable applications and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts, 2) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 3) proposal 16-175 which permits metallic cable trays in plenums, 4) proposal 16-179 which simplifies the installation rules for risers and, 5) proposals 16-165, 166 & 173 which provide for the applications of cable routing assemblies.
16-267 & 278	820.154 & 820.113	Remove installation rules from the applications section 820.154 and relocate them in the installations section 820.113. Simplify cable applications by using a table.	AIP by clarifying the permitted wire and cable applications, permitting communications raceways to be used in place of CATV raceways, and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts and only provides for optical fiber raceways and communications raceways, 2) proposal 16-289a which deleted the listing section for CATV raceways, 3) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 4) proposal 16-280 which permits metallic cable trays in plenums, 5) proposal 16-282 which simplifies the installation rules for risers, and 6) proposals 16-272 & 273 which provide for the application of cable routing assemblies.
16-331, 339	830.151, 830.154 & 830.113	Remove installation rules from the applications sections 830.151 & 830.154 and relocate them in the installations section 830.113. Simplify cable applications by using a table.	AIP by clarifying the permitted cable applications and correlating with, 1) NFPA 90A-2009 which limits cabling in air ducts, 2) proposal 3-94 which changed the NEC nomenclature for air handling spaces, 3) proposal 16-340 which permits metallic cable trays in plenums and, 4) proposals 16-338 & 341 which simplify the installation rules for risers.

The panel action on the revision of 770.113 changed the title and included several applications of cable routing assemblies, but a few applications were missed. Also the current text of 770.154(B)(2) permits all optical fiber cable types in fireproof shafts and metal raceways in shafts but it does not explicitly permit optical fiber raceways. If bare cables are permitted, then cables in optical fiber raceways should be also be permitted. Cable routing assemblies should be permitted in fireproof shafts, but are clearly not suitable for installation inside metal raceway. In order to accommodate both optical fiber raceways and cable routing assemblies, the riser section on metal raceways or fireproof shafts needs to be bifurcated. Repeated references to 770.110 can be replaced with a general requirement to install raceways in accordance with 770.110 and also 770.12.

The panel action text should be revised to read as follows:

770.113 Installation of Optical Fiber Cables, Raceways and Cable Routing Assemblies. Installation of optical fiber cables, raceways and cable routing assemblies shall comply with 770.113 (A) through (J). Installation of raceways shall also comply with 770.12 and 770.110.

(A) Listing. Optical fiber cables, raceways and cable routing assemblies installed in buildings shall be listed.

Exception: Optical fiber cables that comply with 770.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums Used for Environmental Air. The following cables shall be permitted in ducts and plenums, as described in 300.22(B) if they are directly associated with the air distribution system:

(1) Up to 1.22m (4 ft) of Types OFNP and OFCP

(2) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in raceways that are installed in compliance with 300.22(B).

FPN: See sections 4.3.4 & 4.3.11.3.3 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire and cables in air ducts and apparatus casings plenums. See section 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C):

(1) Types OFNP and OFCP

(2) Plenum optical fiber raceway

(3) Types OFNP and OFCP installed in plenum optical fiber raceway or plenum communications raceway

(4) Types OFNP and OFCP supported by metallic cable trays or cable tray systems

(5) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in raceways that are installed in compliance with 300.22(C).

FPN: See sections 4.3.11.2, 4.3.11.4 & 4.3.11.5 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire, cables and raceways in ceiling cavity, raised floor and air-handling unit room plenums. See section 3.3.22 for plenum definitions.

(D) Risers-Cables, Raceways and Cable Routing Assemblies in Vertical Runs. The following cables, raceways and cable routing assemblies shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types OFNP, OFCP, OFNR and OFCR

(2) Plenum and riser optical fiber raceways

(3) Riser cable routing assemblies

(4) Types OFNP, OFCP, OFNR and OFCR installed in:

a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) riser cable routing assembly

FPN: See770.26 for firestop requirements for floor penetrations.

(E) Risers-Cables and Raceways in Metal Raceways. The following cables and raceways shall be permitted in metal raceways in a riser having firestops at each floor:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC

(2) Plenum, riser and general-purpose optical fiber raceways

(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:

a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway

FPN: See 770.26 for firestop requirements for floor penetrations.

(F) Risers-Cables, Raceways and Cable Routing Assemblies in Fireproof Shafts. . The following cables, raceways and cable routing assemblies shall be permitted to be installed in fireproof riser shafts having firestops at each floor:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC

(2) Plenum, riser and general-purpose optical fiber raceways

(3) Riser and general-purpose cable routing assemblies

(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:

a) plenum optical fiber raceway
b) plenum communications raceway
c) riser optical fiber raceway
d) riser communications raceway
e) general-purpose optical fiber raceway
f) general-purpose communications raceway
g) riser cable routing assembly
h) general-purpose cable routing assembly

FPN: See 770.26 for firestop requirements for floor penetrations.

(G) Risers-One- and Two-Family Dwellings. The following cables, raceways and cable routing assemblies shall be permitted in one- and two-family dwellings:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
 a) plenum optical fiber raceway
 b) plenum communications raceway
 c) riser optical fiber raceway
 d) riser communications raceway
 e) general-purpose optical fiber raceway
 f) general-purpose communications raceway
 g) riser cable routing assembly
 h) general-purpose cable routing assembly

(H) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
 a) plenum optical fiber raceway
 b) plenum communications raceway
 c) riser optical fiber raceway
 d) riser communications raceway
 e) general-purpose optical fiber raceway
 f) general-purpose communications raceway

(I) Distributing Frames and Cross-Connect Arrays. The following cables, raceways and cable routing assemblies shall be permitted to be installed in distributing frames and cross-connect arrays:

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser or general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
 a) plenum optical fiber raceway
 b) plenum communications raceway
 c) riser optical fiber raceway
 d) riser communications raceway
 e) general-purpose optical fiber raceway
 f) general-purpose communications raceway
 g) riser cable routing assembly
 h) general-purpose cable routing assembly

(J) Other Building Locations. The following cables, raceways and cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 770.113(B) through (I):

(1) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC
(2) Plenum, riser and general-purpose optical fiber raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC installed in:
 a) plenum optical fiber raceway
 b) plenum communications raceway
 c) riser optical fiber raceway
 d) riser communications raceway
 e) general-purpose optical fiber raceway
 f) general-purpose communications raceway
 g) riser cable routing assembly
 h) general-purpose cable routing assembly

16-49 Log #3094 NEC-P16 **Final Action: Reject**
(770.113)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
770.113 Listing Required. ~~Installation of Optical Fiber Cables.~~
Optical fiber cables installed in buildings shall be listed.
Exception: Optical fiber cables that comply with 770.48 shall not be required to be listed.
Substantiation: The proposed title change more aptly describes the requirement, and it also gives a title that is not so similar to 770.133.
Panel Meeting Action: Reject
Panel Statement: Panel action on Proposal 16-48 revised this section so that the editorial change recommended by this proposal is no longer appropriate.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-50 Log #2462 NEC-P16 **Final Action: Reject**
(770.133(6))

Submitter: Joseph P. Savage, FIFTH Council North America
Recommendation: Add the following line to 770.133
(6) Premise-powered broadband communications circuits in compliance with Article 8XX.
Substantiation: A submission has been made for a new Article to Chapter 8. If this Article is accepted, then Article 770.133 should include the above added reference.
Panel Meeting Action: Reject
Panel Statement: The recommendation is redundant and not needed.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-51 Log #2085 NEC-P16 **Final Action: Accept in Principle in Part**
(770.133(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
(B) With Other Conductors. Optical fibers shall be permitted in the same cable, and conductive and nonconductive optical fiber cables shall be permitted in the same cable tray, enclosure, or raceway with conductors of any of the following:
(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Parts I and III of Article 725
(2) Power-limited fire alarm systems in compliance with Parts I and III of Article 760
(3) Communications circuits in compliance with Parts I and IV of Article 800
(4) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820
(5) Low-power network-powered broadband communications circuits in compliance with Parts I and IV of Article 830
Exception: Only Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN and OFC cables shall be permitted to be installed in plenum, riser and general-purpose optical fiber raceways.
Substantiation: This proposal is editorial and technical.
Section 770.154 restricts the applications of plenum, riser and general-purpose optical fiber raceways by permitting only listed optical fiber cables is thee raceways. Section 770.133(B) conflicts with the restrictions of 770.154.
The purpose of this proposal is to remove the conflict. It is also a companion proposal to a proposal to simplify the applications requirements in 770.154 by replacing the text with a table.
The word "other" was struck from the title because there are no conductors in optical fiber cables.
The NEC Style Manual states:
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as "grounded in accordance with Article 250" unless additional conditions are specified. References to parts within articles shall be permitted.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle in Part
Revise recommended text as follows:
(B) With Other Conductors. Optical fibers shall be permitted in the same cable, and conductive and nonconductive optical fiber cables shall be permitted in the same cable tray, enclosure, ~~or~~ raceway or cable routing assembly with conductors of any of the following:
(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Parts I and III of Article 725
(2) Power-limited fire alarm systems in compliance with Parts I and III of Article 760
(3) Communications circuits in compliance with Parts I and IV of Article 800
(4) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820
(5) Low-power network-powered broadband communications circuits in compliance with Parts I and IV of Article 830.
Panel Statement: The addition of cable routing assemblies meets the intent of the submitter of Proposal 16-52. The new exception has been deleted because of panel action on other proposals to consolidate the types of raceways. See panel proposal 16-289a.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

Comment on Affirmative:

OHDE, H.: We believe that the second sentence of the panel statement should read as follows: The new exception has been deleted because of the panel action on other proposals to consolidate the type of raceways and support systems.

Cable Tray and routing assemblies are not raceways and it should not be insinuated that they are to avoid misinterpretation where the word raceway is used in other places in Chapter 8.

16-52 Log #2263 NEC-P16 **Final Action: Accept in Principle**
(770.133(B))

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:

(B) With Other Conductors. Optical fibers shall be permitted in the same cable, and conductive and nonconductive optical fiber cables shall be permitted in the same cable tray, enclosure, ~~or~~ raceway or optical fiber/communications cable routing assembly, with conductors of any of the following:

(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Article 725

(2) Power-limited fire alarm systems in compliance with Article 760

(3) Communications circuits in compliance with Article 800

(4) Community antenna television and radio distribution systems in compliance with Article 820

(5) Low-power network-powered broadband communications circuits in compliance with Article 830

Substantiation: Article 770 currently covers optical fiber raceways and provides listing requirements for plenum, riser and general-purpose versions. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.) UL 2024a provides for the listing of plenum, riser and general-purpose routing assemblies with the same fire testing requirements as UL 2024.

The significant difference between optical fiber routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.

We have submitted companion proposals to provide for a change of the scope of this article to include routing assemblies and to provide listing requirements for optical fiber routing assemblies.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-51.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-53 Log #1466 NEC-P16 **Final Action: Reject**
(770.133(C))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:

~~Raceways shall be used for their intended purpose~~. Optical fiber cables shall not be strapped, taped, or attached by any means to the exterior of any ~~conduit,~~ raceway, cable, or conductor as a means of support, except a raceway mast shall be permitted to support aerial cables.

Substantiation: Edit. The first sentence is superfluous; covered by the second sentence. Cables and individual conductors should be included.
Panel Meeting Action: Reject
Panel Statement: The panel does not see this as an editorial improvement. The current code text has sufficient clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-54 Log #2283 NEC-P16 **Final Action: Reject**
(770.135 (New))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Add a new Section to read as follows:

770.135 Optical Fiber Device and Equipment Mounting. Optical Fiber devices or equipment shall be mounted in listed boxes, brackets or assemblies designed for the purpose, and such boxes or assemblies shall be securely fastened in place. Boxes or brackets can be completely enclosed or backless.

(A) Optical Fiber Devices and Equipment Mounted to Boxes or Brackets. Optical Fiber devices or equipment shall be mounted to a listed boxes or bracket and installed per 314.20.

(B) Optical Fiber Devices and Equipment Mounted on Covers. Optical Fiber device and equipment mounted to and supported by a cover shall be held rigidly against the cover which is mounted to the box or bracket.

Substantiation: This proposal adds a new section to Article 770 addressing the mounting of devices or equipment to listed boxes and brackets. Currently, depending on the quality of workmanship, Optical Fiber devices or equipment have not been mounted to boxes or brackets that can support them. After several years device and/or covers that are mounted directly to the dry wall will become hazard because they have become loose and exposed. Conductive Optical Fiber cable can become energized by coming in incidental contact with electrical conductors.

770.135 was only a suggestion for the location of this new section. (A) addresses devices mounted directly to boxes or devices where as (B) address devices mounted to covers.

Panel Meeting Action: Reject
Panel Statement: The proposed recommendation is outside the scope of Article 770.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:

IVANS, R.: The scope of 770 states: “The provisions of this article apply to the installation of optical fiber cables and raceways.”
Boxes are clearly part of the installation of such cables. Loose and exposed optical fiber cable or connectors can pose a laser radiation hazard. There are boxes and brackets listed for this purpose using UL Subject 2269, “Outline of Investigation for Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes.”

16-55 Log #1467 NEC-P16 **Final Action: Reject**
(770.153(A))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In the second paragraph, add: “enclosures” after “cable tray”.
Substantiation: Edit. Enclosures such as cabinets should be included as in the third and fourth paragraphs.
Panel Meeting Action: Reject
Panel Statement: The submitter has not indicated the location of the proposed text. 770.153 is not a correct code reference. The panel notes the second paragraph of 770.133(A) contains two possible locations for insertion of the text. The submitter has not supplied technical substantiation to support this proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-56 Log #2086 NEC-P16 **Final Action: Accept in Principle**
(770.154)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:

~~**770.154 Applications of Listed Optical Fiber Cables and Raceways.**~~
~~Nonconductive and conductive optical fiber cables shall comply with any of the requirements given in 770.154(A) through (D) and 770.154(F), or where cable substitutions are made as shown in 770.154(E).~~

~~**(A) Plenums.** Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type OFNP or OFCP. Abandoned cables shall not be permitted to remain. Types OFNR, OFCR, OFNG, OFN, OFCG, and OFC cables installed in compliance with 300.22 shall be permitted. Listed plenum optical fiber raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type OFNP and OFCP cables shall be permitted to be installed in these raceways.~~

~~**(B) Riser.** Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3).~~

~~**(1)** Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type OFNR or OFCR. Floor penetrations requiring Type OFNR or OFCR shall contain only cables suitable for riser or plenum use. Listed riser optical fiber raceways and listed plenum optical fiber raceways shall also be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type OFNP, OFCP, OFNR, and OFCR cables shall be permitted to be installed in these raceways.~~

~~**(2)** Metal Raceways or Fireproof Shafts. Type OFNG, OFN, OFCG, and OFC cables shall be permitted to be encased in a metal raceway or located in a fireproof shaft having firestops at each floor.~~

~~**(3)** One- and Two-Family Dwellings. Type OFNG, OFN, OFCG, and OFC cables shall be permitted in one- and two-family dwellings.~~

~~FPN: See 300.21 for firestop requirements for floor penetrations.~~

~~**(C) Other Cabling Within Buildings.** Cables installed in building locations other than the locations covered in 770.154(A) and (B) shall be Type OFNG, OFN, OFCG, or OFC. Such cables shall be permitted to be installed in listed general-purpose optical fiber raceways, listed riser optical fiber raceways, and listed plenum optical fiber raceways.~~

~~(D) **Cable Trays.** Optical fiber cables of the types listed in Table 770.179 shall be permitted to be installed in cable trays.~~

~~FPN: It is not the intent to require that these optical fiber cables be listed specifically for use in cable trays.~~

~~**(E) Cable Substitutions.** The substitutions for optical fiber cables listed in Table 770.154(E) and illustrated in Figure 770.154(E) shall be permitted.~~

~~**(F) Hazardous (Classified) Locations.** Cables installed in hazardous (classified) locations shall be any type indicated in Table 770.154(E). Cables shall be sealed in accordance with the requirements of 501.15, 502.15, 505.16, or 506.~~

770.154 Applications of Listed Optical Fiber Cables and Raceways.
Permitted and non-permitted applications of listed optical fiber cables and raceways shall be as indicated in Table 770.154(A). The substitutions for optical fiber cables listed in Table 770.154(B) and illustrated in Figure 770.154(B) shall be permitted

Table 770.154(A), Applications of Optical Fiber Cables and Raceways

Cable or Raceway Type	Applications									
	In air ducts and plenums as described in 300.22(B)	In other spaces used for environmental air as described in 300.22(C)	In risers	In building locations other than air ducts, plenums, other spaces used for environmental air and risers	In cable trays	In hazardous locations	In any raceway in Chapter 3	In plenum optical fiber raceways	In riser optical fiber raceways	In general-purpose optical fiber raceways
OFNP, OFCP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNR, OFCR	N	N	Y	Y	Y	Y	Y	Y	Y	Y
OFNG, OFCG, OFN, OFC	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Plenum Optical Fiber Raceways	Y	Y	Y	Y	Y		Y	-	-	-
Riser Optical Fiber Raceways	N	N	Y	Y	Y		Y	-	-	-
General-Purpose Optical Fiber Raceways	N	N	N	Y	Y		Y	-	-	-

Note. Applications indicated by "Y" shall be permitted. Applications indicated by an "N" shall not be permitted. Applications with a "–"are not addressed.

(Renumber Table 770.154(E) and Figure 770.154(E) to Table 770.154(B) and Figure 770.154(B) and insert them here.)

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800,820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal for section 770.154 greatly simplifies the statement of the applications of optical fiber cables and raceways by using a table where the permitted applications are indicated by a "Y" and the applications that are not permitted are indicted by an "N". A companion proposal moves the installation rules to section 770.113 Installation Of Optical Fiber Cables. The hazardous locations section was moved to 770.3.

This proposal makes no changes to the existing permitted and not permitted applications of optical fiber cables and raceways.

This proposal and its companion proposal for section 770.113 need to be considered together as a package.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle

Revise 770.154 text and replace in entirety as follows:

770.154 Applications of Listed Optical Fiber Cables and Raceways. Permitted and non-permitted applications of listed optical fiber cables and raceways shall be as indicated in Table 770.154(A). The permitted applications are subject to the installation rules of 770.113. The substitutions for optical fiber cables listed in Table 770.154(B) and illustrated in Figure 770.154 shall be permitted.

Table 770.154(A), Applications of Optical Fiber Cables and Raceways

Cable or Raceway Type	Applications: In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In risers in vertical runs	In risers in metal raceways or fire-proof shafts	In risers in one- and two-family dwellings	In building locations other than fabricated ducts and plenums, other spaces used for environmental air (plenums), risers distributing frames and cross connect arrays	In cable trays	In distributing frames and cross connect arrays	In hazardous locations in accordance with Chapter 5	In any raceway in Chapter 3	In plenum optical fiber and communications raceways	In riser optical fiber and communications raceways	In general-purpose optical fiber and communications raceways
OFNP, OFCP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNR, OFCR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNG, OFCG, OFN, OFC	N	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Plenum Optical Fiber Raceways	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Riser Optical Fiber Raceways	N	N	Y	Y	Y	Y	Y	Y	Y	Y			
General-Purpose Optical Fiber Raceways	N	N	N	N	Y	Y	Y	Y	Y	Y			
Riser Cable Routing Assemblies	N	N	Y	Y	N	Y	N	Y	Y	N	N	N	N
General-Purpose Cable Routing Assemblies	N	N	N	N	N	Y	N	Y	Y	N	N	N	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 770.113.

(Renumber Table 770.154(E) and Figure 770.154(E) to Table 770.154(B) and Figure 770.154 and insert them here.)

16-56 Meeting Action

Panel Statement: See panel statement in Proposals 16-160 and 16-172.
The table is a combination of the table from proposal 16-48, which has been modified to improve clarity, with entries to incorporate panel actions to accept in principle Proposals 16-57 (cable routing assemblies), 16-59 (metallic cable tray), and 16-62 (requiring riser cable for penetration of one floor) and by modifications to correlate with NFPA 90A-2009.

The panel recognizes that this proposal is a companion proposal to Proposal 16-48 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DORNA, G.: The title of new Table 770.154 should contain the word "listed" to correlate with the title of the section.

The revised 770.154 should appear as shown below:

770.154 Applications of Listed Optical Fiber Cables, Raceways and Cable Routing Assemblies. Permitted and non-permitted applications of listed optical fiber cables, raceways and cable routing assembly type shall be as indicated in Table 770.154(A). The permitted applications are subject to the installation rules of 770.110 and 770.113. The substitutions for optical fiber cables listed in Table 770.154(B) and illustrated in Figure 770.154 shall be permitted.

See Table 770.154(A) on page 1062

(Renumber Table 770.154(E) and Figure 770.154(E) to Table 770.154(B) and Figure 770.154 and insert them here.)

Table 770.154(A), Applications of Listed Optical Fiber Cables, Raceways and Cable Routing Assemblies

Cable, Raceway and Cable Routing Assembly Types	Applications: In Air-Handling Spaces		In Risers				Within Buildings In Other Than Air-Handling Spaces and Risers						
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In vertical runs	In metal raceways	In fireproof shafts	In one- and two-family dwellings	General	In cable trays	In distributing frames and cross connect arrays	In any raceway in Chapter 3	In plenum optical fiber and communications raceways	In riser optical fiber and communications raceways and riser cable routing assemblies	In general-purpose optical fiber and communications raceways and general-purpose cable routing assemblies
OFNP, OFCP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNR, OFCR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNG, OFCG, OFN, OFC	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Plenum Optical Fiber Raceways	N	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Riser Optical Fiber Raceways	N	N	Y	Y	Y	Y	Y	Y	Y	Y			
General-Purpose Optical Fiber Raceways	N	N	N	Y	Y	Y	Y	Y	Y	Y			
Riser Cable Routing Assemblies	N	N	Y	N	Y	Y	Y	N	Y	N	N	N	N
General-Purpose Cable Routing Assemblies	N	N	N	N	Y	Y	Y	N	Y	N	N	N	N

Note: An 'N' in the table indicates that the cable, raceway or cable routing assembly type shall not be permitted to be installed in the application. A 'Y' indicates that the cable, raceway or cable routing assembly type shall be permitted to be installed in the application, subject to the limitations described in 770.110 and 770.113.

Dorna BE (16-56 Log #2086)

IVANS, R.: See my comment on proposal 16-48.

There are multiple changes that could be made to improve the clarity of the new Table 770.154(A).

The applications could be grouped in 1) in air-handling spaces, 2) in risers and 3) in all other spaces.

The column for hazardous locations should be deleted to correlate with the panel action of proposal 16-16 which moved the hazardous locations requirements to 770.3. This move makes Article 770 parallel to articles 800 and 820.

NFPA 90A does not permit nonmetallic raceway in air ducts so the permitted use of plenum optical fiber raceway in 300.22(B) space must be changed to a "N".

The column "In risers in metal raceways or fireproof shafts" should be split into two columns because the permitted wiring methods in a raceway differ from the permitted wiring methods in a fireproof shaft. Obviously cable routing assemblies can be used in a fireproof shaft but not inside a raceway.

The titles of the table, the first column and the last two columns need to be modified to add cable routing assemblies to correlate with the panel actions on proposal 16-48.

The panel action permitted general-purpose cable in a riser in a vertical run. This should be changed to an "N" to correlate with the panel action of proposals 16-48 & 16-62.

The column "In building locations other than fabricated ducts and plenums, other spaces used for environmental air (plenums), risers distributing frames and cross connect arrays" can simply be replaced with "General" to correlate with the titles of 800.154(C)(1) and, 820.154(C)(1).

The title of new Table 770.154 should contain the word "listed" to correlate with the title of the section.

The revised 770.154 should appear as shown below:

See Table 770.154(A) on page 1064

770.154 Applications of Listed Optical Fiber Cables, Raceways and Cable Routing Assemblies. Permitted and non-permitted applications of listed optical fiber cables, raceways and cable routing assembly type shall be as indicated in Table 770.154(A). The permitted applications are subject to the installation rules of 770.110 and 770.113. The substitutions for optical fiber cables listed in <u>Table 770.154(B)</u> and illustrated in <u>Figure 770.154</u> shall be permitted.

We have an additional recommendation for a reformatted table structure for table 770.154(A) (technical content unchanged)

See Table 770.154(A) on page 1065

(Renumber Table 770.154(E) and Figure 770.154(E) to Table 770.154(B) and Figure 770.154 and insert them here.)

16-57 Log #2264 NEC-P16 **Final Action: Accept in Principle**
(770.154)

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:

770.154 Applications of Listed Optical Fiber Cables<u>,</u> ~~and~~ Raceways <u>and Optical Fiber/Communications Cable Routing Assemblies</u>.
Nonconductive and conductive optical fiber cables shall comply with any of the requirements given in 770.154(A) through (D) and 770.154(F), or where cable substitutions are made as shown in 770.154(E).
(A) Plenums. (No change in text.)
(B) Riser. Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3).

(1) Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type OFNR or OFCR. Floor penetrations requiring Type OFNR or OFCR shall contain only cables suitable for riser or plenum use. Listed riser optical fiber raceways and listed plenum optical fiber raceways shall also be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type OFNP, OFCP, OFNR, and OFCR cables shall be permitted to be installed in these raceways. <u>Listed riser optical fiber/communications cable routing assemblies shall be permitted to be installed in risers.</u>

(2) Metal Raceways or Fireproof Shafts. (No change in text.)

(3) One- and Two-Family Dwellings. (No change in text.)

(C) Other Cabling Within Buildings. Cables installed in building locations other than the locations covered in 770.154(A) and (B) shall be Type OFNG, OFN, OFCG, or OFC. Such cables shall be permitted to be installed in listed general-purpose optical fiber raceways, listed riser optical fiber raceways, and listed plenum optical fiber raceways. <u>Listed riser and general-purpose optical fiber/communications cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 770.154(A) and (B).</u>
(No change in text to (D) and (E).)

Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber /communications cable routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)

The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.

We have submitted companion proposals to provide for a change of the scope of this article to include optical fiber /communications cable routing assemblies and to provide listing requirements for these assemblies.

This proposal provides applications for the routing assemblies that are identical to those for riser and general-purpose optical fiber raceway. A plenum grade routing assembly is not being proposed because it is not currently recognized in NFPA 90A which has primary responsibility for combustibles in plenums.

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-48.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-58 Log #117 NEC-P16 **Final Action: Accept**
(770.154(A))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Delete the second sentence.
~~Abandoned cables shall not be permitted to remain.~~
Substantiation: Section 770.25 requires that "The accessible portion of abandoned optical fiber cables shall be removed." The requirement in to remove all abandoned cables in 770.154(A) is an error from the 1999 NEC that the panel tried to correct in the last code cycle.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-59 Log #128 NEC-P16 **Final Action: Accept in Principle**
(770.154(A))

Submitter: Gerald Lee Dorna, Belden
Recommendation: Add the following text at the end of 770.154(A):
<u>Metallic cable trays and metallic cable tray systems shall be permitted to be installed in other spaces used for environmental air. Types OFNP and OFCP cables, and plenum optical fiber raceways shall be permitted to be installed in these cable trays and cable tray systems. Types OFNR, OFCR, OFNG, OFCG, OFN and OFC cables, riser and general-purpose optical fiber raceways shall not be permitted to be installed in these cable trays and cable tray systems.</u>
Substantiation: Article 392, Cable Trays, has requirements for cable trays in air handling spaces in section 392.4.
392.4 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.

Section 300.22 has provisions for cable trays in 300.22(C), Other Space Used For Environmental Air.
(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.

FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.
Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.
(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.

Section 300.22(C)(1) permits only solid bottom metal cable tray with solid metal covers. Optical fiber, communications, CATV, signaling and fire-alarm plenum cables, and plenum raceways are often installed in metal cable trays and metal cable tray systems in plenums (other spaces used for environmental air). These installations are "neat and workmanlike" and safe. They should be permitted.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-48.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

Table 770.154(A), Applications of Optical Fiber Cables, Raceways, and Cable Routing Assemblies

Applications		**Cable, Raceway, and Cable Routing Assembly Type**							
		OFNP, OFCP	OFNR, OFCR	OFNG, OFCG, OFN, OFC	Plenum Optical Fiber Raceway	Riser Optical Fiber Raceway	General-Purpose Optical Fiber Raceway	Riser Cable Routing Assemblies	General-use Cable Routing Assemblies
In Air-Handling Spaces	Fabricated ducts and plenums as described in 300.22(B)	Y	N	N	N	N	N	N	N
	Other spaces used for environmental air (plenums) as described in 300.22(C)	Y	N	N	Y	N	N	N	N
In Risers	Vertical runs	Y	Y	N	Y	Y	N	Y	N
	Metal raceways	Y	Y	Y	Y	Y	Y	N	N
	Fireproof shafts	Y	Y	Y	Y	Y	Y	Y	Y
	One- and two-family dwellings	Y	Y	Y	Y	Y	Y	Y	Y
Within Buildings in other than Air-Handling Spaces and Risers	General	Y	Y	Y	Y	Y	Y	Y	Y
	Cable trays	Y	Y	Y	Y	Y	Y	N	N
	Distributing frames and cross connect arrays	Y	Y	Y	Y	Y	Y	Y	Y
	Chapter 3 raceway	Y	Y	Y	Y	Y	Y	N	N
	Plenum optical fiber and communications raceway	Y	Y	Y				N	N
	Riser optical fiber and communications raceway, and riser cable routing assemblies	Y	Y	Y				N	N
	General-purpose optical fiber and communications raceway, and general-purpose cable routing assemblies	Y	Y	Y				N	N

Note: An ‘N’ in the table indicates that the cable type shall not be permitted to be installed in the application. A ‘Y’ indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 770.113.

Ivans BE (16-56 Log #2086)

Table 770.154(A), Applications of Listed Optical Fiber Cables, Raceways and Cable Routing Assemblies

Cable, Raceway and Cable Routing Assembly Types	Applications												
	In Air-Handling Spaces		In Risers				Within Buildings In Other Than Air-Handling Spaces and Risers						
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In vertical runs	In metal raceways	In fireproof shafts	In one- and two-family dwellings	General	In cable trays	In distributing frames and cross connect arrays	In any raceway in Chapter 3	In plenum optical fiber and communications raceways	In riser optical fiber and communications raceways and riser cable routing assemblies	In general-purpose optical fiber and communications raceways and general-purpose cable routing assemblies
OFNP, OFCP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNR, OFCR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OFNG, OFCG, OFN, OFC	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Plenum Optical Fiber Raceways	N	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Riser Optical Fiber Raceways	N	N	Y	Y	Y	Y	Y	Y	Y	Y			
General-Purpose Optical Fiber Raceways	N	N	N	Y	Y	Y	Y	Y	Y	Y			
Riser Cable Routing Assemblies	N	N	Y	N	Y	Y	Y	N	Y	N	N	N	N
General-Purpose Cable Routing Assemblies	N	N	N	N	Y	Y	Y	N	Y	N	N	N	N

Ivans BE (16-56 Log #2086)

16-60 Log #4544 NEC-P16 **Final Action: Accept**
(770.154(A))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
770.154 Applications of Listed Optical Fiber Cables and Raceways.
Nonconductive and conductive optical fiber cables shall comply with any of the requirements given in 770.154(A) through (D) and 770.154(F), or where cable substitutions are made as shown in 770.154(E).
(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type OFNP or OFCP. ~~Abandoned cables shall not be permitted to remain.~~ Types OFNR, OFCR, OFNG, OFN, OFCG, and OFC cables installed in compliance with 300.22 shall be permitted. Listed plenum optical fiber raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type OFNP and OFCP cables shall be permitted to be installed in these raceways.
Substantiation: The text proposed for deletion is duplicative of the text in section 770.25 and potentially in conflict with it.
For information, see section 770.25:
770.25 Abandoned Cables.
The accessible portion of abandoned optical fiber cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-61 Log #1465 NEC-P16 **Final Action: Reject**
(770.154(B)(1))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add new text to read as follows:
Cables shall be supported by approved methods at the top and at intervals necessary to prevent strain on the cables.
Substantiation: Provisions should be required to prevent strain on the cables and possible damage.
Panel Meeting Action: Reject
Panel Statement: The recommendation is vague and unenforceable.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-62 Log #2210 NEC-P16 **Final Action: Accept in Principle**
(770.154(B)(1))

Submitter: Robert W. Jensen, dbi / Rep. BICSI
Recommendation: Revise text as follows:
Cables installed in vertical runs and penetrating <u>one or more floors</u> ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type OFNR or OFCR. Floor penetrations requiring Type OFNR or OFCR shall contain only cables suitable for riser or plenum use. Listed riser optical fiber raceways and listed plenum optical fiber raceways shall also be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type OFNP, OFCP, OFNR, and OFCR cables shall be permitted to be installed in these raceways.
Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-48.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: The current riser requirements are so complicated that they could be considered to be a “vague and unenforceable”.
Section 770.154(B)(1) requires that “Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type OFNR or OFCR. Floor penetrations requiring Type OFNR or OFCR shall contain only cables suitable for riser or plenum use”. Consequently at least two floor penetrations are required, one for plenum and riser cables and another for general-purpose cables.
The panel action on this proposal greatly simplifies the installation rules for cables in risers in other than one and two-family dwellings. The installation rules for one and two-family dwellings are already simplified since any listed cable is permitted.

16-63 Log #2227 NEC-P16 **Final Action: Accept in Principle**
(770.154(F))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 14 for comment.
Submitter: Paul Guidry, Fluor Enterprises, Inc
Recommendation: Add new text:
<u>Blown fiber systems shall be considered a conduit system for the purposes of sealing in classified areas and must be sealed with a listed fitting.</u>
Substantiation: The issue of blown fiber systems being used in hazardous areas continues to be a problem with manufacturer’s trying to get customers to use the blown fiber system in hazardous locations without proper sealing. Many petrochemical plants have been using this system already without proper sealing methods being used which I believe to be a hazard since gases and vapors can pass freely through the tubes. The blown fiber manufacturers like to say that their system is neither a conduit or a cable, but a cable tube system and, therefore, doesn’t have to be sealed. There isn’t a listed seal on the market for these systems and until the manufacturers are convinced that the sealing method needs to be listed, they won’t spend the effort to acquire the listing. I believe the tube is more of a conduit system than a cable and adding the text will clarify that the sealing method must be listed the same as required in 501.15(C)(1) for conduits.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-16. The panel notes that cable tube systems are listed as raceways.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-64 Log #4000 NEC-P16 **Final Action: Reject**
(770.154(H) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 770.154(H).
<u>(H) Cables With Suffix Markings. Nonconductive and conductive optical fiber cables with single or multiple suffix markings shall be permitted where required to meet special applications.</u>
<u>(1) Cables for Dry, Damp, or Wet Locations. Nonconductive and conductive optical fiber cables installed in dry, damp, or wet locations shall be marked in accordance with 770.179.(E).</u>
<u>(2) Cables Exposed to Direct Sunlight. Nonconductive and conductive optical fiber cables installed exposed to direct sunlight shall be marked in accordance with 770.179(F).</u>
<u>(3) Cables in Corrosive Locations. Nonconductive and conductive optical fiber cables installed in corrosive locations shall be marked in accordance with 770.179(H).</u>
<u>(4) Very-Low-Smoke Producing Cables. Nonconductive and conductive optical fiber very-low-smoke producing cables installed to provide low flame spread and very-low-smoke emissions shall be marked in accordance with 770.179(I).</u>
<u>(5) Fire Hazard Cables. Nonconductive and conductive optical fiber fire hazard cables installed to provide low flame spread, very-low-smoke, and known potential heat release shall be marked in accordance with 770.179(J).</u>
Substantiation: This proposal permits cables identified in 770.154(A), (B), and (C) to have suffix markings.
This proposal establishes 770.154(G) for cables with suffixes for installation in locations requiring special cable characteristics.
Panel Meeting Action: Reject
Panel Statement: 770.154, Applications of Listed Optical Fiber Cables and Raceways, provides information as to where a particular cable can be installed. This proposal does not provide any applications or installation requirements for any of the proposed cables.
All of the suggested changes are dealing with suffix markings, which would be more appropriately addressed in 770.179, Listing Requirements Optical Fiber Cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-65 Log #4001 NEC-P16 **Final Action: Reject**
(770.179)

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add text to the first paragraph of 770.179.

770.179(A) through 770.179(D) do not change.

770.179 Optical Fiber Cables.

Optical fiber cables shall be listed in accordance with 770.179(A) through (D) and shall be marked in accordance with Table 770.179 and shall be permitted to have suffix markings in accordance with 770.179(E) through (J).
Substantiation: This change is editorial to permit the new suffixes proposed for 770.179(E) through (J).

Optical fiber cables are sometimes used in systems covered by Articles 725 and 760, replacing copper conductors. It is important that optical fiber cables have the same listing requirements and suffixes as permitted for cables in Articles 725 and 760.
Panel Meeting Action: Reject
Panel Statement: Articles 725 and 760 do not have any applications or installation requirements or allowances for suffix markings, that are not also currently addressed for Article 770 cables.
770.154, Applications of Listed Optical Fiber Cables and Raceways, does not contain any application for the newly proposed cable listing suffixes. This proposal does not provide any applications or installation requirements for the newly proposed cable listing suffixes. Adding listing requirements without application or installation requirements is not in keeping with the 2003 NEC Style Manual Section 1.3, Regulatory Adoption, which states "Because the National Electrical Code is intended to be suitable for adoption as a regulatory document, it is important that it contain clearly stated mandatory requirements in the Code text."
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-66 Log #4860 NEC-P16 **Final Action: Reject**
(770.179(A), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining a cable that is low smoke producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.~~ See {3}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

See my proposal for new Annex I.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-67 Log #1663 NEC-P16 **Final Action: Reject**
(770.179(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 770.179(B) FPN as follows:

FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the cables pass the requirements of~~ testing in accordance with ~~that the cables pass~~ ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-68 Log #4861 NEC-P16 **Final Action: Reject**
(770.179(B), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~ See {4}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

See my proposal for new Annex I.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-69 Log #31 NEC-P16 **Final Action: Reject**
(770.179(C), FPN)

NOTE: This proposal appeared as Comment 16-73 on Proposal 16-91 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-91 was:

Revise text to read as follows:

One method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-~~1985~~ 2001, Test Methods for Electrical Wires and Cables.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:

FPN: One method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays", in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The Proposal as submitted defines the damage and specifies performance requirements.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-70 Log #1664 NEC-P16 **Final Action: Reject**
(770.179(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 770.179(C) FPN as follows:

FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-71 Log #4862 NEC-P16 **Final Action: Reject**
(770.179(C), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
See my proposal for new Annex I.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-72 Log #32 NEC-P16 **Final Action: Reject**
(770.179(D), FPN)

NOTE: This proposal appeared as Comment 16-74 on Proposal 16-92 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-92 was:
Revise text to read as follows:
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in ~~ANSI/UL 1581-2001, Standard for Electrical Wires, Cables, and Flexible Cords~~. UL 1685-2000 Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-~~1985~~ 2001, Test Methods for Electrical Wires and Cables.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL 1685-2000, *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables*.
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays", in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-73 Log #1666 NEC-P16 **Final Action: Reject**
(770.179(D), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 770.179(D) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-74 Log #4864 NEC-P16 **Final Action: Reject**
(770.179(D), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~
~~Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~ See {5} and {6}, Annex I.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
See my proposal for new Annex I.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-75 Log #1665 NEC-P16 **Final Action: Accept**
(770.179(D) FPN 1 and 2)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Relocate 770.179(D) FPN No. 1 and FPN No. 2 under Table 770.179.
Substantiation: It appears that the present location in the 2008 Code is in error.
The 2005 Code shows the two FPNs immediately below Table 770.113 (now 2008 Table 770.179.
2008 Proposal 16-60, which was accepted, recommended: "Revise 770.113 as shown and move Table 770.113 and Table FPNs to 770.179." There were only two Comments on Proposal 16-60 and neither one addressed the two FPNs so they should have been moved with the Table. This may also explain why the first FPN is not numbered but the other two are numbered.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-76 Log #3995 NEC-P16 **Final Action: Reject**
(770.179(E))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 770.179(E)
(E) Cables in Dry, Damp, or Wet Locations. Nonconductive and conductive optical fiber cables specified in 770.154(A), (B), and (C) shall be listed for installation in dry, damp, or wet locations, or shall have a moisture-impervious metal sheath, and shall be marked with a suffix as required in 770.179(E)(a), (b), or (c).
(a) Cables installed in dry location shall not be required to have an additional suffix marking.
(b) Cables suitable for installation in damp locations shall be identified with the suffix "-DAMP". Conductors and cables listed for damp locations shall be suitable for installation in dry locations.
FPN: One method of defining suitability for installation in damp locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
(c) Cables suitable for installation in wet locations shall be identified with the suffix "-WET". Conductors and cables listed for damp locations shall be suitable for installation in dry or damp locations.
FPN: One method of defining suitability for installation in wet locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies which cables are suitable for dry, damp, or wet locations. Cables suitable for installation in dry locations that are installed in damp or wet locations have the potential to cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: 770.154, Applications of Listed Optical Fiber Cables and Raceways, does not contain any application for the newly proposed cable listing suffixes. This proposal does not provide any applications or installation

requirements for the newly proposed cable listing suffixes. Adding listing requirements without application or installation requirements is not in keeping with the 2003 NEC Style Manual Section 1.3, Regulatory Adoption, which states "Because the National Electrical Code is intended to be suitable for adoption as a regulatory document, it is important that it contain clearly stated mandatory requirements in the Code text."
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-77 Log #4882 NEC-P16 **Final Action: Reject**
(770.179(E) (New))

Submitter: Edward Walton, Draka Cableteq, USA
Recommendation: Add new text as follows:
770.179(E) Fiber Optic Circuit Integrity (CI) Cables. Cables suitable for use in systems to ensure survivability of critical circuits and pathways during a specified time under fire conditions shall be additionally listed as circuit integrity (CI) cable. Cables identified in 770.179(A) through (D) that meet the requirements for circuit integrity shall have the additional classification using the suffix "CI."
FPN: One method of defining circuit integrity (CI) cable is by establishing a minimum 2-hour fire resistance rating for the cable when tested in accordance with UL 2196-2001, Standard for Tests of Fire Resistive Cables.
Substantiation: To comply with the latest changes in NFPA 72, Chapter 12 "Emergency Communications Systems" and Chapter 13 "Pathway Survivability".
Panel Meeting Action: Reject
Panel Statement: 770.154, Applications of Listed Optical Fiber Cables and Raceways, does not contain any application for the newly proposed cable listing suffixes. This proposal does not provide any applications or installation requirements for the newly proposed cable listing suffixes. Adding listing requirements without application or installation requirements is not in keeping with the 2003 NEC Style Manual Section 1.3, Regulatory Adoption, which states "Because the National Electrical Code is intended to be suitable for adoption as a regulatory document, it is important that it contain clearly stated mandatory requirements in the Code text."
The submitter's substantiation is referring to sections of NFPA 72 that have not been adopted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-78 Log #3997 NEC-P16 **Final Action: Reject**
(770.179(F))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 770.179(F)
(F) Cables Exposed to Direct Sunlight. Nonconductive and conductive optical fiber cables installed exposed to direct sunlight shall be listed as sunlight resistant cable. Cables specified in 770.154(A), (B), and (C), and used for installations exposed to direct sunlight shall have the additional classification using the suffix "-SR".
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies cables as being suitable for installation exposed to direct sunlight. Cables that are not listed for exposure to direct sunlight and are installed exposed to direct sunlight have the potential to cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-76. The submitter's substantiation that cables are not marked for exposure to direct sunlight is incorrect. There are cables marked as suitable for installation in direct sunlight.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-79 Log #3998 NEC-P16 **Final Action: Reject**
(770.179(G))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 800.179(G)
(G) Cable Temperature Ratings. Nonconductive and conductive optical fiber cables shall be listed for a temperature rating of not less than 60ºC (140ºF). Communications cables shall be permitted to have an additional temperature rating for the lowest permitted temperature.
Substantiation: Cables may be installed in areas where the temperature exceeds the 60ºC (140ºF) rating, which is not marked on the cable. For example, cable installed in conduit on a rooftop could have a temperature internal to the conduit in excess of 160 ºF.
Additionally, cables may be installed in cold areas (e.g., walk-in freezer), so an indication of the minimum permitted temperature is important.
There is a companion proposal to add temperature marking requirements.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-76.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

Comment on Affirmative:
BRUNSSEN, J.: There is no correlation between this proposal and the Panel Meeting Action on Proposal 16-76. The Panel Statement should read: "The proposal references communications cables which is inappropriate for Article 770."

16-80 Log #3994 NEC-P16 **Final Action: Reject**
(770.179(H))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 770.179(H)
(H) Cables Installed in Corrosive Locations. Nonconductive and conductive optical fiber cables installed in corrosive locations shall be listed as suitable for corrosive locations. Cables specified in 770.154(A), (B), and (C), and used for installation in corrosive locations shall have the additional classification using the following suffixes: "-PR" for oil resistant, and "-GR" for gasoline and oil resistant.
FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*
Substantiation: Presently, there is no marking that identifies which cables as being suitable for installation in corrosive locations. Corrosive locations have the potential to degrade cable insulation and cause system malfunction.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-76.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-81 Log #3999 NEC-P16 **Final Action: Reject**
(770.179(I))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add the following new text:
(I) Very-Low-Smoke Producing Cables. Nonconductive and conductive optical fiber cables used to provide very-low-smoke producing characteristics shall be listed as very-low-smoke producing (50) and shall be listed as having low flame spread characteristics and very-low-smoke producing characteristics. Cables specified in 770.154(A), (B), and (C) shall have the additional classification using the suffix "-50".
FPN: One method of defining a very-low-smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core.
Substantiation: This proposal establishes a listing and marking for cable for installation where minimal smoke generations is required. This cable meets the requirement for installation in concealed spaces that permit a maximum flame spread index of 25 and a maximum smoke developed index of 50. The proposed cable has low flame spread characteristics and very-low-smoke-producing characteristics. Presently, a number of manufacturers have cables listed as meeting the proposed requirements, but do not have a unique marking permitted by the NEC.
The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-76.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-82 Log #2265 NEC-P16 **Final Action: Accept in Principle**
(770.182)

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:
770.182 Optical Fiber Raceways and Optical Fiber/Communications Cable Routing Assemblies.
Optical fiber raceways and optical fiber/communications cable routing assemblies shall be listed in accordance with 770.182(B) through (C).
(A) Plenum Optical Fiber Raceway. (Text unchanged).
(B) Riser Optical Fiber Raceways and Optical Fiber/Communications Cable Routing Assemblies. Riser optical fiber raceways and riser optical fiber/communications cable routing assemblies shall be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.
FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, *Standard for Optical Fiber Cable Raceway*, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*
(C) General-Purpose Optical Fiber Cable Raceways and Optical Fiber/Communications Cable Routing Assemblies. General-purpose optical fiber cable raceways and optical fiber/communications cable routing assemblies shall be listed as being resistant to the spread of fire.

FPN: One method of defining resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, *Standard for Optical Fiber Cable Raceway*, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*

Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber /communications cable routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)

The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.

We have submitted companion proposals to provide for a change of the scope of this article to include optical fiber /communications cable routing assemblies and to provide appropriate applications of optical fiber routing assemblies.

A plenum grade routing assembly is not being proposed because it is not currently recognized in NFPA 90A which has primary responsibility for combustibles in plenums.

Panel Meeting Action: Accept in Principle

Revise recommended text to read as follows:

770.182 Optical Fiber Raceways and Cable Routing Assemblies. Optical fiber raceways and cable routing assemblies shall be listed in accordance with 770.182(A) through (C).

(A) Plenum Optical Fiber Raceway. (Text unchanged).

(B) Riser Optical Fiber Raceways and Cable Routing Assemblies. Riser optical fiber raceways and riser cable routing assemblies shall be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for flame propagation (riser) in UL 2024, *Standard for Optical Fiber Cable Raceway*, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*

(C) General-Purpose Optical Fiber Cable Raceways and Cable Routing Assemblies. General-purpose optical fiber cable raceways and cable routing assemblies shall be listed as being resistant to the spread of fire.

FPN: One method of defining resistance to the spread of fire is that the raceways pass the requirements of the vertical-tray flame test (general use) in UL 2024, *Standard for Optical Fiber Cable Raceway*, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*

Panel Statement: The panel struck "optical fiber/communications" because it was removed from the definitions. See panel action on Proposals 16-12, 16-108, and 16-232.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-83 Log #4872 NEC-P16 **Final Action: Reject**

(770.182)

Submitter: Paul Guidry, Fluor Enterprises, Inc

Recommendation: Add new text:

770.182(D) Optical fiber cable shall be listed for cable tray use where installed in cable tray.

FPN: One method of defining the listing requirements is that the cable passes UL 1277, *Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.*

Substantiation: There are new optical fiber cable products on the market that are listed specifically for cable tray use. They meet UL 1277 criteria for TC cable. I believe this should be a requirement since there are products now being made that meet the proper UL standards. Up until now, there were no products that were listed specifically for cable tray use, so a variety of cables were installed that may or may not have met requirements for tests such as described in "UL Flame Exposure" or "FT4/IEEE 1202 Type of Flame Exposure" in the Standard Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables, UL 1685.

Panel Meeting Action: Reject

Panel Statement: The panel realizes that this is proposing that only listed optical fiber cable tray cable be permitted to be used in cable trays. 770.154(D) right now permits any of the cables in Table 770.179 to be used. The lowest rating in the table is "general-purpose". All of the other articles have a statement in the cable tray clause that permits every type of cable except limited use cable to be used in a cable tray. This includes general-purpose to plenum. There is no reason to restrict optical fiber cable in cable trays to only cable tray cable.

There is no optical fiber cable designated as optical fiber cable tray cable. There are hybrid cables that include power and light conductors as well as optical fiber members that are listed for tray cable use. The use and limitations for this type of cable is governed by the power and light articles.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-84 Log #1667 NEC-P16 **Final Action: Reject**

(770.182(A), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 770.182(A) FPN as follows:

FPN: One method of ~~defining~~ determining the fire resistance and low smoke producing characteristics of ~~that~~ an optical fiber raceway is testing ~~a low smoke producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested~~ in accordance with the plenum test in UL 2024, Standard for Optical Fiber Cable Raceway.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The arrangement of text provides consistency with other similar FPNs.

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-85 Log #4875 NEC-P16 **Final Action: Reject**

(770.182(A), FPN)

Submitter: T. David Mills, T. David Mills Associates

Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining that an optical fiber raceway is a low smoke producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with the plenum test in UL 2024, Standard for Optical Fiber Cable Raceway.~~ See {9}, Annex I.

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

See my proposal for new Annex I.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject

Panel Statement: The FPNs are more user-friendly in current locations.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-86 Log #1668 NEC-P16 **Final Action: Reject**

(770.182(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 770.182(B) FPN as follows:

FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the raceways pass the requirements of the test for~~ testing in accordance with ~~that the cables pass~~ ANSI/UL 1666-2002, Standard Test Flame Propagation (riser) in UL 2024, Standard for Optical Fiber Cable Raceway.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-87 Log #4868 NEC-P16 **Final Action: Reject**
(770.182(B), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, Standard for Optical Fiber Cable Raceway.~~ <u>See {9}, Annex I.</u>
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
See my proposal for new Annex I.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-88 Log #1669 NEC-P16 **Final Action: Reject**
(770.182(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 770.182(C) FPN as follows:
FPN: One method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~that the raceways pass the requirements of the~~ <u>testing in accordance with the</u> Vertical-Tray Flame Test (General Use) in UL2024, Standard for Optical Fiber Cable Raceway.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-89 Log #4869 NEC-P16 **Final Action: Reject**
(770.182(C), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:
FPN: ~~One method of defining resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, Standard for Optical Fiber Cable Raceway.~~ <u>See {9}, Annex I.</u>
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
See my proposal for new Annex I.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

ARTICLE 790

12-183 Log #2891 NEC-P12 **Final Action: Reject**
(790 (New))

Submitter: Jerry Grant, Plainfield, IL
Recommendation: Add new text to read as follows:
<u>Proposed Article 790 Research and Development Laboratories</u>
<u>**790.1 Scope.** The requirements of this article shall apply to the electrical installations in those areas, with custom or special electrical equipment, designated by the facility management for research and development (R&D) or as laboratories.</u>
<u>**790.2 Definitions.** For the purposes of this article, the following definitions shall apply.</u>
<u>**Competent Person.** A person meeting all of the requirements of a qualified person, as defined in Article 100 and, in addition, is responsible for all work activities or safety procedures related to custom or special equipment, and has detailed knowledge regarding the electrical hazard exposure, the appropriate controls for mitigating those hazards, and implementation of those controls.</u>
<u>**Field Evaluated.** A thorough evaluation of nonlisted or modified equipment in the field that is performed by persons or parties acceptable to the authority having jurisdiction. The evaluation approval ensures that the equipment meets appropriate codes and standards, or is similarly found suitable for a specified purpose.</u>
<u>**Laboratory.** A building, space, room, or group of rooms intended to serve activities involving procedures for investigation, diagnostics, product testing, or use of custom or special electrical components, systems, or equipment.</u>
<u>**Research and Development (R&D).** An activity in an installation specifically designated for research or development conducted with custom or special electrical equipment.</u>
<u>**790.3 Applications of Other Articles.** Each electrical system for R&D and laboratory applications shall meet the requirements of the remainder of this document, except as amended by Article 790.</u>
<u>FPN: Examples of these applications include low voltage-high current power systems; high voltage-low current power systems; dc power systems; capacitors; cable trays for signal cables and other systems, such as steam, water, air, gas, or drainage; and custom-made electronic equipment.</u>
<u>**790.4 Specific Measures and Controls for R&D Installations.** Due to the unique nature of R&D and laboratory installations that are outside typical configurations of nominal voltage, current and frequency, the authority having jurisdiction and the competent person shall have the option of adopting special requirements developed from engineering and scientific standards for specific R&D installations based on the field evaluation and/or plan review.</u>
<u>**790.6 Listing Requirements.** The equipment or systems used in the R&D area or in the laboratory shall be listed or field evaluated prior to use.</u>
<u>FPN: Laboratory and R&D equipment or systems can pose unique electrical hazards that might require mitigation. Such hazards include ac and dc, low voltage and high amperage, high voltage and low current, large electromagnetic fields, induced voltages, pulsed power, multiple frequencies, and similar exposures.</u>
Substantiation: NFPA 70E now has a R&D section and this proposal will make NFPA 70 and NFPA 70E consistent on this issue. NFPA 70 is primarily written for typical nominal configurations of nominal voltage, current and 60 HZ. R&D labs often do work outside of these nominal values and need alternative methods to achieve safe installation with the oversight of the competent person and authority having jurisdiction along with NFPA 70.
Panel Meeting Action: Reject
Panel Statement: Article 350 of NFPA 70E was written primarily to address safety issues for energized installations, not for electrical installation requirements, such as found in the NEC. Therefore, this set of requirements more appropriately belongs in NFPA 70E, where it already resides.
The proposed new article does not contain any technical requirement, only a scope, definitions, and requirement for the AHJs to develop “special engineering requirements” to address what is considered unique. This is too broad and will be difficult for AHJs to properly enforce.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

ARTICLE 800 — COMMUNICATIONS CIRCUITS

16-90 Log #2284 NEC-P16 **Final Action: Reject**
(800)

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise the indicated Sections in Article 800 to read as follows:
800.2 Definitions. See Article 100. For the purposes of this article, the following additional definitions apply.
<u>**Communication Raceway (OFCR).** A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of communication cables.</u>
800.3 Other Articles.
(A) Hazardous (Classified) Locations. Communications circuits and equipment installed in a location that is classified in accordance with 500.5 and 505.5 shall comply with the applicable requirements of Chapter 5.
(B) Equipment in Other Space Used for Environmental Air. Section 300.22(C) shall apply.
(C) Network-Powered Broadband Communications Systems. Article 830 shall apply to network-powered broadband communications systems.
<u>**(D) Optical Fiber Raceways (OFCR).** Article 862 applies to the selection and installation of Optical Fiber Raceways (OFCR).</u>
800.110 Raceways for Communications Wires and Cables. Where communications wires and cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or <u>Optical Fiber/Communication Raceway (Type: OFCR) selected and installed per Article 862. The number of Communication Cables shall comply with 862.22.</u> ~~listed plenum communications raceway, listed riser communications raceway, or listed general-purpose communications raceway installed in accordance with 800.154 and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.~~ ~~The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.~~

800.154 Applications of Listed Communications Wires and Cables and Communications Raceways. Communications wires and cables shall comply with the requirements of 800.154(A) through (D), 800.154(F), and 800.154(G), or where cable substitutions are made in accordance with 800.154(E).

(A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CMP. Abandoned cables shall not be permitted to remain. Types CMP, CMR, CMG, CM, and CMX and communications wire installed in compliance with 300.22 shall be permitted. Listed plenum communications raceways shall be permitted to be installed in ducts and plenums as described in ~~300.22(B)~~ 862.10(D) and in other spaces used for environmental air as described in ~~300.22(C)~~ 862.10(E). Only Type CMP cable shall be permitted to be installed in raceways.

(B) Riser. Cables installed in risers shall comply with 800.154(B)(1), (B)(2), or (B)(3).

(1) Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CMR. Floor penetrations requiring Type CMR shall contain only cables suitable for riser or plenum use. Listed riser communications raceways and listed plenum communications raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor as described in 862.10(F). Only Type CMR and CMP cables shall be permitted to be installed in these raceways.

(2) Metal Raceways or Fireproof Shafts. Listed communications cables shall be encased in a metal raceway or located in a fireproof shaft having firestops at each floor.

(3) One- and Two-Family Dwellings. Type CM and CMX cable shall be permitted in one- and two-family dwellings. Listed general-purpose communication raceways, listed riser communication raceways, and listed plenum communication raceways shall be permitted for use as described in 862.10(G) with Type CM and CMX cables.

FPN: See 800.26 for firestop requirements for floor penetrations.

(C) Other Wiring Within Buildings. Cables installed in building locations other than the locations covered in 800.154(A), (B), (D), and (G) shall be in accordance with 800.154(C)(1) through (C)(6).

(1) General. Cables shall be Type CMG or Type CM. Listed communications general-purpose raceways, listed riser communications raceways, and listed plenum communications raceways shall be permitted. Only Types CMG, CM, CMR, or CMP cables shall be permitted to be installed in these communications raceways as described in 862.10(G).

(2) In Raceways. Listed communications wires that are enclosed in a raceway of a type included in Chapter 3 shall be permitted.

(3) Nonconcealed Spaces. Type CMX communications cable shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).

(4) One- and Two-Family Dwellings. Type CMX communications cable less than 6 mm (0.25 in.) in diameter shall be permitted to be installed in one- and two-family dwellings.

(5) Multifamily Dwellings. Type CMX communications cable less than 6 mm (0.25 in.) in diameter shall be permitted to be installed in nonconcealed spaces in multifamily dwellings.

(6) Under Carpets. Type CMUC undercarpet communications wires and cables shall be permitted to be installed under carpet.

(D) Cable Trays. Types CMP, CMR, CMG, and CM communications cables shall be permitted to be installed in cable trays. Communications raceways, as described in ~~800.182~~ 862.2, shall be permitted to be installed in cable trays.

(E) Cable Substitutions. The uses and substitutions for communications cables listed in Table 800.154(E) and illustrated in Figure 800.154(E) shall be permitted.

FPN: For information on Types CMP, CMR, CMG, CM, and CMX cables, see 800.179.

Table 800.154(E) Cable Substitutions (existing)

(F) Hybrid Power and Communications Cable. Hybrid power and communications cable listed in accordance with 800.179(H) shall be permitted to be installed in one- and two-family dwellings.

(G) Distributing Frames and Cross-Connect Arrays. Listed communications wire and Types CMP, CMR, CMG, and CM communications cables shall be used in distributing frames and cross-connect arrays.

800.182 ~~**Communications Raceways.** Communications raceways shall be listed in accordance with 800.182(A) through (C).~~ **Nonmetallic Communication Raceways (OFCR).** Nonmetallic Communication Raceways (OFCR) shall be listed in accordance to Article 862.6.

~~**(A) Plenum Communications Raceways.** Plenum communications raceways listed as plenum optical fiber raceways shall be permitted for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.~~

~~FPN: One method of defining that an optical fiber raceway is a low smoke producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with the plenum test in UL 2024, Standard for Optical Fiber Cable Raceway.~~

~~**(B) Riser Communications Raceways.** Riser communications raceways shall be listed as having adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.~~

~~FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, Standard for Optical Fiber Cable Raceway.~~

~~**(C) General-Purpose Communications Raceways.** General-purpose communications raceways shall be listed as being resistant to the spread of fire.~~

~~FPN: One method of defining resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, Standard for Optical Fiber Cable Raceway.~~

Substantiation: This is a companion proposal to correlate with the proposal for a new optical fiber/communication raceway article. The new optical fiber/communication raceway article was proposed to Panel 16 as Article 862.

Optical fiber/communication raceways (Type OFCR) are currently listed raceways for use in plenums, risers or general purpose applications for the management of signaling, optical fiber, communication and CATV cables. This new Article and the companion proposals will clarify the selection, and installation optical fiber/communication raceways including the construction specifications. It is not the intent of the submitter to revise or change any of the currently permitted uses by this proposal, but only to enhance the usability of the Code.

Panel Meeting Action: Reject

Panel Statement: This proposal was submitted in companion with Proposal 16-350, which was rejected. The submitter of this proposal assumes the acceptance of Proposal 16-350, which was rejected.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-91 Log #4190 NEC-P16 **Final Action: Reject**
(800)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Revise text to read as follows:

Replace the term "grounding conductor" with "grounding electrode conductor" throughout this Article.

Substantiation: The term "Grounding Conductor" is being proposed to be deleted because it is almost identical to the term "grounding electrode conductor". The defined term "grounding electrode conductor" includes the ability of connecting to a point on the grounding electrode system. This has been submitted as a single proposal to the Article instead of numerous proposals to allow the panel to ensure the resulting language still meets their intent in each specific section.

Panel Meeting Action: Reject

Panel Statement: The term "grounding electrode conductor" (GEC) has historically and traditionally both distinguished and identified the specific conductor that connects the grounded conductor (neutral) and equipment grounding conductor from within the power service equipment to the grounding electrode/grounding electrode system at the premises. This distinction must remain in place to identify the unique purpose of the GEC and to avoid confusion and misapplication of the numerous grounding/bonding requirements throughout the NEC.

There are very specific requirements for the material (250.62), installation, sizing and accessibility (250.64) of the GEC that are not specific to other 'grounding conductors'. It is often the access and connection point for other systems/equipment required to be grounded to the premises grounding electrode/grounding electrode system, and has the physical and electrical attributes for this function. Connection of other systems/equipment to a conductor designated as a GEC but not meeting the criteria of 250.62 and 250.64 may result in an unsafe installation.

No technical or electrical safety reasons have been cited to substantiate the proposed change.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

JANIKOWSKI, R.: I agree with the submitter that the term "grounding conductor" and "grounding electrode conductor" are all but identical. The term "grounding electrode conductor" will not be mistaken in the field for the grounded conductor and refers to any point on the grounding electrode system.

Comment on Affirmative:

BRUNSSEN, J.: This is a correlation issue with Panel 5. Although the deletion of the term "grounding conductor" is appropriate for articles covered by Panel 5, the term is used over 120 times in Chapter 8 articles covering low power communications circuits and elsewhere in the code. The term "Grounding Conductor" has proven a useful and well understood term within the communications articles and a definition should be retained in Article 100. Substitution of "Grounding Conductor" with "Grounding Electrode Conductor" is not appropriate for all uses in Chapter 8 articles. The definition of "Grounding Conductor" could be modified to make it more specific to communications circuits as follows: "G**rounding Conductor.** A conductor used to connect communications equipment and cable shield, as required, to a grounding electrode system or grounding electrode(s)." This definition would meet the needs of Chapter 8.

16-92 Log #1128 NEC-P16 **Final Action: Accept**
(800.1 FPN No. 1 (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Insert the following as FPN No 1:
<u>FPN No. 1: See 90.2(B)(4) for installations of communications circuits and equipment that are not covered.</u>
Renumber existing FPNs 1 through 5 as FPNs 2 through 6.
Substantiation: Adding the FPN reminds NEC users to check 90.2(B)(4) thereby avoiding misapplication of 800, and provides correlation between 800.1 and 830.1 that contains a similar FPN.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-93 Log #2099 NEC-P16 **Final Action: Accept**
(800.1, FPN to No. 5)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Delete 800.1 FPN No 5 as follows:
~~FPN No. 5: For installation requirements for network-powered broadband communications circuits, see Article 830.~~
Substantiation: This is an editorial proposal.
Section 800.1, FPN No. 5 is superfluous as the information is currently and properly contained in 800.3(C).
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-94 Log #178 NEC-P16 **Final Action: Accept in Principle**
(800.1, FPN 1 (New))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Renumber existing FPN No. 1 to 2, 2 to 3, etc.
Insert a new FPN No. 1.
<u>FPN No. 1: See 90.2(B)(4) for installations of communications equipment that are not covered.</u>
Substantiation: The proposed FPN will provide important scope information. It will also establish parallelism with the scope Article 830 which has a similar fine print note. "FPN No. 2: See 90.2(B)(4) for installations of broadband communications systems that are not covered."
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-92.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-95 Log #2078 NEC-P16 **Final Action: Accept in Principle**
(800.1, FPN 1)

Submitter: Steve C. Dryden, Poole Fire Protection, Inc. / Rep. NFPA TC on Telecommunications
Recommendation: Renumber existing FPN No. 1 to 2, 2 to 3, etc.
Insert a new FPN No. 1.
<u>FPN No. 1: See 90.2(B)(4) for installations of communications equipment that are not covered.</u>
Substantiation: The proposed FPN will provide important scope information. It will also establish parallelism with the scope Article 830 which has a similar fine print note. "FPN No. 2: See 90.2(B)(4) for installations of broadband communications systems that are not covered."
The NFPA Technical Committee on Telecommunications is responsible for NFPA 76. This proposal was developed by the Technical Committee at a pre-ROP meeting and is being submitted by the chairman on behalf of the Technical Committee.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-92.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-96 Log #2100 NEC-P16 **Final Action: Accept**
(800.1, FPN 1)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: After deleting the fine print note renumber the remaining fine print notes to n-1.
~~FPN No. 1: For installation requirements for information technology equipment and systems in an information technology equipment room, see Article 645.~~
Substantiation: This is an editorial proposal.
The fine print note reference to Article 645 is not necessary. It is being misinterpreted as applying to communications equipment in a computer room. Deleting it will remove any possible misinterpretation.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-97 Log #119 NEC-P16 **Final Action: Accept**
(800.1, FPN 5)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Delete FPN No. 5.
Substantiation: FPN No. 5 is redundant. The text in 800.3(C) is sufficient to refer users to Article 830.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-98 Log #2077 NEC-P16 **Final Action: Reject**
(800.1, FPN 6 (New))

Submitter: Steve C. Dryden, Poole Fire Protection, Inc. / Rep. NFPA TC on Telecommunications
Recommendation: Add a new FPN.
<u>FPN. No. 6. For information on cable and equipment requirements in telecommunications facilities where telecommunication services such as telephone, data, cellular, internet, voice over internet protocol (VoIP), and video are rendered to the public, see NFPA 76, Standard for the Fire Protection of Telecommunications Facilities.</u>
Substantiation: Fire protection requirements, including cabling and equipment, for telecommunications facilities such as a central office, are covered by NFPA 76, Standard for the Fire Protection of Telecommunications Facilities. Although many telecommunications facilities are not covered by the NEC (see 90.2(B)(4)), the central offices of non-utility telecommunications companies are covered by NFPA 76 <u>and</u> NEC Article 800. The NFPA Technical Committee on Telecommunications is responsible for NFPA 76. This proposal was developed by the Technical Committee at a pre-ROP meeting and is being submitted by the chairman on behalf of the Technical Committee.
Panel Meeting Action: Reject
Panel Statement: The proposed FPN directs the reader to a document that applies to facilities identified in 90.2(B)(4) as not covered by the NEC. It is misleading as written and cannot be broadly applied to all communications facilities. For example, it does not apply to a communications closet of less than 500 square feet on a customer premises (e.g., office building or shopping center). It also does not apply to service to a PBX located on a customer premises.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-99 Log #2459 NEC-P16 **Final Action: Accept in Principle**
(800.1, FPN 6 (New))

Submitter: Joseph P. Savage, FIFTH Council North America
Recommendation: Add the following line to 800.1
FPN No. 6: For installation requirements for premises-powered broadband communications circuits, see Article 8XX.
Substantiation: A submission has been made for a new Article to Chapter 8. If this Article is accepted, then Article 800.1 should include the above added reference.
Panel Meeting Action: Accept in Principle
Add the following FPN and number as the last FPN to 800.1 to read as follows: "FPN No. 5: For installation requirements for premises-powered broadband communications circuits, see Article 840."
Panel Statement: See panel action on Proposal 16-349. The panel renumbered the FPN and reference article number. See panel action on Proposal 16-93, 16-96, 16-97, and 16-92, which added and deleted FPNs.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
PREZIOSO, L.: There is no need to add reference to the new article if the new article is not Accepted.

16-100 Log #1463 NEC-P16 **Final Action: Reject**
(800.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
A circuit that is in such a position location that, in case of failure of supports or insulation contact with another circuit ~~may~~ is likely to result.
Substantiation: Edit. "May" is subjective and a term to be avoided. "Likely" is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitters recommendation is not editorial. The term "may" connotes "a possibility"; the term "likely" connotes "is probable". The panel does not agree that these are probable events.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-101 Log #1464 NEC-P16 **Final Action: Reject**
(800.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "or premises" after "buildings".
Substantiation: Edit. The provision should include structures not deemed as buildings.
Panel Meeting Action: Reject
Panel Statement: The submitter has not specified to which definition of 800.2 the proposed revision is intended to apply.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-102 Log #744 NEC-P16 **Final Action: Reject**
(800.2.Abandoned Communications Cable)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Delete text and the associated Fine Print Note to read as follows:
800.2 Definitions.
See Article 100. For the purposes of this article, the following additional definitions apply.
~~**Abandoned Communications Cable.** Installed communications cable that is not terminated at both ends at a connector or other equipment and not identified for future use with a tag.~~
~~FPN: See Article 100 for a definition of Equipment.~~
[remainder of 800.2 unchanged by this Proposal]
Substantiation: Companion proposals have been made to add a single generalized definition in Article 100 and to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
NEC® Manual of Style 2.2.2.1. Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2. Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discreet definitions can be broadly consolidated into a single definition in Article 100.
The specific method by which identification for future use is achieved ("… with a tag") is conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 violates *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …") and is omitted in the generalized definition for "Abandoned" being added in Article 100. This identification-with-a-tag requirement in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 is redundant to the actual requirement statements in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Also, words regarding the possibility of ceasing connection to an electric supply have been added in the generalized definition for "Abandoned" to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-103 Log #814 NEC-P16 **Final Action: Reject**
(800.2.Abandoned Communications Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Communications Cable. Installed communications cable that is not terminated at both ends at a connector or other equipment and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-104 Log #4555 NEC-P16 **Final Action: Accept**
(800.2.Air Duct)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Delete the following text:
~~**800.2 Air Duct.** A conduit or passageway for conveying air to or from heating, cooling, air conditioning, or ventilating equipment, but not including the plenum.~~
Substantiation: The term "air duct" is not used in article 800 and should not be defined in the article, as per the manual of style of the National Electrical Code.
This has been proposed before but was caught in the NEC moratorium associated with plenum cables.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-105 Log #122 NEC-P16 **Final Action: Accept**
(800.2.Communications Raceway)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with 2.2.2 of the NEC Style Manual to not contain mandatory text, such as "listed" and not contain the defined term.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add definition to read as follows:
Communications Raceway. A raceway listed as a Plenum Communications Raceway, or a Riser Communications Raceway, or a General-Purpose Communications Raceway.
Substantiation: The term "Communications Raceway" is used throughout Article 800 and therefore needs to be defined. The proposed definition is precise. Companion proposals have been submitted for Articles 770 and 820.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
GUBISCH, R.: The proposed definition contains a requirement which conflicts with 2.2.2 of the NEC Style Manual.

16-106 Log #211 NEC-P16 **Final Action: Accept in Principle**
(800.2.Communications Raceway (New))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add new definition to read as follows:
"Communications Raceway. A raceway listed as a Plenum Communications Raceway, or a Riser Communications Raceway, or a General-Purpose Communications Raceway."
Substantiation: The term "Communications Raceway" is used throughout Article 800 and therefore needs to be defined. The proposed definition is precise. Companion proposals have been submitted for Articles 770 and 820.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-105.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
GUBISCH, R.: The proposed definition contains a requirement which conflicts with 2.2.2 of the NEC Style Manual.

16-107 Log #204 NEC-P16 **Final Action: Reject**
(800.2.Concealed Space)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Revise as follows:
Concealed Space. That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, attics, and in whose size might normally range from 44.45 mm (1 3/4 in.) stud spaces to 2.44 m (8 ft) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting. [NFPA 96:3.3.42.1]
Nonconcealed space. That portion of a building that is not a concealed space.
Substantiation: Section 800.154(C)(3) has application requirements for communications cables in nonconcealed spaces. A definition of a concealed space is needed in order to define and understand what a nonconcealed space is. I have also submitted a proposal to clarify that the definition of "concealed" in Article 100 applies only to wiring methods.
Panel Meeting Action: Reject
Panel Statement: The terms "concealed spaces" and "nonconcealed spaces" are generally understood and do not require definitions.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-108 Log #3595 NEC-P16 **Final Action: Accept in Principle**
(800.2.Optical fiber /communications cable routing assembly)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with 2.2.2 of the NEC Style Manual to not contain mandatory text, such as "listed" and not contain the defined term.
This action will be considered by the panel as a public comment.
Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Add new text to read as follows:
Optical fiber /communications cable routing assembly. A flame retardant, nonmetallic assembly of pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings used to support and protect optical fiber, communications and data cables in applications with a high density of cabling such a information technology (computer) rooms, broadcast stations and telecommunications offices. Parts of the assembly may have hinged or removable covers. The assembly is designed for cables be laid or set in place after the enclosures have been installed as a complete system.
Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, Optical Fiber and Communication Cable Raceway. UL lists optical fiber /communications cable routing assemblies to UL2024a, Outline of Investigation for Optical Fiber Cable Routing Assemblies. Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)
For further information see the attached application guide from one of the manufacturers or got to http://www.storage-expo.com/ExhibitorLibrary/302/FiberRunner_6.pdf on the web.
The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
Since users of the code may not be familiar with optical fiber /communications cable routing assemblies we are submitting this proposal to define them. We have submitted companion proposals to provide for a change of the scope of Article 770 to include optical fiber /communications cable routing assemblies and to provide listing and application for requirements for them. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Cable Routing Assembly. A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support listed cables.
Panel Statement: The panel action meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BRUNSSEN, J.: The definition as stated in the Panel Meeting Action is incomplete as it fails to identify the types of cable to be supported and protected. Revise the Panel Meeting Action as follows: "**Cable Routing Assembly.** A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support and protect optical fiber, communications and data listed cables."
DORNA, G.: See my comment on proposal 16-12.

16-109 Log #1279 NEC-P16 **Final Action: Reject**
(800.2.Cable, Cable Sheath)

Submitter: Steven L. Millard, Catering ELectric
Recommendation: Revise text to read as follows:
Remove the definitions "cable" and "cable sheath" from 800.2 and put them in Article 100.
Substantiation: The definitions "cable" and "cable sheath" are more appropriate for the Scope of Article 100 because the terms are used in other articles throughout the Code.
Panel Meeting Action: Reject
Panel Statement: The terms "cable" and "cable sheath" have specific connotation when associated with communications systems. CMP-16 does not, and should not, have purview over power cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-110 Log #158 NEC-P16 **Final Action: Accept in Principle**
(800.3(A) (New))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action on this proposal since there is no need to duplicate 90.3 in accordance with 4.1 of the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Re-letter the existing (A) to (B), (B) to (C), etc. and establish a new (A).
(A) Chapters 1 through 7. See 90.3. The requirements of Chapters 1 through 7 shall not apply to Article 800 except where the requirements are specifically referenced in Article 800.
Substantiation: Section 90.3 is extremely important to the application of Article 800. Adoption of this proposal will add clarity.
Panel Meeting Action: Accept in Principle
Re-letter the existing (A) to (B), (B) to (C), etc. and establish a new (A).
(A) Chapters 1 through 7. The requirements of Chapters 1 through 7 shall not apply to Article 800 except where the requirements are specifically referenced in Article 800. See 90.3.
Panel Statement: Field experience shows that 90.3 is often overlooked. The panel moved the reference to 90.3 to the end for clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-111 Log #120 NEC-P16 **Final Action: Accept in Principle**
(800.3(D) (New))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add new text to read:
(D) Optical Fiber Cable. Where optical fiber cable is part of a communications circuit, Article 770 shall apply.
Substantiation: Communications circuits utilize optical fibers as well as copper wires and cables for transmission of communications signals.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-113.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-112 Log #2408 NEC-P16 **Final Action: Reject**
(800.3(D))

Submitter: Jerry Feagans, City of St. Louis
Recommendation: Add text to read as follows:
(D) Underground Installation. Minimum cover requirements shall comply with Table 300.5.
Substantiation: Article 800 does not indicate any burial depths for conductors. Table 300.5 is for all installations ranging from 0 to 600 volts communication conductors do fall into that category. I understand the electrical shock hazard is not there, but the possible loss of the transmission of communications should be a concern.
Panel Meeting Action: Reject
Panel Statement: The communications cables of Article 800 contain very low power levels. If cut, it may be an annoyance, but does not constitute an electrical safety hazard. Communications cables containing higher levels of network power are covered in Article 830 and are required to meet the minimum cover requirements of Table 830.47.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
OHDE, H.: This proposal should have been an AIP. There should be established burial depths for communications conductors in the NEC whether or not voltage is an issue. Often times cables are placed just below the sod (2" to 3" in depth); at these depths ordinary grounds maintenance can destroy the cable. The submitter should revise this proposal in the ROC stage with specific burial depth requirements.

16-113 Log #2107 NEC-P16 **Final Action: Accept in Principle**
(800.3(D) (New) and 800.1, FPN No. 4)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
(D) Optical Fiber Cable. Where optical fiber cable is used to provide a communications circuit, either in whole or in part, Article 770 shall apply to the optical fiber cable portion of the communications circuit.
~~FPN No. 4: For installation requirements of optical fiber cables and raceways, see Article 770.~~
Substantiation: This proposal is editorial and technical.
Communications circuits utilize optical fibers as well as copper wires and cables for transmission of communications signals.
The task group is aware of section 4.1.1 of the NEC Style Manual which prohibits reference to an entire article. However, since it the intent of this proposal to have the entire article apply, it is necessary to reference the entire Article 770.
The fine print note referring to Article 770 in section 800.1 will be redundant with the acceptance of the text for 800.3(D). Therefore it should be deleted.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
(D) Optical Fiber Cable. Where optical fiber cable is used, either in whole or in part, to provide a communications circuit within a building, Article 770 shall apply to the installation of the optical fiber portion of the communications circuit.
Delete FPN No. 4 in 800.1.
Panel Statement: The panel added the words "within a building" to distinguish between cable within a building and outside plant cable. The panel also moved "either in whole or in part" to modify "optical fiber cable". The panel added "installation" and deleted "cable" to broaden the applicability of Article 770.
The panel understands that the submitter's intent is to delete the existing 800.1 FPN No. 4 not add a new FPN No. 4. The panel understands that 800.3(D) is a new section.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
IVANS, R.: The panel revised the text to read as follows: Where optical fiber cable is used, either in whole or in part, to provide a communications circuit within a building, Article 770 shall apply to the installation of the optical fiber portion of the communications circuit.
"Within a building" should not be added as this changes the requirement and was not part of the submitter's proposal or rationale. There is no reason this requirement should be limited to "within a building".

16-114 Log #1588 NEC-P16 **Final Action: Reject**
(800.10(C))

Submitter: William Q. Cellini, Jr., Ardmore, PA
Recommendation: Add new text to read as follows:
(C) On walls (service conductors and cables): Residential, Commercial, institutional, industrial. Service conductors and cables on exterior walls shall be installed in metallic conduit.
Substantiation: This requirement is needed for protection from burglars and arson, especially telephone, security and fire-alarm notification services, including residential, etc.
Panel Meeting Action: Reject
Panel Statement: The panel is unable to identify submitter's intended placement of the proposed text. The reference location of 800.10 does not exist in the NEC. A broad-based requirement, as proposed by the submitter, is inappropriate as only a small portion of communications installations are used for such purposes. Responsibility for physical protection to deter burglary/arson should accrue to the alarm service provider and/or customer, not the communications utility.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-115 Log #167 NEC-P16 **Final Action: Accept**
(800.18)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "telecommunications" to "communications".
Substantiation: Throughout Article 800 the term "communications" is used rather than "telecommunications". Also, Article 100 defines "Communications Equipment" not "Telecommunications Equipment". Use of terminology should be consistent throughout the article.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-116 Log #2150 NEC-P16 **Final Action: Reject**
(800.24)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Revise text as follows:
The installation shall also conform to 300.4(D), ~~and~~ 300.11~~.~~, and 334.15(C).
Substantiation: Cables ran across joists need running boards or bored holes to protect them from occupants hanging and damaging the conductors and cables.
Panel Meeting Action: Reject
Panel Statement: 334.15(C) does not apply to communications cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-117 Log #3095 NEC-P16 **Final Action: Reject**
(800.24)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
800.24 Mechanical Execution of Work.
Communications circuits and equipment shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware, including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform to 300.4~~(D)~~ and 300.11.
FPN: Text to remain unchanged.
Substantiation: This is one of a series of proposals intended to provide correlation with sections 640.6(B), 725.24, 760.24, 770.24, 800.24, 820.24 and 830.24. Due to the power limitations of these circuits, there is no reason that the requirements should be different.
Panel Meeting Action: Reject
Panel Statement: Communications cables operate at very low voltage and power levels and do not present a potential electrical safety hazard. There is insufficient substantiation to justify a major increase in physical protection requirements for communications cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-118 Log #3811 NEC-P16 **Final Action: Reject**
(800.24)

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add language to the end of 800.24 as follows: "...to damage the cable. The installation shall also conform to 300.4(D), 300.5 and 300.11. All cables in wet locations shall be listed for that use."
Substantiation: Communication cables that are only listed for dry locations are being installed either in conduits underground or as direct burial cables without regard to depth, to provide phone, TV, and data service to accessory structures (pool houses, workshops, etc.) at dwelling units. There have even been instances where these dry location cables have been routed through a planting bed under less than one in. of mulch. While there is usually no hazard from shock or burn from these cables, there is the issue of a cable deteriorating, or getting cut by a lawn mower, wrapping into the blade, and being pulled from the structure so as to injure the operator. By mandating rules for underground installations, these hazards will be mitigated.
Panel Meeting Action: Reject
Panel Statement: Acceptance of this proposal will result in conflict with 800.48.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-119 Log #4189 NEC-P16 **Final Action: Reject**
(800.24)

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Add new text as follows:
Cables shall be permitted to be secured to and supported by cable trays.
Substantiation: It is common practice to secure cables to vertical runs of cable trays but this section does not specifically address that.
Panel Meeting Action: Reject
Panel Statement: The submitter has not indicated where the text of his proposal would appear in 800.24. This proposal would allow cables to be secured and supported underneath horizontal cable trays because the word "vertical" was not included in the actual text.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-120 Log #4387 NEC-P16 **Final Action: Reject**
(800.24)

Submitter: Michal Hofkin, Middle Atlantic Inspections
Recommendation: Add language to the end of 800.24 as follows:
(language to this point unchanged) …to damage the cable. The installation shall also conform to 300.4(D), 300.5, and 300.11. All cables in wet locations shall be listed for that use.
Substantiation: Communication cables that are only listed for dry locations are being installed either in conduits underground or as direct burial cables without regard to depth, to provide phone, TV, and data service to accessory structures (pool houses, workshops, etc.) at dwelling units. There have even been instances where these dry location cables have been routed through a planting bed under less than one inch of mulch. While there is usually no hazard from shock or burn from these cables, there is the issue of a cable deteriorating, or getting cut by a lawn mower, wrapping into the blade, and being pulled from the structure so as to injure the operator. By mandating rules for underground installations, these hazards will be mitigated.
Panel Meeting Action: Reject
Panel Statement: Acceptance of this proposal will result in conflict with 800.48.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-121 Log #3722 NEC-P16 **Final Action: Accept in Principle**
(800.24, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add the following Fine Print Note:
FPN: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in air-handling plenums in accordance with 300.22.
Substantiation: This proposal addresses new requirements in NFPA 90A having an influence on installations in NEC Section 800.24, as well as held comments from the 2008 NEC Cycle, ROC 16-29 and 16-30.
Imposing the requirement that such products be "listed" in this section of the NEC would result in additional requirements not included in NFPA 90A. The implication of requiring listing in this section of the NEC would impose the full scope of requirements in UL 1565 for cable ties and UL 2239 for other support hardware. This effort to correlate with NFPA 90A would create big correlation issues within NFPA 70 for the same products used for supporting all other cables and conduits outside of the jurisdiction of code-making panel 16, for no good reason. It is not necessary to repeat requirements from NFPA 90A in NFPA 70 especially when doing so imposes unsubstantiated additional requirements.
The NFPA 90A requirements are focused on smoke and heat generated from a fire in an air-handling plenum. The NFPA 90A-2009 requirement is as follows for discrete combustible components installed in air-handling spaces in accordance with NEC 300.22 (C) and (D): (The actual clause numbers in NFPA 90A-2009 may vary editorially)
NFPA clause 4.3.10.2.6.5 Loudspeakers, recessed lighting fixtures and other electrical equipment with combustible enclosures, including their assemblies and accessories, cable ties and other discrete products shall be permitted in the ceiling cavity plenum where listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with UL2043, *Standard for Safety Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.*
And very similar requirements in 4.3.10.6.5.6 apply in NFPA 90A for discrete combustible products installed in a "raised floor plenum".
Importantly, none of these requirements pertain to noncombustible products. There are many metallic products, including metallic cable ties, used to support power, data and communications conduits and cables and there has been no substantiation offered that these be required to be "listed".
Panel Meeting Action: Accept in Principle
Revise fine print note text to read as follows:
FPN No. 2: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in accordance with 300.22(B) and (C).
Panel Statement: The panel removed the vague term "air-handling plenums" and added the references to 300.22(B) and (C). This meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-122 Log #4552 NEC-P16 **Final Action: Reject**
(800.25)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
800.25 Abandoned Cables.
The accessible portion of abandoned communications cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. Removal of abandoned cables shall be performed in a neat and workmanlike manner.
Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 800.24. Moreover, section 110.12 would only apply if specifically referenced. It is important to point out that similar care must be taken when removing cables.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Consistent wording is being proposed for other sections in the code.
For information, see relevant definitions in the NEC.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-24.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-123 Log #1597 NEC-P16 **Final Action: Reject**
(800.26)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Add a third sentence to 800.26: Conduits or raceways entering enclosures of the ventilated type, shall be sealed or plugged with an approved fire stopping material at the point of entrance to the enclosure to prevent fire, smoke, or other products of combustion from passing through the raceway into other areas of the building or structure.
Substantiation: A fire in the area where the enclosure is located will produce smoke, poison gases, and other products of combustion which can easily be carried through the enclosure's vents and these unsealed raceways to other areas in the building. Essentially defeating any firewalls. I have not seen this particular problem addressed in building codes or fire resistance directories since these raceways are not "sleeves" which ARE required to be fire stopped, but rather they are complete raceway systems which generally require only sealing up around the OUTSIDE of the pipe where it penetrates a firewall. In this particular installation smoke could easily pass right through the INSIDE of the raceway because of the ventilation openings in the enclosure.

I have witnessed the results of this "chimney-effect" problem when the smoke from a fire in a basement electric room spread throughout the upper floors of a high rise building because the raceways leaving the switch gear acted like chimneys and transported heavy smoke from the basement directly to panelboards and switchboards on the upper floors of the building thus bypassing and defeating any fire walls that the raceways penetrated and completely filling the UPPER floors with smoke. Luckily nobody was injured. If the ends of the raceways were simply filled with some fire-stopping type caulk or similar material this situation would probably never have happened.

Once a fire starts to produce toxic fumes we almost have to think of that area as a Hazardous (classified) location similar to those in Article 500. We must try to prevent those hazardous gases passing from one area in a building to another.

Just as other sealing requirements throughout the code prevent moisture, condensation, dusts, gases or vapors from traveling through raceways, this requirement for some simple fire proof putty could prevent toxic fumes from spreading throughout the building. The seals required by this proposal are equally as important as any other seals required by the NEC such as 230.8, 300.5(G), 300.7(A), 300.50(E), 312.5(C) exception to (D), 324.40(A), 332.40(A), 368, 238, 372.7, 501.15, 502.15, 504.70, 505.16, 506.16, 680.24(B) and any other seals that may be required.

I am submitting companion proposals to sections 300.21, 770.26, 800.26, 820.26 and 830.26.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The proposed recommendation is impractical. The submitter has not supplied sufficient data for substantiation of a problem.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

IVANS, R.: The submitter is correct that vented enclosures connected via unsealed raceways and conduit can bypass fire breaks between floors. It would not be impractical to seal such raceways or conduit.

16-124 Log #4517 NEC-P16 **Final Action: Reject**
(800.26)

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

800.26 Spread of Fire or Products of Combustion.

~~Installations of communications cables and communications raceways in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased.~~ <u>When required by the building, fire or mechanical code, communications cables and communications raceways within shaftways, plenums and air-handling ducts shall maintain a flame spread and smoke development index.</u> Openings around penetrations of communications cables and communications raceways <u>into or</u> through ~~fire-resistant-rated~~ <u>fire-resistive</u> walls, partitions, floors, or ceilings <u>and smoke partitions</u> shall be firestopped using approved methods ~~to maintain the fire resistance rating~~.

Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.

This section covers two issues: 1) appurtenances in certain locations must comply with flamespread and smoke development requirements established in the building, fire and mechanical codes; and 2) penetrations made in fire-resistive construction shall be provided with firestopping to maintain their fire-resistance rating.

Currently, the first sentence is vague. It is unclear what quantitatively will prevent the possible spread of fire or products of combustion from being substantially increased. What is "substantially". Additionally, we could not identify what constitutes a hollow space, and we could not identify any requirement that the combustible loading is regulated in general in hollow spaces. We do agree that building, fire and mechanical codes regulate flame spread and smoke development for spaces that are used for air distribution, see 300.22.

The second issue is addressed in the second sentence, which has been clarified. The end of the second sentence is revised to eliminate redundancy. Adding the term "into or" makes it clear that not only through penetrations, but also membrane penetrations into fire-resistive construction must be provided with firestopping to maintain the fire-resistance rating. This should also apply to smoke partitions, which are not required to be fire resistive construction. Note that a "smoke barrier" is also required to be fire-resistive, hence the change to "fire-resistive" in the second sentence.

See similar proposal to 300.21.

Panel Meeting Action: Reject

Panel Statement: Section 4.2 of the NEC Style Manual prohibits references to other standards in mandatory code text.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-125 Log #2351 NEC-P16 **Final Action: Reject**
(800.30 (New))

Submitter: Kevin M. Weigman, Northeast Wisconsin Technical College

Recommendation: Add new text as follows:

To 800.30???

Securing and Supporting.

<u>Communication cables shall be secured at intervals not to exceed 1.4 meters (4.5 ft).</u>

<u>The cable is permitted to be unsupported where the cable is fished between access points through concealed spaces in finished buildings or structures and support is impracticable.</u>

Substantiation: Currently, there are no requirements specifying the maximum distance to support such cables. As the code reads now, it states that the cables must be supported by the building structure but does not state the distance between such supports.

Panel Meeting Action: Reject

Panel Statement: The present text of 800.24, the reference to 300.11, Securing and Supporting, and the ANSI standards cited in the fine print note provide adequate guidelines for the installation and support of communications cables.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 14 Negative: 2

Explanation of Negative:

JANIKOWSKI, R.: I agree with inserting a maximum distance for supports. It would not have to be 4.5' I would be happy with the 5' in the reference document in the fpn. Inspectors like to have a value for supports like every other wiring method so there is no question at the time of inspection.

OHDE, H.: This proposal should have been an AIP. There are no specific maximum distances for supporting of communications cables in the NEC. 800.24 as referenced in the panel statement deals with mechanical execution of work and the requirements of 300.4 (D) and 300.11. 300.11 doesn't provide any supporting distances of cables. The FPN only provides guidance and is not enforceable. The submitter should revise this proposal in the ROC stage with more clear defined supporting requirements depending on the type and size of the cable.

16-126 Log #2098 NEC-P16 **Final Action: Accept**
(800.44, 820.44, and 830.44)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: See Tables starting on the next page.

Revise sections 800.44, 820.44 & 830.44 as shown in the table below:

800.44 Overhead (Aerial) Communications Wires and Cables. Overhead (aerial) communications wires and cables entering buildings shall comply with 800.44(A) and (B).	820.44 Overhead (Aerial) Coaxial Cables. Overhead (aerial) coaxial ~~Coaxial~~ cables, prior to the point of grounding, as defined in 820.93, shall comply with 820.44(A) through (E ~~F~~).	830.44 Overhead (Aerial) Cables. Overhead (aerial) ~~Aerial~~ network-powered broadband communications cables shall comply with 830.44(A) through (G ~~I~~). FPN: For additional information regarding overhead (aerial) wires and cables, see ANSI C2-2007, National Electric Safety Code, Part 2, Safety Rules For Overhead Lines.
(A) On Poles and In-Span. Where communications wires and cables and electric light or power conductors are supported by the same pole or are run parallel to each other in-span, the conditions described in 800.44(A)(1) through (A)(4) shall be met. (1) Relative Location. Where practicable, the communications wires and cables shall be located below the electric light or power conductors. (2) Attachment to Cross-Arms. Communications wires and cables shall not be attached to a cross-arm that carries electric light or power conductors. (3) Climbing Space. The climbing space through communications wires and cables shall comply with the requirements of 225.14(D). (4) Clearance. Supply service drops of 0–750 volts running above and parallel to communications service drops shall have a minimum separation of 300 mm (12 in.) at any point in the span,	~~(A) On Poles. Where practicable, conductors on poles shall be located below the electric light, power, Class 1, or non power-limited fire alarm circuit conductors and shall not be attached to a cross-arm that carries electric light or power conductors.~~ (A) On Poles and In-Span. Where coaxial cables and electric light or power conductors are supported by the same pole or are run parallel to each other in-span, the conditions described in 820.44(A)(1) through (A)(4) shall be met. (1) Relative Location. Where practicable, the coaxial cables shall be located below the electric light or power conductors. (2) Attachment to Cross-Arms. Coaxial cables shall not be attached to a cross-arm that carries electric light or power conductors. (3) Climbing Space. The climbing space through coaxial cables shall comply with the requirements of 225.14(D).	~~(A) On Poles. Where practicable, network-powered broadband communications cables on poles shall be located below the electric light, power, Class 1, or non power-limited fire alarm circuit conductors and shall not be attached to a crossarm that carries electric light or power conductors.~~ (A) On Poles and In-Span. Where network-powered broadband communications cables and electric light or power conductors are supported by the same pole or are run parallel to each other in-span, the conditions described in 830.44(A)(1) through (A)(4) shall be met. (1) Relative Location. Where practicable, the network-powered broadband communications cables shall be located below the electric light or power conductors. (2) Attachment to Cross-Arms. Network-powered broadband communications cables shall not be attached to a cross-arm that carries electric light or power conductors. (3) Climbing Space. The climbing space through network-powered broadband

including the point of and at their attachment to the building, provided the nongrounded conductors are insulated and that a clearance of not less than 1.0 m (40 in.) is maintained between the two services at the pole.	(4) Clearance. Lead-in or overhead (aerial)-drop coaxial cables from a pole or other support, including the point of initial attachment to a building or structure, shall be kept away from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact. Exception: Where proximity to electric light, power, Class 1, or non–power-limited fire alarm circuit service conductors cannot be avoided, the installation shall be such as to provide clearances of not less than 300 mm (12 in.) from light, power, Class 1, or non–power-limited fire alarm circuit service drops. The clearance requirement shall apply at all points along the drop, and it shall increase to 1.02 m (40 in.) at the pole.	communications wires and cables shall comply with the requirements of 225.14(D). (4) Clearance. Lead-in or overhead (aerial)-drop network-powered broadband communications cables from a pole or other support, including the point of initial attachment to a building or structure, shall be kept away from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact. Exception: Where proximity to electric light, power, Class 1, or non–power-limited fire alarm circuit service conductors cannot be avoided, the installation shall be such as to provide clearances of not less than 300 mm (12 in.) from light, power, Class 1, or non–power-limited fire alarm circuit service drops. The clearance requirement shall apply to all points along the drop, and it shall increase to 1.02 m (40 in.) at the pole.
(B) Above Roofs. Communications wires and cables shall have a vertical clearance of not less than 2.5 m (8 ft) from all points of roofs above which they pass. Exception No. 1: Auxiliary buildings, such as garages and the like. Exception No. 2: A reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (a) not more than 1.2 m (4 ft) of communications service-drop	~~(B) Lead-in Clearance. Lead-in or aerial-drop coaxial cables from a pole or other support, including the point of initial attachment to a building or structure, shall be kept away from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact.~~ ~~Exception: Where proximity to electric light, power, Class 1, or non–power-limited fire alarm circuit service conductors cannot be avoided, the~~	~~(B) Climbing Space. The climbing space through network-powered broadband communications cables shall comply with the requirements of 225.14(D).~~ Renumber 830.44(F) to 830.44(B) and insert it here.

conductors pass above the roof overhang and (b) they are terminated at a through- or above-the-roof raceway or approved support. Exception No. 3: Where the roof has a slope of not less than 100 mm in 300 mm (4 in. in 12 in.), a reduction in clearance to not less than 900 mm (3 ft) shall be permitted. FPN: For additional information regarding overhead (aerial) wires and cables, see ANSI C2-2007, National Electric Safety Code, Part 2, Safety Rules for Overhead Lines.	~~installation shall be such as to provide clearances of not less than 300 mm (12 in.) from light, power, Class 1, or non-power-limited fire alarm circuit service drops. The clearance requirement shall apply at all points along the drop, and it shall increase to 1.02 m (40 in.) at the pole.~~ Renumber 820.44(D) to 820.44(B) and insert it here.	
	(C) On Masts. Overhead (aerial) ~~Aerial~~ coaxial cables shall be permitted to be attached to an above-the-roof raceway mast that does not enclose or support conductors of electric light or power circuits.	~~(C) Lead-in Clearance. Lead-in or aerial-drop network-powered broadband communications cables from a pole or other support, including the point of initial attachment to a building or structure, shall be kept away from electric light, power, Class 1, or non-power-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact.~~ ~~Exception: Where proximity to electric light, power, Class 1, or non-power-limited fire alarm circuit service conductors cannot be avoided, the installation shall be such as to provide clearances of not less than 300 mm (12 in.) from light, power, Class 1, or non-power-limited fire alarm circuit service drops. The clearance requirement shall apply to all points along the drop, and it shall increase to 1.02 m (40 in.) at the pole.~~
	(B ~~D~~) Above Roofs. Coaxial cables shall	(C ~~D~~) Clearance from Ground. Overhead

have a vertical clearance of not less than 2.5 m (8 ft) from all points of roofs above which they pass. Exception No. 1: Auxiliary buildings such as garages and the like. Exception No. 2: A reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.2 m (4 ft) of communications service drop conductors pass above the roof overhang, and (2) they are terminated at a raceway mast or other approved support. Exception No. 3: Where the roof has a slope of not less than 100 mm in 300 mm (4 in. in 12 in.), a reduction in clearance to not less than 900 mm (3 ft) shall be permitted.	(aerial) spans of network-powered broadband communication cables shall conform to not less than the following: (1) 2.9 m (9.5 ft) — above finished grade, sidewalks, or from any platform or projection from which they might be reached and accessible to pedestrians only (2) 3.5 m (11.5 ft) — over residential property and driveways, and those commercial areas not subject to truck traffic (3) 4.7 m (15.5 ft) — over public streets, alleys, roads, parking areas subject to truck traffic, driveways on other than residential property, and other land traversed by vehicles such as cultivated, grazing, forest, and orchard FPN: These clearances have been specifically chosen to correlate with ANSI C2-2007, National Electrical Safety Code, Table 232-1, which provides for clearances of wires, conductors, and cables above ground and roadways, rather than using the clearances referenced in 225.18. Because Article 800 and Article 820 have had no required clearances, the communications industry has used the clearances from the NESC for their installed cable plant.
(D ~~E~~) Between Buildings. Coaxial cables extending between buildings and also the supports or attachment fixtures shall be acceptable for the purpose and shall have sufficient strength to withstand the loads to which they may be subjected.	(D ~~E~~) Over Pools. Clearance of network-powered broadband communications cable in any direction from the water level, edge of pool, base of diving platform, or anchored raft shall comply with those clearances in 680.8.

Exception: Where a coaxial cable does not have sufficient strength to be self-supporting, it shall be attached to a supporting messenger cable that, together with the attachment fixtures or supports, shall be acceptable for the purpose and shall have sufficient strength to withstand the loads to which they may be subjected.	
(E ~~F~~) On Buildings. Where attached to buildings, coaxial cables shall be securely fastened in such a manner that they will be separated from other conductors in accordance with 820.44(F)(1), (F)(2), and (F)(3). (1) Electric Light or Power. The coaxial cable shall have a separation of at least 100 mm (4 in.) from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors not in raceway or cable, or shall be permanently separated from conductors of the other system by a continuous and firmly fixed nonconductor in addition to the insulation on the wires. (2) Other Communications Systems. Coaxial cable shall be installed so that there will be no unnecessary interference in the maintenance of the separate systems. In no case shall the conductors, cables, messenger strand, or equipment of one system cause abrasion to the conductors, cable, messenger strand, or equipment of any other system.	(B ~~F~~) Above Roofs. Network-powered broadband communications cables shall have a vertical clearance of not less than 2.5 m (8 ft) from all points of roofs above which they pass. Exception No. 1: Auxiliary buildings such as garages and the like. Exception No. 2: A reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.2 m (4 ft) of the broadband communications drop cables pass above the roof overhang, and (2) they are terminated at a through-the-roof raceway or support. Exception No. 3: Where the roof has a slope of not less than 100 mm in 300 mm (4 in. in 12 in.), a reduction in clearance to not less than 900 mm (3 ft) shall be permitted.

(3) Lightning Conductors. Where practicable, a separation of at least 1.8 m (6 ft) shall be maintained between any coaxial cable and lightning conductors. FPN: For additional information regarding overhead (aerial) wires and cables, see ANSI C2-2007, National Electric Safety Code, Part 2, Safety Rules for Overhead Lines.	
	(E G) Final Spans. Final spans of network-powered broadband communications cables without an outer jacket shall be permitted to be attached to the building, but they shall be kept not less than 900 mm (3 ft) from windows that are designed to be opened, doors, porches, balconies, ladders, stairs, fire escapes, or similar locations. Exception: Conductors run above the top level of a window shall be permitted to be less than the 900-mm (3-ft) requirement above. Overhead (aerial) network-powered broadband communications cables shall not be installed beneath openings through which materials may be moved, such as openings in farm and commercial buildings, and shall not be installed where they will obstruct entrance to these building openings.
	(F ~~H~~) Between Buildings. Network-powered broadband communications cables extending between buildings and also the supports or attachment fixtures shall be acceptable for the purpose and shall have sufficient strength to withstand the loads to which

they may be subjected.
Exception: Where a network-powered broadband communications cable does not have sufficient strength to be self-supporting, it shall be attached to a supporting messenger cable that, together with the attachment fixtures or supports, shall be acceptable for the purpose and shall have sufficient strength to withstand the loads to which they may be subjected.

(G ~~I~~) On Buildings. Where attached to buildings, network-powered broadband communications cables shall be securely fastened in such a manner that they are separated from other conductors in accordance with 830.44(I)(1) through (I)(4).

(1) Electric Light or Power. The network-powered broadband communications cable shall have a separation of at least 100 mm (4 in.) from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors not in raceway or cable, or be permanently separated from conductors of the other system by a continuous and firmly fixed nonconductor in addition to the insulation on the wires.

(2) Other Communications Systems. Network-powered broadband communications cables shall be installed so that there will be no unnecessary interference in the maintenance of the separate systems. In no case shall the conductors, cables, messenger strand, or equipment of one system cause abrasion to the conductors, cables, messenger strand, or equipment of any other system.

(3) Lightning Conductors. Where practicable, a separation of at least 1.8 m (6 ft) shall be maintained between any network-powered broadband communications cable and lightning conductors.

(4) Protection from Damage. Network-powered broadband communications cables attached to buildings and located within 2.5 m (8 ft) of finished grade shall be protected by enclosures, raceways, or other approved means.

Exception: A low-power network-powered broadband communications circuit that is equipped with a listed fault protection device, appropriate to the network-powered broadband communications cable used, and located on the network side of the network-powered broadband communications cable being protected.

Substantiation: The objective of this proposal is to improve the parallelism of sections 800.44, 820.44 and 830.44.

Sections 800.44 and 820.44 use the term "aerial" in the title and 830.44 uses "overhead". The exception to 800.133(B) uses "overhead (aerial)", which seems like a reasonable clarification, so this proposal uses "overhead (aerial)" in place of "overhead" and "aerial".

In order to improve parallelism, this proposal rearranges the parts of these sections and adds a new section "climbing space" to 820.44. The proposal is part editorial (rearrangement) and part technical (adding "climbing space").

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-127 Log #4516 NEC-P16 **Final Action: Reject**
(800.44(B))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)

Recommendation: Revise text to read as follows:

Communications wires and cables shall have a vertical clearance of not less than 2.5 m (8 ft)~~. from all points of roofs above which they pass~~ <u>above the roof surface</u>.

Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.

This revision offers consistency with section 230.24(A). Note that the second sentence from 230.24(A) is not included here because it does not apply to low voltage wiring.

Panel Meeting Action: Reject

Panel Statement: The present text provides for clearance above all points of a roof over which they pass. The suggested revision, "above the roof surface", may be interpreted as meaning only the flat or sloped portion of the roof, excluding higher points such as the ridge, dormers and cupolas.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-128 Log #2108 NEC-P16 **Final Action: Accept**
(800.47)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Revise text to read as follows:

800.47 Underground ~~Circuits~~ <u>Communications Wires and Cables</u> Entering Buildings.

Underground communications wires and cables entering buildings shall comply with 800.47(A) and (B).

Substantiation: This is an editorial proposal. It will improve clarity.

Communications wires and cables enter the buildings to feed the circuits. The circuits themselves are not entering the building.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-129 Log #2470 NEC-P16 **Final Action: Accept in Principle**
(800.47)

Submitter: Gerald Lee Dorna, Belden Wire & Cable

Recommendation: Revise text to read as follows:

After the first sentence of "800.47 Underground Circuits Entering Buildings" add the following sentence. <u>The requirements of 310.8(B) and 310.8(C) shall not apply.</u>

Rather than enter another Proposal, if CMP-16 would rather put the above new sentence after 800.110, it would meet the proposal's intent.

Substantiation: We get calls all the time from our customers who are telling us that the local inspector is reading "800.110 Raceways for Communications Wires and Cables" and telling our customers that the Communications Wires and Cables have to meet "300.5(B) Wet Locations" since it is an underground installation which refers the reader to "310.8(C)" because in 800.110 it says the raceway shall be installed in accordance with Chapter 3. We have tried to explain that it is only the raceway that is to be per Chapter 3 and that Chapter 8 is a stand alone chapter. There is no such thing as a wet rated Communications Wire or Cable in the Standard UL-444 document.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

800.47 Underground Circuits Entering Buildings.

Underground communications wires and cables entering buildings shall comply with 800.47(A) and (B). <u>The requirements of 310.8(C) shall not apply to communications wires and cables.</u>

Panel Statement: The panel action meets the submitter's intent.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-130 Log #2109 NEC-P16 **Final Action: Accept in Principle**
(800.48)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Revise text to read as follows:

800.48 Unlisted Cables Entering Buildings.

Unlisted outside plant communications cables shall be permitted to be installed in <u>building spaces other than risers, air ducts, plenums and other spaces used for environmental air,</u> ~~locations as described in 800.154(C)~~ where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated in an enclosure or on a listed primary protector.

Substantiation: This proposal is editorial clarification. The locations described in 800.154(C) are risers, air ducts, plenums and other spaces used for environmental air.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle

Revise recommendation text to read as follows:

800.48 Unlisted Cables Entering Buildings. Unlisted outside plant communications cables shall be permitted to be installed in building spaces other than risers, ducts used for environmental air, plenums used for environmental air, and other spaces used for environmental air, where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated in an enclosure or on a listed primary protector.

Panel Statement: The revised text adds clarity and meets the intent of the submitter.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-131 Log #4515 NEC-P16 **Final Action: Reject**
(800.48)

TCC Action: It was the action of the Technical Correlating Committee that this Proposal be reported as "Reject" because less than two-thirds of the members eligible to vote have voted in the affirmative.
Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
800.48 Unlisted Cables Entering Buildings
Unlisted outside plant communications cables shall be permitted to be installed in locations as described in 800.154(C) where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) ~~and the cable enters the building from the outside~~ and is terminated in an enclosure or on a listed primary protector.
FPN No. 1: Splice cases or terminal boxes, both metallic and plastic types, are typically used as enclosures for splicing or terminating telephone cables.
FPN No. 2: This section limits the length of unlisted outside plant cable to 15 m (50 ft), while 800.90(B) requires that the primary protector be located as close as practicable to the point at which the cable enters the building. ~~Therefore, i~~In installations requiring a primary protector, the outside plant cable may not be permitted to extend 15 m (50 ft) into the building if it is practicable to place the primary protector closer than 15 m (50 ft) to the entrance point.
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
The phrase has been eliminated from the text of the code because the provision already states that it is "measured from its point of entrance". This proposal eliminates the redundancy. In FPN No. 2, the term "therefore" is not needed.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 9 Negative: 7
Explanation of Negative:
BOYER, J.: Acceptance of proposal 16-131 would conflict with the panel action on proposal 16-130.
This negative vote will also favorably create parallelism with 770.48 and 820.48.
BRUNSSEN, J.: This requirement is intended to apply only to unlisted outside plant cables that enter from the outside. The requirement was originally introduced to provide relief from requiring multiple splices, one immediately upon entering the building to convert from unlisted to listed cable, and another only a short distance further (50 feet or less) at the 'telephone closet'. The definition of "Point of Entrance" in 800.2 is not restricted to cables entering from the outside. The '50-foot rule' is not intended to permit general use of unlisted outside plant cable within the building. The text that is proposed to be deleted ("and the cable enters the building from the outside") reinforces that the 50-foot allowance applies **only** to cables entering from the outside and should remain.
DORNA, G.: I agree with Mr. Brunssen. Furthermore, acceptance of this proposal would conflict with the panel action on Proposal 16-130. Acceptance of this proposal would also result in lack of parallelism with 770.48 and 820.48 because the submitter did not submit correlating proposals for 770.48 and 820.48.
ESEMPLARE, R.: I agree with Mr. Brunssen's comment on vote. Furthermore, acceptance of this proposal would conflict with the panel action on proposal 16-130. Acceptance on this proposal would also result in lack of parallelism with 770.48 and 820.48 because the submitter did not submit correlating proposals for 770.48 and 820.48.
IVANS, R.: I agree with Mr. Brunssen's comments concerning his negative vote. Furthermore, acceptance of this proposal would conflict with the panel action on proposal 16-130. Acceptance on this
proposal would also result in lack of parallelism with 770.48 and 820.48 because the submitter did not submit correlating proposals for 770.48 and 820.48.
OHDE, H.: We agree with Mr. Brunssen as this requirement was not intended to permit general use of unlisted outside plant cable within the building.
PIRKLE, W.: I agree with Mr. Brunssen's comment on vote. Acceptance of this proposal would conflict with the panel action taken on Proposal 16-130 resulting in a lack of parallelism with 770.48 and 820.48. The submitter did not submit correlating proposals for 770.48 and 820.48.

16-132 Log #4512 NEC-P16 **Final Action: Accept**
(800.50(B))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
800.50(B) On Buildings
Communications wires and cables in accordance with 800.50(A) shall be separated at least 100 mm (4 in.) from electric light or power conductors not in a raceway or cable or be permanently separated from conductors of the other systems by a continuous and firmly fixed nonconductor in addition to the insulation on the wires, such as porcelain tubes or flexible tubing...
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
The term "system" should be plural. This appears to be editorial.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-133 Log #4513 NEC-P16 **Final Action: Accept**
(800.90)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relating to the exact location of the proposed text.
This action will be considered by the panel as a public comment.
Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
(2)(B) Location
For purposes of this section, primary protectors located at mobile home service equipment ~~located~~ within 9.0m (30 ft) …
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
The word is proposed for deletion because it is redundant.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-134 Log #3253 NEC-P16 **Final Action: Reject**
(800.90(1)(a))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "current-carrying capacity" to "ampacity".
Substantiation: Editorial. The Style Manual specifies ampacity is the term to be used for current-carrying capacity of conductors.
Panel Meeting Action: Reject
Panel Statement: Communications protectors and communications grounding conductors are subject to transient conditions resulting from power fault and lightning events. "Ampacity" applies to a continuous (i.e. steady-state) condition and is an inappropriate term in this context (see Article 100).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-135 Log #400 NEC-P16 **Final Action: Accept**
(800.90(A), FPN 2(3))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "per" to "each".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-136 Log #3096 NEC-P16 **Final Action: Reject**
(800.90(A)(1))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal since the phrase "effectively grounded" is no longer defined in the NEC.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(a) Text to remain unchanged
(b) Where insulated conductors in accordance with 800.50(A) are used to extend circuits to a building from a cable with a~~n effectively~~ grounded metallic sheath member(s) and where the conductors in the cable or cable stub, or the connections between the insulated conductors and the plant exposed to accidental contact with electric light or power conductors operating at greater than 300 volts to ground, safely fuse on all currents greater than the current-carrying capacity of the primary protector, or the associated insulated conductors and of the primary protector grounding conductor.
(c) Text to remain unchanged.
(d) Text to remain unchanged.
(e) Where insulated conductors in accordance with 800.50(A) are used to extend circuits to a building from cable with a~~n effectively~~ grounded metallic sheath member(s), and where (1) the combination of the primary protector and insulated conductors is listed as being suitable for this purpose for application with circuits extending from a cable with a~~n effectively~~ grounded metallic sheath member(s), and (2) the insulated conductors safely fuse on all currents greater than the current-carrying capacity of the primary protector and of the primary protector grounding conductor.
Substantiation: The term "effectively grounded" is no longer used in the Code. This proposal simply finishes the work that was begun in the 2008 NEC.
Panel Meeting Action: Reject
Panel Statement: The term "effectively grounded" is defined in the National Electrical Safety Code (NESC) as "Intentionally connected to earth through a ground connection...". It is used extensively in that document and should remain.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-137 Log #168 NEC-P16 **Final Action: Accept**
(800.90(A)(1), FPN)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "telecommunications" to "communications".
Substantiation: Throughout Article 800 the term "communications" is used rather than "telecommunications". Also, Article 100 defines "Communications Equipment" not "Telecommunications Equipment". Use of terminology should be consistent throughout the article.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-138 Log #2110 NEC-P16 **Final Action: Accept**
(800.90(C))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the following:
(C) Hazardous (Classified) Locations. The primary protector shall not be located in any hazardous (classified) locations as defined in 500.5 and 505.5 or in the vicinity of easily ignitable material.
Exception: As permitted in 501.50, 502.150 and 503.150.
Substantiation: This is a clarification proposal. It is editorial and technical.
CMP 16 was instructed by the Technical Correlating Committee during the 2008 NEC ROP process to consider not only the different hazardous location division applications (500.5) but also the different hazardous location zone applications (505.5). This directive was issued for 2008 Proposal 16-121 which dealt with 800.3(A). This reference of 505.5 should be added here as well to correlate with all related sections that references these defined hazardous locations and hazardous location zones.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-139 Log #4561 NEC-P16 **Final Action: Reject**
(800.100 (New))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Add the following new text:
800.100 Grounding. Article 250 covers the general requirements for grounding and bonding of communications circuits and their associated electrical installations, and the specific requirements in (1) through (5), unless otherwise indicated in 800.100(A) through (D).
(1) Systems, circuits, and equipment required, permitted, or not permitted to be grounded
(2) Circuit conductor to be grounded on grounded systems
(3) Location of grounding connections
(4) Types and sizes of grounding and bonding conductors and electrodes
(5) Methods of grounding and bonding
800.101 ~~800.100~~ Cable and Primary Protector Grounding.
The primary protector and the metallic member(s) of the cable sheath shall be grounded as specified in 800.101(A) through (D) ~~800.100(A) through (D)~~.
(A) Grounding Conductor. *(no change to text except for renumbering section 800.100 to section 800.101)*
(B) Electrode. *(no change to text except for renumbering section 800.100 to section 800.101)*
(C) Electrode Connection. *(no change to text)*
(D) Bonding of Electrodes. *(no change to text)*
Substantiation: This proposal recommends wording to ensure that communications circuits appropriately comply with the grounding and bonding requirements of article 250, while recommending that Article 800 include specific requirements associated with communications circuits. This change is needed because Chapter 8 is independent of Chapters 1 through 4 and thus Article 250 on grounding. Please note that "medium power wiring" is included in Article 800 and not just low power wiring and that brings some additional needs.
Panel Meeting Action: Reject
Panel Statement: The NEC Style Manual, Section 4.1.1, prohibits reference to complete articles. A blanket statement referencing Article 250 is redundant as communications grounding requirements are fully covered in Article 800, IV. Grounding Methods, with specific reference to the applicable sections of Article 250 contained throughout Sections 800.100(B) and (C).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-140 Log #3097 NEC-P16 **Final Action: Accept in Principle**
(800.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(1) Listing ~~Insulation~~. The grounding conductor ~~shall be insulated and~~ shall be listed.
Substantiation: There is no electrical reason that this conductor should be required to be insulated. This proposal provides consistency with nearly every other grounding/bonding related section of the code.
Panel Meeting Action: Accept in Principle
Revise 800.100(A)(1) to read as follows:
(1) Insulation. The grounding conductor shall be listed and shall be permitted to be insulated, covered, or bare.
Panel Statement: The grounding conductor does not need to be insulated but for esthetic reasons, such as exposed grounding conductors routed within a premises, insulation or covering may be appropriate. Adding 'covered' accommodates Proposal 16-141. Permitting all three, "insulated, covered, or bare" will clarify that all three are now permitted since for many years only an insulated conductor was permitted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-141 Log #4394 NEC-P16 **Final Action: Accept in Principle in Part**
(800.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Jake Killinger, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
800.100 Cable and Primary Protector Grounding.
The primary protector and the metallic member(s) of the cable sheath shall be grounded as specified in 800.100(A) through (D).
(A) Grounding Conductor.
(1) ~~Insulation~~Insulated or Covered Conductors. The grounding conductor shall be permitted to be insulated, or covered and ~~shall be~~ listed as Protector Grounding Conductors.
(remaining text remains unchanged)
Substantiation: The existing text would require fully insulated and Listed conductors for cable and primary protector grounding whereas in most other cases, bare conductors are usually adequate for most grounding purposes. Prior to the 1990 NEC, protective grounding conductors were required to have 30 mil rubber insulation and be covered by a fibrous covering. It also permitted conductors Listed for this use having less than 30 mil rubber insulation or having other kinds of insulation. In 1990 the NEC removed the thickness statements so that it read the grounding conductor shall be insulated and shall be listed as suitable for the purpose. In 2008, the suitable for the purpose clause was removed.
Discussions with past members of this CMP revealed that the reason for specifying insulated conductors was only to combat theft of uncovered copper wire. That being the case, thinner insulated conductor was permitted so long as it gave the same illusion of a conductor carrying power.
Listed Protector Grounding Conductors having less than the full insulation of Listed and insulated conductors exist today. These are based on the past allowances for thinner insulations. The 2008NEC text would literally not permit the use of these thinner walled insulated conductors and would make their certification obsolete.
If the reason for using the term ‘insulated’ was merely to provide a theft deterrent, then fully insulated wire is unnecessary. By definition in Article 100, only a “covered” conductor would be more than adequate. Therefore propose changing the text to permit both “insulated as well as “covered” conductors.
Also propose adding “Protector Grounding Conductor” to help identify the type of Listed products suitable in this application. These “Protector Grounding Conductors” are surface marked with this terminology to make it clear that they are listed only for this purpose and are not intended for general use with other Articles in the Code. They are presently certified under UL’s KDER category, but may be relocated to the KDSH (Grounding and Bonding Equipment – Communication) category to make their restricted use more obvious.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: Accept in principle the part to add “covered”. See panel action and statement on Proposal 16-140, which now permits the use of listed insulated, covered, or bare conductors. The title is left as “insulation” since the paragraph now deals with levels of insulation.
Reject the parts adding the phrases “permitted to be” and “as a protector grounding conductor”. The panel does not want to restrict the listed wire to only listed “protector grounding conductors”.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-141a Log #CP1604 NEC-P16 **Final Action: Accept**
(800.100(A)(3))

Submitter: Code-Making Panel 16,
Recommendation: Add the following additional text:
(3) Size. The grounding conductor shall not be smaller than 14 AWG. <u>It shall have a current-carrying capacity not less than the grounded metallic sheath member(s) and protected conductor(s) of the communications cable. The grounding conductor shall not be required to exceed 6 AWG.</u>
Substantiation: This change correlates 800.100(A)(3) with similar changes in 770.100(A)(3), 820.100(A)(3) and 830.100(A)(3). See Panel Action on Proposals 16-255 and 16-322. See panel Proposal 16-30a.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-142 Log #4514 NEC-P16 **Final Action: Reject**
(800.100(A)(4))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
800.100 (A)(4) Length. The primary protector grounding conductor shall be as short as practicable. In one- and two-family dwellings, the primary protector grounding conductor shall ~~be as short as practicable,~~ not ~~to~~ exceed 6.0 m (20 ft) in length.
FPN: Similar grounding conductor length limitations applied at apartment buildings and commercial buildings help to reduce voltages that may be developed between the building’s power and communications systems during lightning events.
Exception: In one- and two-family dwellings where it is not practicable to <u>limit</u> ~~achieve~~ an overall maximum primary protector grounding conductor length <u>to</u> ~~of~~ 6.0 m (20 ft)…
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee’s endorsement.
Deleting the repeated phrase “be as short as practicable” in item (4) will eliminate redundancy, as this has already been addressed by the first sentence. Deleting this phrase will also clarify that the code limits the conductor to 20 ft or less in one- and two-family dwellings.
As written in the code, the exception appears to conflicts with item (4) above. The objective of item (4) is to limit the length of the primary protector grounding conductor to 20 ft to reduce the fire and shock hazard as described in the NEC Handbook. As written, the exception implies that the objective of item (4) is to reach a maximum length of 20 ft. This revision to the exception clarifies that the objective is to limit the length to 20 ft.
Panel Meeting Action: Reject
Panel Statement: The objective of 800.100(A)(4) is to encourage minimizing the length of the communications grounding conductor, but not be overly restrictive. In many instances it is impossible to limit the conductor to a maximum of 20 ft. This might occur when power enters on one side of the building and communications on the other. In such cases the installer must be given a workable solution, which is provided in the exception.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-143 Log #3727 NEC-P16 **Final Action: Accept in Principle in Part**
(800.100(A)(4) Exception)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 800.100(A)(4), Exception as follows:
Exception: In one- and two-family dwellings where it is not practicable to achieve an overall maximum primary protector grounding conductor length of 6.0 m (20 ft), <u>one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used as a separate communications electrode.</u> ~~a separate communications ground rod meeting the minimum dimensional criteria of 800.100(B)(2)(2) shall be driven, t~~ The primary protector shall be connected to the communications ~~ground rod~~ <u>electrode(s)</u> in accordance with 800.100(C), and the communications ~~ground rod~~ <u>electrode(s)</u> shall be connected to the power grounding electrode system in accordance with 800.100(D).
Substantiation: The current reference in this exception to 800.100(B)(2)(2) addressing a ground rod is incorrect as 800.100(B)(2)(2) addresses the attachment location of a grounding electrode conductor to an interior metal water pipe. In addition, it must be assumed that in the case of this exception a grounding electrode is not available within 20 feet of the communications system installation and that an electrode is required to be installed and utilized. A ground rod is only one such electrode that can be installed therefore this exception should reference all electrodes that are practicable in such necessary installations.
In addition, the requirements of this section should state that where a grounding electrode is required to be installed, the electrode installed should be a ground ring, rod, pipe, plate, or other underground metal structure that is recognized by Article 250 and more specifically 250.52(A)(4), (A)(5), (A)(6), (A)(7), and (A)(8). This revision would bring the electrode requirements included in this exception into line with the requirements of Article 250 for both consistency and for technical application.
Panel Meeting Action: Accept in Principle in Part
Revise existing exception as follows:
“*Exception: In one- and two-family dwellings where it is not practicable to achieve an overall maximum primary protector grounding conductor length of 6.0 m (20 ft), a separate communications ground rod meeting the minimum dimensional criteria of 800.100(B)~~(2)~~<u>(3)</u>(2) shall be driven, the primary protector shall be connected to the communications ground rod in accordance with 800.100(C), and the communications ground rod shall be connected to the power grounding electrode system in accordance with 800.100(D).*”
Reject the remainder of the proposal.
Panel Statement: Referencing the grounding electrodes in 250.52(A)(4) through (A)(8) is unnecessary as:
1. 800.100(B)(1) through (3) presents a logical sequence for selecting the appropriate telecom grounding electrode, in order of preference. The first choice is the Intersystem Bonding Termination (introduced in the 2008 NEC), where available. The second choice is one of the electrodes of 800.100(B)(2). If none of the above are available, then an electrode as specified in 800.100(B)(3) is selected, some of which are contained in 250.52(A).
2. The electrodes identified in 250.52(A)(4) through (A)(8) are intended for power system applications. Telecom system currents are small, typically less than 100 mA. Where telecom circuits are subjected to power contact, currents are limited by the equivalent small gauge of the communications conductors, precluding the need for expansive and expensive grounding electrodes.

3. The submitter has provided no technical substantiation for revising the telecom grounding criteria and eliminating the 5-ft telecom ground rod that has been used successfully and safely by the telecom industry for decades.

4. Increasing the diameter and length of the telecom ground rod has minimal impact on grounding resistance (see panel substantiation for Proposal 16-151).

5. The most important safety aspect is the bonding together of the power and telecom systems. When bonded together as specified in 800.100(D), intersystem voltages are equalized and the telecom grounding electrode, if separate, becomes part of the grounding electrode system at the premises.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-144 Log #944 NEC-P16 **Final Action: Reject**
(800.100(A)(6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete text and substitute: The grounding conductor shall be protected by identified means where likely to be subject to physical damage. Where the grounding conductor is run in a metal raceway or cable armor, or the metal enclosure, the grounding conductor shall be bonded to the raceway, armor, or enclosure at the point where it emerges from the raceway, armor, or enclosure, and to the same electrode and terminal to which it is connected. Bonding jumpers shall have an ampacity not less than the grounding conductor.
Substantiation: Editorial.
Panel Meeting Action: Reject
Panel Statement: The proposal is not editorial, as the submitter states, and provides no improvement in clarity over the existing text. Bonding of the grounding conductor to a ferrous metal raceway at both ends is performed to reduce inductance (reactance) effects. Such effects do not apply to metal enclosures, such as a junction box. The subject of the section is protection from physical damage; addressing bonding jumper ampacity in this section is inappropriate.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-145 Log #3311 NEC-P16 **Final Action: Reject**
(800.100(A)(6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The grounding conductor shall be protected by ~~approved~~ identified means where likely to be subject to physical damage. Where the grounding conductor is run in a metal raceway the raceway shall be nonflexible type with ~~both~~ each end of the raceway bonded to the same terminal or electrode to which the grounding conductor is connected. Where a bonding jumper is used it shall not be smaller than the grounding conductor. These bonding requirements shall also apply where an armored grounding conductor is used.
Substantiation: There may be no exposure to physical damage when the grounding conductor is first installed, but a likelihood of damage. Raceways should be specified as nonflexible to correlate with 250.64(B). Bonding jumper size should be specified to correlate with 250.64(E).
Panel Meeting Action: Reject
Panel Statement: The submitter is proposing to revise text that is not present in the 2008 NEC. See panel action on Proposal 16-144.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-146 Log #195 NEC-P16 **Final Action: Accept**
(800.100(B))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal as the existing numbering complies with the NEC Style Manual and, is consistent with other lists in the code.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Renumber 800.100(B) as shown.

(B) Electrode. The grounding conductor shall be connected in accordance with 800.100(B)(1), (B)(2), or (B)(3).

(1) In Buildings or Structures with an Intersystem Bonding Termination. If the building or structure served has an intersystem bonding termination, the grounding conductor shall be connected to the intersystem bonding termination.

(2) In Buildings or Structures with Grounding Means. If the building or structure served has no intersystem bonding termination, the grounding conductor shall be connected to the nearest accessible location on the following:

(~~1~~a) The building or structure grounding electrode system as covered in 250.50

(~~2~~b) The grounded interior metal water piping system, within 1.5 m (5 ft) from its point of entrance to the building, as covered in 250.52

(~~3~~c) The power service accessible means external to enclosures as covered in 250.94

(~~4~~d) The metallic power service raceway

(~~5~~e) The service equipment enclosure

(~~6~~f) The grounding electrode conductor or the grounding electrode conductor metal enclosure

(~~7~~g) The grounding conductor or the grounding electrode of a building or structure disconnecting means that is grounded to an electrode as covered in 250.32

A bonding device intended to provide a termination point for the grounding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is nonremovable.

For purposes of this section, the mobile home service equipment or the mobile home disconnecting means, as described in 800.90(B), shall be considered accessible.

(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 800.100(B)(2), the grounding conductor shall be connected to either of the following:

(~~1~~a) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4)

(~~2~~b) If the building or structure served has no intersystem bonding termination or has no grounding means, as described in 800.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(7), and (A)(8) or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.

Substantiation: The current numbering is not in compliance with the style manual. See section 2.1.5.3 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-147 Log #1497 NEC-P16 **Final Action: Accept**
(800.100(B)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify that the panel action text on this proposal does not change “intersystem bonding termination” to “intersystem grounding termination” in the title and in the text of the requirement.
This action will be considered by the panel as a public comment.
Submitter: L. Keith Lofland, IAEI
Recommendation: Revise text as follows:

800.100(B)(1) In Buildings or Structures with an Intersystem Grounding Termination. If the building or structure served has an intersystem grounding termination as required by 250.94, the grounding conductor shall be connected to the intersystem grounding termination.

Substantiation: A link needs to be provided between 800.100(B)(1) and 250.94. Section 250.94 requires an external intersystem bonding termination. As 90.3 states, Chapter 8 is not subject to the requirements of Chapters 1-7 except where the requirements are specifically referenced in Chapter 8.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-148 Log #1129 NEC-P16 **Final Action: Accept**
(800.100(B)(1), FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Add the FPN following 800.100(B) (1):
FPN: See Article 100 for the definition of *Intersystem Bonding Termination.*
Substantiation: *Intersystem Bonding Termination* is a new and unfamiliar term introduced in the 2008 NEC. The FPN reference to Article 100 will help ensure that NEC users not only become familiar with the new terminology, but encourage application of this preferred intersystem bonding arrangement as well.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-149 Log #3310 NEC-P16 **Final Action: Accept in Principle in Part**
(800.100(B)(2))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise: (3) The ~~power~~ electric service accessible means external to enclosures as covered in 250.94.
(4) The nonflexible ~~power~~ electric service raceway.
(6) The grounding electrode conductor or the grounding electrode conductor nonflexible metal enclosure.
Substantiation: "Power" may infer this provision doesn't apply where the electric service is only for lighting. Flexible metal service raceways and flexible metal armor of grounding conductors do not seem suitable for connection of ground clamps.
Panel Meeting Action: Accept in Principle in Part
Revise 800.100(B)(2)(4) as follows:
(4) The nonflexible metallic power service raceway.
Reject the remainder of the recommendation.
Panel Statement: The panel accepts in principle the part adding "nonflexible" in (4). The panel rejects the part replacing "power" with "electric" in (4). The panel rejects adding "nonflexible" to modify metal enclosures in (6) as it does not improve clarity.
See panel action and statement on Proposal 16-35.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-150 Log #3098 NEC-P16 **Final Action: Reject**
(800.100(B)(2)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(2) Text to remain unchanged.
(1) Text to remain unchanged.
(2) Text to remain unchanged.
~~(3) The power service accessible means external to enclosures as covered in 250.94~~
~~(4)~~ (3) Text to remain unchanged.
~~(5)~~ (4) Text to remain unchanged.
~~(6)~~ (5) Text to remain unchanged.
~~(7)~~ (6) Text to remain unchanged.
A bonding device intended to provide a termination point for the grounding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is nonremovable.
For purposes of this section, the mobile home service equipment or the mobile home disconnecting means, as described in 800.90(B), shall be considered accessible.
Substantiation: The item being discussed in (3) is the item covered in 800.100(B)(1), so there is no reason for it to be in 800.100(B)(2).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-34.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-151 Log #3726 NEC-P16 **Final Action: Reject**
(800.100(B)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 800.100(B)(3)(1) as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 800.100(B)(2), one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used with the requirements of 250.56 being applicable to rod, pipe, and plate electrode installations. ~~the grounding conductor shall be connected to either of the following:~~
~~(1) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4).~~
~~(2) If the building or structure served has no intersystem bonding termination or has no grounding means, as described in 800.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(7), and (A)(8) or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (½ in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.~~
Substantiation: The requirement in existing 800.100(B)(3)(1) to connect the grounding electrode conductor to either a metal underground water pipe, the metal frame of a building or structure, a concrete-encased electrode, or a ground ring seems to require these electrodes to be installed as the subject of this section is **"Buildings or Structures Without …. Grounding Means."** This is not consistent with 250.50 that only requires the use of such electrodes where they are "present at each building or structure served." In addition, the first sentence of 800.100(B)(3)(2) is not a complete sentence, is simply a list of references, and thus has no meaning. In addition, it allows either a rod or pipe electrode to be used that is only 1.5 m (5 ft) in length and 12.7 mm (½ in.) in diameter and driven where practicable into permanently damp earth. Into permanent damp earth is a good requirement but is doubtfully attained with a ½ in. rod or ½ in. pipe 5 ft in length.
The requirements of this section should state that where a building or structure is without grounding means, it is to have such reasonable grounding means installed such as a ground ring, rod, pipe, plate, or other underground metal structure that is recognized by Article 250 and more specifically 250.52(A)(4), (A)(5), (A)(6), (A)(7), and (A)(8). Also, 250.56 already requires that rod, pipe, and plate electrodes that do not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52(A)(4) through (A)(8), and that where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart. This revision would bring the grounding of communications circuits into line with the requirements of Article 250 for both consistency and for technical application.
In addition 250.60 already states, "Air terminal conductors and driven pipes, rods, or plate electrodes used for grounding air terminals shall not be used in lieu of the grounding electrodes required by 250.50 for grounding wiring systems and equipment." With the revisions being sought, these revisions would also prohibit other possible electrodes not recognized by 250.52.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for eliminating the 5-ft telecom ground rod, currently permitted by 800.100(B)(3)(2), that has been used successfully and safely by the telecom industry for decades. The tutorial, The ABCs of Grounding and Bonding, states: "Very little resistance change will result from using larger sizes of electrodes." The most important safety aspect is the bonding together of the power and telecom systems. When bonded together as specified in 800.100(D), intersystem voltages are equalized and the telecom grounding electrode, if separate, becomes part of the grounding electrode system at the premises.
The electrodes identified in 250.52(A)(4) through (A)(8), as proposed by the submitter, are intended for power system applications. Telecom system currents are small, typically less than 100 mA. Where power contact to telecom circuits is of concern (i.e., power fault) currents are limited by the equivalent small gauge of the telecom conductors, precluding the need for expansive and expensive grounding electrodes.
Finally, the title of 800.100(B)(3), "In Buildings or Structures Without …… Grounding Means" must be considered in context with the preceding Section 800.100(B)(2) where specific grounding means at the building or structure are identified.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-152 Log #1130 NEC-P16 **Final Action: Accept**
(800.100(B)(3)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the last sentence of 800.100 (B)(3)(2) as follows:
Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors and grounded metallic members.
Substantiation: Steam and hot water pipes may be rendered electrically discontinuous by installation of non-conductive equipment such as valves and hot water heaters, making them ineffective as a grounding means. Air terminal conductors (lightning-rod conductors) are subject to large voltages and currents during lightning events, may introduce such voltages and currents into the systems being connected to them, and are dangerous and inappropriate as a grounding means. See 250.60. The proposed revision provides correlation with 830.100(B)(3)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-153 Log #948 NEC-P16 **Final Action: Reject**
(800.100(D))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
A copyright bonding jumper not smaller than 6 AWG ~~copper or equivalent~~ or a corrosion resistant conductor with equal or greater ampacity. Shall be connected between...". (remainder unchanged)
Substantiation: Edit. "Equivalent" is a term to be avoided by the Style Manual and is subjective. Section 800.100(A)(2) specified a grounding conductor to be corrosion-resistant, which should also apply to bonding jumpers.
Panel Meeting Action: Reject
Panel Statement: The NEC Style Manual does not prohibit the use of the term "equivalent", but states in Section 3.2.1 that it's use "… shall be reviewed in context and if the resulting requirement is unenforceable or vague, the term shall not be used." In the context of 800.100(D), it is perfectly clear that the term "equivalent" means a conductor of comparable electrical (i.e., current-carrying capacity) and physical (i.e., corrosion resistance) properties. The proposed editorial changes do not improve clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-154 Log #1131 NEC-P16 **Final Action: Accept**
(800.106(A)(1))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
"... the primary protector ground shall be connected to a grounding conductor in accordance with ~~800.100(B)(2)~~ 800.100(B)(3)."
Substantiation: The reference is incorrect. In the 2005 NEC 800.106(A)(1) referred to 800.100(B)(2). That information is now contained in 800.100(B)(3) in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-155 Log #1132 NEC-P16 **Final Action: Accept**
(800.106(A)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
"…the primary protector ground shall be connected to a grounding conductor in accordance with ~~800.100(B)(2)~~ 800.100(B)(3)."
Substantiation: The reference is incorrect. In the 2005 NEC 800.106(A)(1) referred to 800.100(B)(2). That information is now contained in 800.100(B)(3) in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-156 Log #33 NEC-P16 **Final Action: Accept in Principle**
(800.110)

NOTE: This proposal appeared as Comment 16-135 on Proposal 16-171 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-171 was:
Revise as follows:
800.110 Raceways for Communications Wires and Cables.
Where communications wires and cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or listed plenum communications raceway, listed riser communications raceway, or listed general-purpose communications raceway installed in accordance with 800.154, and ~~a listed nonmetallic raceway complying with 800.182, and installed in accordance~~ with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
Exception: Conduit fill restrictions shall not apply.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: The panel action on the Proposal should continue to be Accept in Principle, however, the following additional changes should be made to the panel action:
Revise 800.110 as shown:
800.110 Raceways for Communications Wires and Cables. Where communications wires and cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or a ~~listed plenum~~ communications raceway listed in accordance with 800.182 and~~, listed riser communications raceway, or listed general purpose communications raceway~~ installed in accordance with 800.154~~, and a listed nonmetallic raceway complying with 800.182,~~ and ~~installed in accordance with 362.24~~ 362.22 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply. ~~The raceway fill tables of Chapter 3 and Chapters shall not apply.~~
Substantiation: The revisions in the first sentence clarify that the listing requirements are specified in 800.182 and the installation requirements in 800.154. 362.22 should also apply if the requirements for ENT are to be utilized.
Revising the text as proposed will still permit the installation of communications wires and cables in communications raceways (plenum riser, or general-purpose) or in any type of listed raceway permitted in Chapter 3 without adding additional text to the Code.
Using the term "listed communications raceways" will also permit the installation of other types of listed communications raceways that may be included in future Codes without having to revise 800.110.
The Exception should have been deleted rather than including it as positive text in the last sentence.
No substantiation was submitted to support the deletion of the conduit fill restrictions or raceway fill tables of Chapters 3 and 9. The fill restrictions are based on the physical limitations of being able to pull conductors or cables into raceways without damaging the conductors or cables, particularly when there are bends in the run, and to avoid conductor/cable jamming. The maximum percentage fill requirements are independent of whether they are electrical conductors or not.
The maximum percentage fill requirements in Chapters 3 and 9 are an integral part of the permitted uses of the raceways contained in Chapter 3 and if conductors or cables are to be installed in a Chapter 3 raceway, then the maximum percentage fill requirements must also apply.
The first sentence in 800.110, as modified by the panel action, already states "installed in accordance with Chapter 3" which would include all of Chapter 3 requirements pertaining to raceways including the maximum percentage fill limitations in Chapter 9. The proposal introduces conflicting requirements between the two sentences in 800.110.
Chapter 9, Table 1 permits 53 percent fill when one conductor or cable is installed in a raceway; 31 percent for two; and 40 percent for three or more.
The panel action to change "conduit" to "raceway" was appropriate since raceway is defined in Article 100 and includes, but is not limited to, conduit and tubing. Also, 800.110 references the applicable Sections of Article 362 which addresses Electrical Nonmetallic Tubing (ENT).
Panel Meeting Action: Accept in Principle
Panel Statement: See Proposal 16-159, which reorganizes this section for greater clarity and meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-157 Log #34 NEC-P16 **Final Action: Accept in Principle**
(800.110)

NOTE: This proposal appeared as Comment 16-136 on Proposal 16-173 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-173 was:
Add the specific paragraph references as shown:
800.110 Raceways for Communications Wires and Cables.
Where communications wires and cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or a listed nonmetallic raceway complying with 800.182(A), (B) or (C), as applicable, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
Exception: Conduit fill restrictions shall not apply.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: The Proposal should have been Accepted in Principle and the panel action revised as stated in my Comment on Proposal 16-171.
Substantiation: See substantiation on my Comment on Proposal 16-171.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-159, which revises this section for greater clarity and addresses the submitter's concern.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-158 Log #1749 NEC-P16 **Final Action: Reject**
(800.110)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Where communication wires and or cables are installed in a raceway, auxiliary gutter, or cable tray, the applicable provisions of the wiring method used shall apply. ~~the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3~~ or a listed general purpose...". (remainder unchanged).

The ~~raceway~~ conductor fill ~~tables of Chapter 3 and Chapter 9~~ requirements for raceways, auxiliary gutters, boxes, and other enclosures shall not apply.
Substantiation: Auxiliary gutters (not listed as a raceway in Article 100 definition of raceway) and cable trays should be included. If conductor fill requirements for raceways are excluded, it should also apply to boxes and other enclosures such as conduit bodies. There are no raceway fill tables in Chapter 3.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation to justify the change.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-159 Log #2101 NEC-P16 **Final Action: Accept**
(800.110)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise 800.110 as follows:
800.110 Raceways for Communications Wires and Cables.
(A) Types of Raceways.
Communication wires and cables shall be permitted to be installed in any raceway that complies with either (A)(1) or (A)(2).
(1) Chapter 3 Raceways. ~~Where~~ Communications wires and cables shall be permitted to be ~~are~~ installed in ~~a~~ any raceway, ~~the raceway shall be either of a type~~ included ~~permitted~~ in Chapter 3. The raceways shall be ~~and~~ installed in accordance with the requirements of Chapter 3.
(2) Other Permitted Raceways. ~~or~~ Communications wires and cables shall be permitted to be installed in listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway selected in accordance with the provisions of 800.113 ~~800.154~~, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
(B) Raceway Fill for Communications Wires and Cables. Raceway fill ~~tables~~ requirements of Chapter 3 and Chapter 9 shall not apply to communications wires and cables.
Substantiation: This revision is both editorial and technical. The addition of the two first level subdivisions (A) Types of Raceways and (B) Raceway Fill for Communications Wires and Cables and their second level subdivisions provides more clarity and make the section as self-sufficient as possible. Replacing the word "tables" by the word " requirements" is more appropriate as Chapter 3 has no raceway tables. However, Chapter 3 provides the raceway fill requirements which direct the code user to Chapter 9 for the conduit fill tables.

This proposal coordinates with the task group's proposal to move the cable and raceway installation requirements from 800.154 to 800.113.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:

DORNA, G.: This proposal contains a cut-and-paste error. It is a companion proposal to 16-47. "Optical fiber raceway" should have been replaced with "communications raceway".

16-160 Log #2102 NEC-P16 **Final Action: Accept in Principle**
(800.113)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Add new text to read as follows:
800.113 Installation of Communications Wires, and Cables and Communications Raceways. Installation of communications wires and cables, and communications raceways shall comply with 800.113 (A) through (L).
(A) Listing. Communications wires and cables installed in buildings shall be listed.

Exception: Communications cables that comply with 800.48 shall not be required to be listed.
(B) Air Ducts and Plenums. The following wires, cables and raceways shall be permitted in air ducts and plenums as described in 300.22(B).

(1) Type CMP

(2) Plenum communications raceway installed in compliance with 800.110

(3) Type CMP installed in plenum communications raceway

(4) Types CMP, CMR, CMG, CM, CMX and listed communications wires installed in raceways that are installed in compliance with 300.22(B)
(C) Other Spaces Used For Environmental Air. The following wires, cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C).

(1) Type CMP

(2) Plenum communications raceway installed in compliance with 800.110

(3) Type CMP installed in plenum communications raceway

(4) Types CMP, CMR, CMG, CM, CMX and listed communications wires installed in raceways that are installed in compliance with 300.22(C)
(D) Risers-Wires and Cables in Vertical Runs. The following wires, cables and raceways shall be permitted in vertical runs penetrating more than one floor and in vertical runs in a shaft:

(1) Types CMP and CMR

(2) Plenum and riser communications raceways installed in compliance with 800.110

(3) Types CMP and CMR installed in plenum or riser communications raceway

FPN: See 800.26 for firestop requirements for floor penetrations.
(E) Risers-Cables in Metal Raceways, Fireproof Shafts and One- and Two-Family Dwellings. The following cables and raceways shall be permitted in metal raceway, in a fireproof shaft with firestops at each floor and in one- and two-family dwellings:

(1) Types CMP, CMR, CMG, CM and CMX

(2) Plenum, riser and general-purpose communications raceways installed in compliance with 800.110

(3) Types CMP, CMR, CMG and CM installed in plenum, riser or general-purpose optical fiber raceway

FPN: See 800.26 for firestop requirements for floor penetrations.
(F) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays.

(1) Types CMP, CMR, CMG and CM

(2) Plenum, riser and general-purpose communications raceways installed in compliance with 800.110

(3) Types CMP, CMR, CMG and CM installed in plenum, riser or general-purpose communications raceway.
(G) Distributing Frames and Cross-Connect Arrays. The following wires and cables shall be permitted to be installed in distributing frames and cross-connect arrays.

(1) Types CMP, CMR, CMG and CM

(2) Listed communications wire
(H) Other Building Locations. The following wires, cables and raceways shall be permitted to be installed in building locations other than the locations covered in 800.113(B) through (G).

(1) Types CMP, CMR, CMG and CM

(2) Plenum, riser and general-purpose communications raceways installed in compliance with 800.110

(3) Types CMP, CMR, CMG and CM installed in plenum, riser or general-purpose communications raceway

(4) Listed communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3

(5) A maximum of 3m (10 ft) of exposed Type CMX in nonconcealed spaces
(I) One- and Two-Family Dwellings. The following cables and raceways shall be permitted to be installed in one- and two-family dwellings in locations other than the locations covered in 800.113(B) through (F).

(1) Types CMP, CMR, CMG, CM and Type CMX less than 6 mm (0.25 in.) in diameter

(2) Plenum riser and general-purpose communications raceways installed in compliance with 800.110

(3) Types CMP, CMR, CMG and CM installed in plenum, riser or general-purpose communications raceway
(J) Multifamily Dwellings. The following cables and raceways shall be permitted to be installed in one- and two-family dwellings in locations other than the locations covered in 800.113(B) through (F).

(1) Types CMP, CMR, CMG, CM

(2) Type CMX less than 6 mm (0.25 in.) in diameter in nonconcealed spaces

(3) Plenum, riser and general-purpose communications raceways installed in compliance with 800.110

(4) Types CMP, CMR, CMG and CM installed in plenum riser or general-purpose communications raceway

(5) Listed communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(K) Under Carpets. Type CMUC undercarpet communications wires and cables shall be permitted to be installed under carpet in locations other than the locations covered in 800.113(B) through (G)

(L) Hybrid Power and Communications Cable. Hybrid power and communications cable listed in accordance with 800.179(I) shall be permitted to be installed in one- and two-family dwellings.

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 800.113.

A companion proposal for section 800.154 greatly simplifies the statement of the applications of communications cables and raceways by using a table. This proposal and its companion proposal for section 800.154 need to be considered together as a package.

Panel Meeting Action: Accept in Principle

Revise 800.113 text to read as follows:

800.113 Installation of Communications Wires and Cables, Communications Raceways, and Cable Routing Assemblies. Installation of communications wires and cables, communications raceways, and cable routing assemblies shall comply with 800.113 (A) through (K).

(A) Listing. Communications wires and cables, communications raceways, and cable routing assemblies installed in buildings shall be listed.

Exception: Communications cables that comply with 800.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums Used for Environmental Air. The following wires and cables shall be permitted in ducts and plenums used for environmental air as described in 300.22(B) if they are directly associated with the air distribution system:

(1) Up to 1.22 m (4 ft) of Type CMP cable

(2) Types CMP, CMR, CMG, CM, CMX, and listed communications wires installed in raceways that are installed in compliance with 300.22(B)

FPN: See 4.3.4 and 4.3.11.3.3 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems,* for information on wire and cables in air ducts and apparatus casings plenums. See 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following wires, cables, and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C):

(1) Type CMP

(2) Plenum communications raceway installed in compliance with 800.110

(3) Type CMP installed in plenum communications raceway

(4) Type CMP supported by metallic cable trays or cable tray systems

(5) Types CMP, CMR, CMG, CM, CMX, and listed communications wires installed in raceways that are installed in compliance with 300.22(C)

FPN: See 4.3.11.2, 4.3.11.4 and 4.3.11.5 of NFPA 90A-2009, *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire, cables, and raceways in ceiling cavity, raised floor, and air-handling unit room plenums. See 3.3.22 for plenum definitions.

(D) Risers-Wires and Cables in Vertical Runs. The following wires, cables, and raceways shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types CMP and CMR

(2) Plenum and riser communications raceways installed in compliance with 800.110 and listed riser cable routing assemblies

(3) Types CMP and CMR installed in plenum communications raceway, riser communications raceway, or a listed riser cable routing assembly

FPN: See 800.26 for firestop requirements for floor penetrations.

(E) Risers-Cables in Metal Raceways or Fireproof Shafts. Types CMP, CMR, CMG, CM, and CMX shall be permitted in metal raceway or in a fireproof shaft with firestops at each floor

FPN: See 800.26 for firestop requirements for floor penetrations.

(F) Risers- One- and Two-Family Dwellings. The following cables and raceways shall be permitted in one- and two-family dwellings:

(1) Types CMP, CMR, CMG, and CM

(2) Type CMX less than 6 mm (0.25 in.) in diameter

(3) Plenum, riser, and general-purpose communications raceways installed in compliance with 800.110

(4) Types CMP, CMR, CMG, and CM installed in plenum, riser, or general-purpose communications raceway

(G) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays:

(1) Types CMP, CMR, CMG, and CM

(2) Plenum, riser, and general-purpose communications raceways installed in compliance with 800.110

(3) Types CMP, CMR, CMG, and CM installed in plenum, riser, or general-purpose communications raceway

(H) Distributing Frames and Cross-Connect Arrays. The following wires and cables shall be permitted to be installed in distributing frames and cross-connect arrays:

(1) Types CMP, CMR, CMG, and CM

(2) Listed communications wires

(I) Other Building Locations. The following wires, cables, and raceways shall be permitted to be installed in building locations other than the locations covered in 800.113(B) through (H).

(1) Types CMP, CMR, CMG, and CM

(2) A maximum of 3 m (10 ft) of exposed Type CMX in nonconcealed spaces

(3) Plenum, riser, and general-purpose communications raceways installed in compliance with 800.110

(4) Types CMP, CMR, CMG, and CM installed in plenum, riser or general-purpose communications raceway, or listed riser or general-purpose cable routing assembly

(5) Listed communication wires and Types CMP, CMR, CMG, CM, and CMX and installed in a raceway of a type included in Chapter 3

(6) Type CMUC undercarpet communications wires and cables installed under carpet

(J) Multifamily Dwellings. The following cables and raceways shall be permitted to be installed in multifamily dwellings in locations other than the locations covered in 800.113(B) through (F).

(1) Types CMP, CMR, CMG, CM

(2) Type CMX less than 6 mm (0.25 in.) in diameter in nonconcealed spaces

(3) Plenum, riser, and general-purpose communications raceways installed in compliance with 800.110

(4) Types CMP, CMR, CMG, and CM installed in plenum riser or general-purpose communications raceway

(5) Listed communication wires and Types CMP, CMR, CMG, CM, and CMX and installed in a raceway of a type included in Chapter 3

(6) Type CMUC undercarpet communications wires and cables installed under carpet

(K) One- and Two-Family Dwellings. The following cables and raceways shall be permitted to be installed in one- and two-family dwellings in locations other than the locations covered in 800.113(B) through (F):

(1) Types CMP, CMR, CMG, and CM

(2) Type CMX less than 6 mm (0.25 in.) in diameter

(3) Plenum, riser, and general-purpose communications raceways installed in compliance with 800.110

(4) Types CMP, CMR, CMG and CM installed in plenum, riser or general-purpose communications raceway

(5) Listed communication wires and Types CMP, CMR, CMG, CM, and CMX and installed in a raceway of a type included in Chapter 3

(6) Type CMUC undercarpet communications wires and cables installed under carpet

(7) Hybrid power and communications cable listed in accordance with 800.179(I).

Panel Statement: The text is a combination of the text from Proposal 16-160, which has been modified to improve clarity, with text to incorporate panel actions to accept in principle Proposals 16-173 (cable routing assemblies), 16-175 (metallic cable tray), and 16-179 (requiring riser cable for penetration of one floor) and by modifications to correlate with NFPA 90A-2009.

The NFPA 90A-2009 requirements for wires, cables, and raceways in air ducts and apparatus casing plenums (Sections 4.3.11.4 and 4.3.11.5) permit only 4 ft of plenum cable that is associated with the air distribution system. There is no provision for plenum communications raceways in air ducts and apparatus casing plenums. The air handling spaces that NFPA 90A defines as air ducts and apparatus casing plenums match the air handling spaces in NEC Section 300.2(B). The requirements for wires, cables, and raceways in ceiling cavity plenums, raised floor plenums, and air-handling unit room plenums (Sections 4.3.11.2, 4.3.11.4 and 4.3.11.5) are the same as in sections 800.154(A), 800.179(A), and 800.182(A) the 2008 NEC. The air handling spaces that NFPA 90A describes as ceiling cavity plenums, raised floor plenums, and air-handling unit room plenums match the air handling spaces in NEC Section 300.22(C).

The panel recognizes that references to 300.22(B) and (C) may need to be changed to correlate with Panel 3 action on Proposal 3-94. In anticipation the words “Fabricated” and “(Plenums)” were added to the titles.

Correlation with NFPA 90A is required by numerous Standards Council decisions—Standards Council decision 80-60, which established that the Technical Committee on Air-Conditioning has primary responsibility for combustibles in plenums and Standards Council decision 03-10-25, which directed the NEC project to hold off on making any changes to plenum requirements in the NEC until NFPA 90A-2009, Standard for the Installation of Air-Conditioning and Ventilating Systems has completed its revision process. NFPA 90A has completed its process and has been published.

The revised text relocates the wire, cable, and raceway installation rules from 800.154 and also includes installation rules from 800.110.

The requirements for CMX cable in one- and two-family risers were corrected. The current text of 800.154(B)(3) permits Type CMX in a riser in one- or two-family dwellings whereas 800.154(C)(4) only permits Type CMX under ¼ in. in diameter. Obviously if the only skinny CMX is permitted in the general space in a house that’s all that would be running up to another floor.

The panel recognizes that this proposal is a companion proposal to Proposal 16-172 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Abstain: 1

Explanation of Abstention:

BOYER, J.: The proposal does not appear to add any clarity to the NEC.

Comment on Affirmative:

DORNA, G.:

See my comment on proposals 16-48 and 16-56.

Section 800.110 permits communications wires to be installed in communications raceways but 800.154 has no specific application for communications wires in communications raceways. Communications wires are used primarily in cross-connect arrays. They should be permitted to be installed in communications raceways and routing assemblies that are part of a cross-connect array.

The panel action on the revision of 800.113 changed the title and included several applications of cable routing assemblies, but a few applications were missed.

The panel action should be revised to read as follows:

800.113 Installation of Communications Wires, Cables, Raceways and Cable Routing Assemblies. Installation of communications wires, cables, raceways and cable routing assemblies shall comply with 800.113 (A) through (L). Installation of raceways shall also comply with 800.110.

(A) Listing. Communications wires, cables, raceways and cable routing assemblies installed in buildings shall be listed.

Exception: Communications cables that comply with 800.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums Used for Environmental Air. The following wires and cables shall be permitted in ducts and plenums used for environmental air as described in 300.22(B) if they are directly associated with the air distribution system.

(1) Up to 1.22 m (4 ft) of Type CMP cable
(2) Types CMP, CMR, CMG, CM, CMX and communications wires installed in raceways that are installed in compliance with 300.22(B)

FPN: See sections 4.3.4 & 4.3.11.3.3 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire and cables in air ducts and apparatus casings plenums. See section 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following wires, cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C).

(1) Type CMP
(2) Plenum communications raceway
(3) Type CMP installed in plenum communications raceway
(4) Type CMP supported by metallic cable trays or cable tray systems
(5) Types CMP, CMR, CMG, CM, CMX and communications wires installed in raceways that are installed in compliance with 300.22(C)

FPN: See sections 4.3.11.2, 4.3.11.4 & 4.3.11.5 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire, cables and raceways in ceiling cavity, raised floor and air-handling unit room plenums. See section 3.3.22 for plenum definitions.

(D) Risers- Cables, Raceways and Cable Routing Assemblies in Vertical Runs. The following cables, raceways and cable routing assemblies shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types CMP and CMR
(2) Plenum and riser communications raceways
(3) Riser cable routing assemblies
(4) Types CMP and CMR installed in:
a) plenum communications raceway
b) riser communications raceway
c) riser cable routing assembly

FPN: See 800.26 for firestop requirements for floor penetrations.

(E) Risers-Cables and Raceways in Metal Raceways. The following cables and raceways shall be permitted in metal raceways in a riser having firestops at each floor.

(1) Types CMP, CMR, CMG, CM and CMX
(2) Plenum and riser communications raceways
(3) Types CMP, CMR, CMG, CM and CMX installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway

FPN: See 800.26 for firestop requirements for floor penetrations.

(F) Risers-Cables, Raceways and Cable Routing Assemblies in Fireproof Shafts. . The following cables, raceways and cable routing assemblies shall be permitted to be installed in fireproof riser shafts having firestops at each floor.

(1) Types CMP, CMR, CMG, CM and CMX
(2) Plenum, riser and general-purpose communications raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

FPN: See 800.26 for firestop requirements for floor penetrations.

(G) Risers- One- and Two-Family Dwellings. The following cables, raceways and cable routing assemblies shall be permitted in one- and two-family dwellings:

(1) Types CMP, CMR, CMG and CM
(2) Type CMX less than 6 mm (0.25 in.) in diameter,
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

(H) Cable Trays. The following wires, cables and raceways shall be permitted to be installed in cable trays.

(1) Types CMP, CMR, CMG and CM
(2) Plenum, riser and general-purpose communications raceways
(3) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway

(I) Distributing Frames and Cross-Connect Arrays. The following wires, cables, raceways and cable routing assemblies shall be permitted to be installed in distributing frames and cross-connect arrays.

(1) Types CMP, CMR, CMG, CM and communications wires
(2) Plenum, riser and general-purpose communications raceways
(3) Riser and general-purpose cable routing assemblies
(4) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

(J) Other Building Locations. The following wires, cables, raceways and cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 800.113(B) through (I).

(1) Types CMP, CMR, CMG and CM
(2) A maximum of 3 m (10 ft) of exposed Type CMX in nonconcealed spaces
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(6) Types CMP, CMR, CMG and CM installed in:
a) riser cable routing assembly
b) general-purpose cable routing assembly
(7) Communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(8) Type CMUC undercarpet communications wires and cables installed under carpet

(K) Multifamily Dwellings. The following cables, raceways and wring assemblies shall be permitted to be installed in multifamily dwellings in locations other than the locations covered in 800.113(B) through (G).

(1) Types CMP, CMR, CMG, CM
(2) Type CMX less than 6 mm (0.25 in.) in diameter in nonconcealed spaces
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(6) Types CMP, CMR, CMG and CM installed in:
a) riser cable routing assembly
b) general-purpose cable routing assembly
(7) Communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(8) Type CMUC undercarpet communications wires and cables installed under carpet

(L) One- and Two-Family Dwellings. The following cables and raceways shall be permitted to be installed in one- and two-family dwellings in locations other than the locations covered in 800.113(B) through (F).

(1) Types CMP, CMR, CMG, CM
(2) Type CMX less than 6 mm (0.25 in.) in diameter
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Communications wires and Types CMP, CMR, CMG and CM installed in;
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(6) Types CMP, CMR, CMG and CM installed in:

a) riser cable routing assembly
b) general-purpose cable routing assembly
(7) Communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(8) Type CMUC undercarpet communications wires and cables installed under carpet
(9) Hybrid power and communications cable listed in accordance with 800.179(I)

IVANS, R.:

We agree with the revision proposal prepared by the CMP 16 Special Editorial Task Group.

See my comment on proposals 16-48 and 16-56.

Section 800.110 permits communications wires to be installed in communications raceways but 800.154 has no specific application for communications wires in communications raceways. Communications wires are used primarily in cross-connect arrays. They should be permitted to be installed in communications raceways and routing assemblies that are part of a cross-connect array.

The panel action on the revision of 800.113 changed the title and included several applications of cable routing assemblies, but a few applications were missed.

The panel action should be revised to read as follows:

800.113 Installation of Communications Wires, Cables, Raceways and Cable Routing Assemblies. Installation of communications wires, cables, raceways and cable routing assemblies shall comply with 800.113 (A) through (L). Installation of raceways shall also comply with 800.110.

(A) Listing. Communications wires, cables, raceways and cable routing assemblies installed in buildings shall be listed.

Exception: Communications cables that comply with 800.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums Used for Environmental Air. The following wires and cables shall be permitted in ducts and plenums used for environmental air as described in 300.22(B) if they are directly associated with the air distribution system.

(1) Up to 1.22 m (4 ft) of Type CMP cable
(2) Types CMP, CMR, CMG, CM, CMX and communications wires installed in raceways that are installed in compliance with 300.22(B)

FPN: See sections 4.3.4 & 4.3.11.3.3 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire and cables in air ducts and apparatus casings plenums. See section 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following wires, cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C).

(1) Type CMP
(2) Plenum communications raceway
(3) Type CMP installed in plenum communications raceway
(4) Type CMP supported by metallic cable trays or cable tray systems
(5) Types CMP, CMR, CMG, CM, CMX and communications wires installed in raceways that are installed in compliance with 300.22(C)

FPN: See sections 4.3.11.2, 4.3.11.4 & 4.3.11.5 of NFPA 90A-2009 *Standard for the Installation of Air-Conditioning and Ventilation Systems* for information on wire, cables and raceways in ceiling cavity, raised floor and air-handling unit room plenums. See section 3.3.22 for plenum definitions.

(D) Risers- Cables, Raceways and Cable Routing Assemblies in Vertical Runs. The following cables, raceways and cable routing assemblies shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types CMP and CMR
(2) Plenum and riser communications raceways
(3) Riser cable routing assemblies
(4) Types CMP and CMR installed in:
a) plenum communications raceway
b) riser communications raceway
c) riser cable routing assembly

FPN: See 800.26 for firestop requirements for floor penetrations.

(E) Risers-Cables and Raceways in Metal Raceways. The following cables and raceways shall be permitted in metal raceways in a riser having firestops at each floor.

(1) Types CMP, CMR, CMG, CM and CMX
(2) Plenum and riser communications raceways
(3) Types CMP, CMR, CMG, CM and CMX installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway

FPN: See 800.26 for firestop requirements for floor penetrations.

(F) Risers-Cables, Raceways and Cable Routing Assemblies in Fireproof Shafts. . The following cables, raceways and cable routing assemblies shall be permitted to be installed in fireproof riser shafts having firestops at each floor.

(1) Types CMP, CMR, CMG, CM and CMX
(2) Plenum, riser and general-purpose communications raceways
(3) Riser and general-purpose cable routing assemblies
(4) Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

FPN: See 800.26 for firestop requirements for floor penetrations.

(G) Risers- One- and Two-Family Dwellings. The following cables, raceways and cable routing assemblies shall be permitted in one- and two-family dwellings:

(1) Types CMP, CMR, CMG and CM
(2) Type CMX less than 6 mm (0.25 in.) in diameter,
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

(H) Cable Trays. The following wires, cables and raceways shall be permitted to be installed in cable trays.

(1) Types CMP, CMR, CMG and CM
(2) Plenum, riser and general-purpose communications raceways
(3) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway\
b) riser communications raceway
c) general-purpose communications raceway

(I) Distributing Frames and Cross-Connect Arrays. The following wires, cables, raceways and cable routing assemblies shall be permitted to be installed in distributing frames and cross-connect arrays.

(1) Types CMP, CMR, CMG, CM and communications wires
(2) Plenum, riser and general-purpose communications raceways
(3) Riser and general-purpose cable routing assemblies
(4) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

(J) Other Building Locations. The following wires, cables, raceways and cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 800.113(B) through (I).

(1) Types CMP, CMR, CMG and CM
(2) A maximum of 3 m (10 ft) of exposed Type CMX in nonconcealed spaces
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(6) Types CMP, CMR, CMG and CM installed in:
a) riser cable routing assembly
b) general-purpose cable routing assembly
(7) Communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(8) Type CMUC undercarpet communications wires and cables installed under carpet

(K) Multifamily Dwellings. The following cables, raceways and wring assemblies shall be permitted to be installed in multifamily dwellings in locations other than the locations covered in 800.113(B) through (G).

(1) Types CMP, CMR, CMG, CM
(2) Type CMX less than 6 mm (0.25 in.) in diameter in nonconcealed spaces
(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Communications wires and Types CMP, CMR, CMG and CM installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(6) Types CMP, CMR, CMG and CM installed in:
a) riser cable routing assembly
b) general-purpose cable routing assembly
(7) Communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(8) Type CMUC undercarpet communications wires and cables installed under carpet

(L) One- and Two-Family Dwellings. The following cables and raceways shall be permitted to be installed in one- and two-family dwellings in locations other than the locations covered in 800.113(B) through (F).

(1) Types CMP, CMR, CMG, CM
(2) Type CMX less than 6 mm (0.25 in.) in diameter

(3) Plenum, riser and general-purpose communications raceways
(4) Riser and general-purpose cable routing assemblies
(5) Communications wires and Types CMP, CMR, CMG and CM installed in;
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(6) Types CMP, CMR, CMG and CM installed in:
a) riser cable routing assembly
b) general-purpose cable routing assembly
(7) Communication wires and Types CMP, CMR, CMG, CM and CMX and installed in a raceway of a type included in Chapter 3
(8) Type CMUC undercarpet communications wires and cables installed under carpet
(9) Hybrid power and communications cable listed in accordance with 800.179(I)

OHDE, H.: We vote affirmative but note there are a number of corrections that need to be made which we will addresses during the 2011 ROC period. For example in 800.113(B)(2) and in 800.113 (C)(5) the word "metal" should be inserted if front of the word " raceways" to clarify that the cable types permitted must be installed in metal raceways and this clarification is included for cable trays.

16-161 Log #2576 NEC-P16 **Final Action: Accept in Principle**
(800.113)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text to read as follows:
Communication wires and cables installed in building or structures shall be listed.
Substantiation: Edit. Cables and structures other than "buildings" should be included.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-160.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-162 Log #3099 NEC-P16 **Final Action: Reject**
(800.113)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
800.113 ~~Installation of Communications Wires and Cables.~~ Listing Required.
Communications cables installed in buildings shall be listed.
Exception: Communications cables that comply with 800.48 shall not be required to be listed.
Substantiation: The proposed title change more aptly describes the requirement, and it also gives a title that is not so similar to 800.133.
Panel Meeting Action: Reject
Panel Statement: Panel action on Proposal 16-160 revised this section so that the editorial change recommended by this proposal is no longer appropriate.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-163 Log #1743 NEC-P16 **Final Action: Reject**
(800.133)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "...or structures" after "buildings" in the first paragraph.
Revise (A)(1)(a): Communication wires and cables shall be permitted in the same raceway, auxiliary gutter, cable tray or enclosure with ~~cables~~ conductors of any of the following: (remainder unchanged).
(b) Class I circuits shall not be run in the same cable, raceway, or enclosure with communication circuits. Class 2 and Class 3 circuit conductors shall be permitted in the same cable, raceway, or enclosure with communication circuits. Where installed in cable trays communication circuits shall comply with 830.154(D).
Substantiation: "Cables" implies two or more conductors per the definition in 800.2 and doesn't include wire as defined in 800.2, which seems appropriate for inclusion in this provision. Raceways and enclosures should be included in (b).
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation to justify the change.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-164 Log #1747 NEC-P16 **Final Action: Reject**
(800.133)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add "or structure" after "building" in the first paragraph.
Revise (A)(1)(a): Other power-limited circuits. Communication wires and cables shall be permitted in the same raceway, auxiliary gutter, cable tray, or enclosure with ~~cables~~ conductors of any of the following: (remainder unchanged).
(b) Class I circuits shall not be run in the same cable, raceway, or enclosure with communication circuits. Class 2 and Class 3 circuit conductors shall be permitted in the same cable, raceway, or enclosure with communication circuits in which case the Class 2 and Class 3 circuits shall be classified as communication circuits and shall meet the requirements of this article. The ~~cables~~ Class 2 and Class 3 conductor shall be ~~listed~~ classified as communication circuits. ~~cables.~~ Where installed in cable trays communication circuits shall comply with 830.154(D).
Substantiation: Edit. "Cables" implies two or more conductors per the definition in 800.2 and doesn't include wire as defined in 800.2, which seems appropriate for inclusion. Raceways and enclosures should be included in (b).
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided sufficient substantiation to justify the change.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-164a Log #CP1612 NEC-P16 **Final Action: Accept**
(800.133(A)(1))

Submitter: Code-Making Panel 16,
Recommendation: Revise 800.133(A)(1) Title to read as follows:
(1) In Raceways, Cable Trays, Boxes, Cables, and Enclosures.
Substantiation: The panel revised the title to include "Enclosures" in order to provide consistency.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-165 Log #2266 NEC-P16 **Final Action: Accept in Principle**
(800.133(A)(1))

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:
(1) In Raceways, Routing Assemblies, Cable Trays, Boxes, and Cables.
(a)*Other Power-Limited Circuits.* Communications cables shall be permitted in the same raceway, optical fiber/communications cable routing assembly, cable tray, or enclosure with cables of any of the following:
(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Article 725
(2) Power-limited fire alarm systems in compliance with Article 760
(3) Nonconductive and conductive optical fiber cables in compliance with Article 770
(4) Community antenna television and radio distribution systems in compliance with Article 820
(5) Low-power network-powered broadband communications circuits in compliance with Article 830
Substantiation: Article 770 currently covers optical fiber raceways and provides listing requirements for plenum, riser and general-purpose versions. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.) UL 2024a provides for the listing of plenum, riser and general-purpose routing assemblies with the same fire testing requirements as UL 2024.
The significant difference between optical fiber routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
We have submitted companion proposals to provide for a change of the scope of Article 770 to include routing assemblies and to provide listing and application for requirements for optical fiber routing assemblies. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 16-166.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-166 Log #2103 NEC-P16 **Final Action: Accept in Principle in Part**
(800.133(A)(1)(a))

TCC Action: The Technical Correlating Committee directs that the action on this proposal be rewritten to comply with the NEC Style Manual with respect to the use of mandatory language.

The Technical Correlating Committee directs that the Chairs of Code-Making Panels 3 and 16 form a Task Group to correlate the actions taken on this proposal and Proposal 3-196.

This action will be considered by the panel as a public comment.

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Revise text to read as follows:

(a)*Other ~~Power-Limited~~ Circuits.* Communications cables shall be permitted in the same raceway, cable tray, or enclosure with cables of any of the following:

(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with <u>Parts I and III of </u>Article 725

(2) Power-limited fire alarm systems in compliance with <u>Parts I and III of </u>Article 760

(3) Nonconductive and conductive optical fiber cables in compliance with <u>Parts I and IV of </u>Article 770

(4) Community antenna television and radio distribution systems in compliance with <u>Parts I and IV of </u>Article 820

(5) Low-power network-powered broadband communications circuits in compliance with <u>Parts I and IV of </u>Article 830

<u>Exception: Only Types CMP, CMR, CMG and CM cables shall be permitted to be installed in plenum communications raceways, riser communications raceways and general-purpose communications raceways.</u>

Substantiation: This proposal is editorial and technical.

Section 800.154 restricts the applications of plenum, riser and general-purpose communications raceways by permitting only Types CMP, CMR, CMG and CM cables in these raceways.

Section 800.133(A)(1)(a) conflicts with the restrictions of 800.154.

The purpose of this proposal is to remove the conflict. It is also a companion proposal to a proposal to simplify the applications requirements in 800.154 by replacing the text with a table.

Power-limited is struck from the title to improve parallelism with Article 820. Also, optical fiber cables are not electrical and therefore are not power-limited circuits.

The NEC Style Manual states:

4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as "grounded in accordance with Article 250" unless additional conditions are specified. References to parts within articles shall be permitted.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle in Part

Revise text to read as follows:

(a) *Other ~~Power-Limited~~ Circuits.*

Communications cables shall be permitted in the same raceway, cable tray, <u>or</u> enclosure <u>or cable routing assembly </u>with cables of any of the following:

(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with <u>Parts I and III of</u> Article <u>725</u>

(2) Power-limited fire alarm systems in compliance with <u>Parts I and III of</u> Article <u>760</u>

(3) Nonconductive and conductive optical fiber cables in compliance with <u>Parts I and IV of</u> Article <u>770</u>

(4) Community antenna television and radio distribution systems in compliance with <u>Parts I and IV of</u> Article <u>820</u>

(5) Low-power network-powered broadband communications circuits in compliance with <u>Parts I and IV of</u> Article <u>830.</u>

Panel Statement: The recommendation from Proposal 16-165 has been incorporated into this proposal, and the new exception has been deleted because of panel action on other proposals to consolidate the types of raceways. See the panel actions on Proposals 16-278 and 16-267.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-167 Log #4691 NEC-P16 **Final Action: Reject**
(800.133(A)(2) Exception No. 3 (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.

Recommendation: Add a third exception as follows:

Exception No. 3: Where all of the electric light, power, Class 1, non-power limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the communications wires and cables through the use of sheathing that provides for system separation that does not rely on conductor or cable insulation alone, the combination of conductors comprising different systems shall be permitted to be combined into a listed hybrid cable assembly.

Substantiation: There is not and has never been any express permission to include communications circuit conductors within a common cable assembly with power conductors. Para (2) here comes the closest, because it recognizes a "continuous and firmly fixed nonconductor." This is crucial to the production of hybrid cables, where additional separation beyond the conductor insulation is applied to the power-limited conductors in accordance with the spirit of these principles. For example, 334.116(C) expressly recognizes this type of construction for Type NMS cable, and UL has been listing such constructions for many years. This topic must be addressed in the limited-power wiring articles, and this proposal is designed to raise the issue.

Panel Meeting Action: Reject

Panel Statement: The submitter has neither identified a specific application nor cited any technical rationale for an additional exception that appears to be covered in the present Exception No. 2.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-168 Log #1748 NEC-P16 **Final Action: Reject**
(800.133(B))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text: Raceways <u>enclosing conductors or fiber optic cables</u> shall be used for ~~their intended~~ the purposes <u>required or permitted by this Code.</u> Communication wires and cables <u>and fiber optic cables</u> shall not be ~~strapped, taped or~~ attached to the exterior of any conduit or raceway, <u>cable, or conductor</u> as a means of support <u>except where supported by a raceway mast.</u>

Substantiation: Edit. "Intended purpose" could be many things to the installer. Intended purpose could be strictly mechanical such as protection posts, mounting posts for equipment, support brackets, etc. Cables and single conductors such as grounding electrode conductor should be included. A provision for support by a raceway mast should be provided.

Panel Meeting Action: Reject

Panel Statement: Article 800 deals with communications circuits, not optical fiber cables.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-169 Log #2104 NEC-P16 **Final Action: Accept**
(800.133(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Revise the title of 800.133 (B) as follows:

(B) Support of ~~Conductors~~ <u>Communications Wires and Cables</u>. Raceways shall be used for their intended purpose. Communications ~~cables or~~ wires <u>and cables </u>shall not be strapped, taped, or attached by any means to the exterior of any ~~conduit or~~ raceway as a means of support.

Exception: Overhead (aerial) spans of communications ~~cables or~~ wires <u>and cables </u>shall be permitted to be attached to the exterior of a raceway-type mast intended for the attachment and support of such ~~conductors~~ <u>wires and cables.</u>

Substantiation: This proposal is editorial. The addition of the wording "Communications Cables" is more appropriate than conductors as this section deals with communications cables and not conductors. "Cables or Wires" was changed to 'wires and cables" to be consistent with the rest of the article. Conduit was struck because conduits are a form of raceway.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-170 Log #2105 NEC-P16 **Final Action: Accept**
(800.133(C))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Delete 800.133(C)
~~(C) Wiring in Ducts for Dust, Loose Stock, or Vapor Removal. Section 300.22(A) shall apply.~~
Relocate the same to 800.3(D).
800.3 (E) Wiring in Ducts for Dust, Loose Stock, or Vapor Removal. 300.22(A) shall apply.
Substantiation: This change is both editorial and technical. This proposal relocates the requirements in 800.133(C) to a more appropriate section 800.3 (E) – Other Articles. (Another task group proposal used (D)). The requirements of 300.22 (A) really apply to the entire Article 800 therefore the requirements of 300.4 should be inserted in 800.3.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Panel Statement: The panel understands that the last sentence of the first paragraph of the submitters substantiation was intended to read as follows: The requirements of 300.22 (A) really apply to the entire Article 800 therefore the requirements of 800.133(C) should be moved to 800.3.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-171 Log #2285 NEC-P16 **Final Action: Reject**
(800.135 (New))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Add a new Section to read as follows:
800.135 Communication Device and Equipment Mounting. Communication devices or equipment shall be mounted in listed boxes, brackets or assemblies designed for the purpose, and such boxes or assemblies shall be securely fastened in place. Boxes or brackets can be completly enclosed or backless.
(A) Communication Devices and Equipment Mounted to Boxes or Brackets. Communication devices or equipment shall be mounted to a listed boxes or bracket and installed per 314.20.
(B) Communication Devices and Equipment Mounted on Covers. Communication device and equipment mounted to and supported by a cover shall be held rigidly against the cover which is mounted to the box or bracket.
Substantiation: This proposal adds a new section to Article 800 addressing the mounting of devices or equipment to listed boxes and brackets. Currently, depending on the quality of workmanship, Communication devices or equipment have not been mounted to boxes or brackets that can support them. After several years device and/or covers that are mounted directly to the dry wall will become hazard because they have become loose and exposed. Communication cable can become energized by coming in incidental contact with electrical conductors.
800.135 was only a suggestion for the location of this new section. (A) addresses devices mounted directly to boxes or devices where as (B) address devices mounted to covers.
Panel Meeting Action: Reject
Panel Statement: Not all communications equipment and devices need to be mounted in boxes, brackets or assemblies.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
IVANS, R.: Loose and exposed cable or connectors can pose a risk of electric shock. Ringing voltages can exceed 100V and should not become easily accessible. Loose cabling and connectors can come into contact with electric light and power conductors. There are boxes and brackets listed for this purpose using UL Subject 2269, “Outline of Investigation for Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes.”
OHDE, H.: We agree with Mr. Ivans negative statement as loose cabling and connectors could indeed come into contact with electric light and power conductors therefore is a risk of electrical shock and hazard. UL lists boxes and brackets for this purpose.

16-172 Log #2106 NEC-P16 **Final Action: Accept in Principle**
(800.154)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
~~**800.154 Applications of Listed Communications Wires and Cables and Communications Raceways.**~~
~~Communications wires and cables shall comply with the requirements of 800.154(A) through (D), 800.154(F), and 800.154(G), or where cable substitutions are made in accordance with 800.154(E).~~
~~**(A) Plenum.** Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CMP. Abandoned cables shall not be permitted to remain. Types CMP, CMR, CMG, CM, and CMX and communications wire installed in compliance with 300.22 shall be permitted. Listed plenum communications raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CMP cable shall be permitted to be installed in raceways.~~
~~**(B) Riser.** Cables installed in risers shall comply with 800.154(B)(1), (B)(2), or (B)(3).~~
~~**(1) Cables in Vertical Runs.** Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CMR. Floor penetrations requiring Type CMR shall contain only cables suitable for riser or plenum use. Listed riser communications raceways and listed plenum communications raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CMR and CMP cables shall be permitted to be installed in these raceways.~~
~~**(2) Metal Raceways or Fireproof Shafts.** Listed communications cables shall be encased in a metal raceway or located in a fireproof shaft having firestops at each floor.~~
~~**(3) One- and Two-Family Dwellings.** Type CM and CMX cable shall be permitted in one- and two-family dwellings.~~
~~FPN: See 800.26 for firestop requirements for floor penetrations.~~
~~**(C) Other Wiring Within Buildings.** Cables installed in building locations other than the locations covered in 800.154(A), (B), (D), and (G) shall be in accordance with 800.154(C)(1) through (C)(6).~~
~~**(1) General.** Cables shall be Type CMG or Type CM. Listed communications general-purpose raceways, listed riser communications raceways, and listed plenum communications raceways shall be permitted. Only Types CMG, CM, CMR, or CMP cables shall be permitted to be installed in these communications raceways.~~
~~**(2) In Raceways.** Listed communications wires that are enclosed in a raceway of a type included in Chapter 3 shall be permitted.~~
~~**(3) Nonconcealed Spaces.** Type CMX communications cable shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).~~
~~**(4) One- and Two-Family Dwellings.** Type CMX communications cable less than 6 mm (0.25 in.) in diameter shall be permitted to be installed in one- and two-family dwellings.~~
~~**(5) Multifamily Dwellings.** Type CMX communications cable less than 6 mm (0.25 in.) in diameter shall be permitted to be installed in nonconcealed spaces in multifamily dwellings.~~
~~**(6) Under Carpets.** Type CMUC undercarpet communications wires and cables shall be permitted to be installed under carpet.~~
~~**(D) Cable Trays.** Types CMP, CMR, CMG, and CM communications cables shall be permitted to be installed in cable trays. Communications raceways, as described in 800.182, shall be permitted to be installed in cable trays.~~
~~**(E) Cable Substitutions.** The uses and substitutions for communications cables listed in Table 800.154(E) and illustrated in Figure 800.154(E) shall be permitted.~~
~~FPN: For information on Types CMP, CMR, CMG, CM, and CMX cables, see 800.179.~~
~~**(F) Hybrid Power and Communications Cable.** Hybrid power and communications cable listed in accordance with 800.179(H) shall be permitted to be installed in one- and two-family dwellings.~~
~~**(G) Distributing Frames and Cross-Connect Arrays.** Listed communications wire and Types CMP, CMR, CMG, and CM communications cables shall be used in distributing frames and cross-connect arrays.~~
800.154 Applications of Listed Communications Wires and Cables and Communications Raceways. Permitted and non-permitted applications of listed communications wires, cables and raceways shall be as indicated in Table 800.154(A). The substitutions for communications cables listed in Table 800.154(B) and illustrated in Figure 800.154(B) shall be permitted.

Table 800.154(A), Applications of Communications Wires, Cables and Raceways

Wire, Cable or Raceway Type	Applications													
	In air ducts and plenums as described in 300.22(B)	In other spaces used for environmental air as described in 300.22(C)	In risers	In building locations other than air ducts, plenums, other spaces used for environmental air, risers, cable trays, distributing frames and cross-connect arrays	In one- and two-family dwellings	In multifamily dwellings	In nonconcealed spaces	In cable trays	Under carpets	In distributing frames and cross-connect arrays	In any raceway in Chapter 3	In plenum communications raceways	In riser communications raceways	In general-purpose communications raceways
CMP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CMR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CMG,CM	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CMX	N	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y
CMUC	N	N	N	-	Y	Y	-	N	Y	N	-	N	N	N
Hybrid Power and Communications Cables	N	N	-	-	Y	N	-	-	--	N	-	N	N	N
Communications Wires	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N
Plenum Communications Raceways	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-
Riser Communications Raceways	N	N	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-
General-Purpose Communications Raceways	N	N	N	Y	Y	Y	Y	Y	-	-	-	-	-	-

Note. Applications indicated by "Y" shall be permitted. Applications indicated by an "N" shall not be permitted. Applications with a "–" are not addressed.

(Renumber Table 800.154(E) and Figure 800.154(E) to Table 800.154(B) and Figure 800.154(B) and insert them here.)

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800,820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal for section 800.154 greatly simplifies the statement of the applications of optical fiber cables and raceways by using a table where the permitted applications are indicated by a "Y" and the applications that are not permitted are indicted by an "N". A companion proposal moves the installation rules to section 800.113 Installation Of Communications Cables.

This proposal makes no changes to the existing permitted and not permitted applications of communications wires, cables and raceways.

This proposal and its companion proposal for section 800.113 need to be considered together as a package.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle

See revised Table on page 1102

Panel Statement: See the panel action and statement on Proposal 16-160.

Some of the non-permitted applications were determined by considering the listing requirements for the cable—for example, Type CMUC fire testing is the same as Type CMX. Other non-permitted applications were determined from existing code requirements as determined by the panel.

The panel recognizes that this proposal is a companion proposal to Proposal 16-160 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DORNA, G.: See my comments on proposals 16-48, 16-56 and 16-160.

The word "In" was omitted from head of the second column of Table 800.154(A). It should read "<u>In</u> fabricated ducts and plenums as described in 300.22(B)"

The references to "routing assemblies" in the last two columns need to be corrected to "cable routing assemblies".

Section 800.110 permits communications wires to be installed in communications raceway.

The revised 800.154 should appear as shown below:

See Table 800.154(A) on page 1103

800.154 Applications of Listed Communications Wires, Cables, Raceways and Cable Wiring Assemblies. Permitted and non-permitted applications of listed communications wires, cables, raceways and cable routing assemblies shall be as indicated in Table 800.154(A). The permitted applications are subject to the installation rules of 800.110 and 800.113. The substitutions for communications cables listed in Table 800.154(B) and illustrated in Figure 800.154 shall be permitted.

See Table 800.154(B) on page 1102

(Renumber Figure 800.154(E) to Figure 800.154 and insert it here.)

IVANS, R.: See my comments on proposals 16-48, 16-56 and 16-160.

The word "In" was omitted from head of the second column of Table 800.154(A). It should read "<u>In</u> fabricated ducts and plenums as described in 300.22(B)"

The references to "routing assemblies" in the last two columns need to be corrected to "cable routing assemblies".

Section 800.110 permits communications wires to be installed in communications raceway.

The revised 800.154 should appear as shown below:

See Table 800.154(A) on page 1104

800.154 Applications of Listed Communications Wires, Cables, Raceways and Cable Wiring Assemblies. Permitted and non-permitted applications of listed communications wires, cables, raceways and cable routing assemblies shall be as indicated in Table 800.154(A). The permitted applications are subject to the installation rules of 800.110 and 800.113. The substitutions for communications cables listed in <u>Table 800.154(B)</u> and illustrated in <u>Figure 800.154</u> shall be permitted.

Table 800.154(A) Applications of Listed Communications Wires, Cables, Raceways and Cable Routing Assemblies

We have an additional recommendation for a reformatted table structure for Table 800.154(A) (technical content unchanged).

See Table 820.154(A) on page 1105

Table 800.154(B) Cable Substitutions

See Table 800.154(B) on page 1105

(Renumber Figure 800.154(E) to Figure 800.154 and insert it here.)

16-173 Log #2267 NEC-P16 **Final Action: Accept in Principle**
(800.154)

Submitter: Terry Peters, The Society of the Plastics Industry

Recommendation: Revise text to read as follows:

800.154 Applications of Listed Communications Wires and Cables~~, and~~ Communications Raceways <u>and Optical Fiber/Communications Cable Routing Assemblies</u>. Communications wires and cables shall comply with the requirements of 800.154(A) through (D), 800.154(F), and 800.154(G), or where cable substitutions are made in accordance with 800.154(E).

(A) Plenum. (No change in text.)

(B) Riser. Cables installed in risers shall comply with 800.154(B)(1), (B)(2), or (B)(3).

(1) Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CMR. Floor penetrations requiring Type CMR shall contain only cables suitable for riser or plenum use. Listed riser communications raceways and listed plenum communications raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CMR and CMP cables shall be permitted to be installed in these raceways. <u>Listed riser optical fiber/communications cable routing assemblies shall be permitted to be installed in risers.</u>

(2) Metal Raceways or Fireproof Shafts. (No change in text.)

(3) One- and Two-Family Dwellings. (No change in text.)

(C) Other Wiring Within Buildings. Cables installed in building locations other than the locations covered in 800.154(A), (B), (D), and (G) shall be in accordance with 800.154(C)(1) through (C)(6).

(1) General. Cables shall be Type CMG or Type CM. Listed communications general-purpose raceways, listed riser communications raceways, and listed plenum communications raceways shall be permitted. Only Types CMG, CM, CMR, or CMP cables shall be permitted to be installed in these communications raceways. <u>Listed riser and general-purpose optical fiber/communications cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 800.154(A) and (B).</u>

(2) In Raceways. (No change in text.)

(3) Nonconcealed Spaces. (No change in text.)

(4) One- and Two-Family Dwellings. (No change in text.)

(5) Multifamily Dwellings. (No change in text.)

(6) Under Carpets. (No change in text.)

Substantiation: This is a companion proposal to provide for the use of optical fiber /communications cable routing assemblies. Please refer to the substantiation for the companion proposals for 770.154 and 770.182.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action and statement on Proposal 16-160.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-174 Log #121 NEC-P16 **Final Action: Accept**
(800.154(A))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Delete the second sentence.

~~Abandoned cables shall not be permitted to remain.~~

Substantiation: Section 800.25 requires that "The accessible portion of abandoned communications cables shall be removed." The requirement in to remove all abandoned cables in 800.154(A) is an error from the 1999 NEC that the panel tried to correct in the last code cycle.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Revise 800.154 and replace in entirety to read as follows:

"800.154 Applications of Listed Communications Wires and Cables and Communications Raceways. Permitted and non-permitted applications of listed communications wires, cables and raceways shall be as indicated in Table 800.154(A). The permitted applications are subject to the installation rules of 800.113. The substitutions for communications cables listed in Table 800.154(B) and illustrated in Figure 800.154 shall be permitted.

Table 800.154(A) Applications of Communications Cables, Wires and Raceways

Wire, cable, or raceway type	Applications															
	Fabricated Ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In risers in vertical runs	In risers in metal raceways or fire-proof shafts	In risers in one- and two-family dwellings	In building locations other than fabricated ducts and plenums, other spaces used for environmental air (plenums), risers, cable trays, distributing frames and cross-connect arrays	In one- and two-family dwellings	In multi-family dwellings	In nonconcealed spaces	In cable trays	Under carpet	In distributing frames and cross-connect arrays	In any raceway in Chapter 3	In plenum communications raceways	In riser communications raceways and riser routing assemblies	In general-purpose communications raceways and general-purpose routing assemblies
CMP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
CMR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
CMG, CM	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
CMX	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	N	N
CMUC	N	N	N	N	N	N	Y	Y	Y	N	Y	N	Y	N	N	N
Hybrid power and communications cables	N	N	N	N	Y	N	Y	N	Y	Y	N	N	N	N	N	N
Communications wires	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	N
Plenum communications raceways	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y				
Riser communications raceways and riser cable routing assemblies	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y				
General-purpose communications raceways and general-purpose routing assemblies	N	N	N	N	N	Y	Y	Y	Y	Y	N	Y				

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 800.113.

Table 800.154(B) Cable Substitutions

Cable type	Permitted Substitutions
CMR	CMP
CMG, CM	CMP, CMR
CMX	CMP, CMR, CMG, CM

(Renumber Figure 800.154(E) to Figure 800.154 and insert it here.)

16-172 Meeting Action

Table 800.154(A) Applications of Listed Communications Wires, Cables, Raceways and Cable Routing Assemblies

Wire, cable, Raceway and Cable Routing Assembly Types	Applications: In Air-Handling Spaces		In Risers				Within Buildings in Other Than Air-Handling Spaces and Risers										
	Fabricated Ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In vertical runs	In metal raceways	In fireproof shafts	In one- and two-family dwellings	General	In one- and two-family dwellings	In multi-family dwellings	In nonconcealed spaces	In cable trays	Under carpet	In distributing frames and cross-connect arrays	In any raceway in Chapter 3	In plenum communications raceways	In riser communications raceways and riser cable routing assemblies	In general-purpose communications raceways and general-purpose cable routing assemblies
CMP	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**
CMR	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**
CMG, CM	**N**	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**
CMX	**N**	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**N**	**N**	**Y**	**N**	**N**	**N**
CMUC	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**Y**	**Y**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**N**	**N**
Hybrid power and communications cables	**N**	**N**	**N**	**N**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**Y**	**N**	**N**	**N**	**N**	**N**	**N**
Communications wires	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**
Plenum communications raceways	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**			
Riser communications raceways	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**			
General-purpose communications raceways	**N**	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**Y**	**Y**			
Riser cable routing assemblies	**N**	**N**	**Y**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**N**	**Y**	**N**	**N**	**N**	**N**
General-purpose cable routing assemblies	**N**	**N**	**N**	**N**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**N**	**N**	**Y**	**N**	**N**	**N**	**N**

Note: An 'N' in the table indicates that the wire, cable, raceway or cable routing assembly type shall not be permitted to be installed in the application. A 'Y' indicates that the wire, cable, raceway or cable routing assembly type shall be permitted to be installed in the application, subject to the limitations described in 800.110 and 800.113.

Table 800.154(B) Cable Substitutions

Cable type	**Permitted Substitutions**
CMR	CMP
CMG, CM	CMP, CMR
CMX	CMP, CMR, CMG, CM

16-172 Dorna BE

Table 800.154(A), Applications of Communications Wires, Cables, Raceways and Cable Routing Assemblies

Applications		Wire, Cable, Raceway and Cable Routing Assembly Type											
		CMP	CMR	CMG, CM	CMX	CMUC	Hybrid power and communications cables	Communications wires	Plenum communications raceways	Riser communications raceways	General-purpose communications raceways	Riser cable routing assemblies	General-purpose cable routing assemblies
In Air-Handling Spaces	Fabricated ducts and plenums as described in 300.22(B)	Y	N	N	N	N	N	N	N	N	N	N	N
	Other spaces used for environmental air (plenums) as described in 300.22(C)	Y	N	N	N	N	N	N	Y	N	N	N	N
In Risers	Vertical runs	Y	Y	N	N	N	N	N	Y	Y	N	Y	N
	Metal raceways	Y	Y	Y	Y	N	N	N	Y	Y	Y	N	N
	Fireproof shafts	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
	One- and two-family dwellings	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
Within Buildings in Other Than Air-Handling Spaces and Risers	General	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y
	One- and two-family dwellings	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
	Multifamily dwellings	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
	Nonconcealed spaces	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
	Cable trays	Y	Y	Y	N	N	Y	N	Y	Y	Y	N	N
	Under carpet	N	N	N	N	Y	N	N	N	N	N	N	N
	Distributing frames and cross-connect arrays	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y
	Chapter 3 raceway	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N
	Plenum communications raceways	Y	Y	Y	N	N	N	Y				N	N
	Riser communications raceways and riser cable routing assemblies	Y	Y	Y	N	N	N	Y				N	N
	General-purpose communications raceways and general-purpose cable routing assemblies	Y	Y	Y	N	N	N	Y				N	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 800.113.

16-172 Ivans BE

Table 820.154(A), Applications of Coaxial Cables and Cable Routing Assemblies

Applications		Cable or Cable Routing Assembly Type: CATVP	CATVR	CATV	CATVX	Riser Cable Routing Assemblies	General-Purpose Cable Routing Assemblies
In Air-Handling Spaces	Fabricated Ducts and plenums as described in 300.22(B)	Y	N	N	N	N	N
	Other spaces used for environmental air (plenums) as described in 300.22(C)	Y	N	N	N	N	N
In Risers	Vertical runs	Y	Y	N	N	Y	N
	Metal raceways	Y	Y	Y	Y	N	N
	Fireproof shafts	Y	Y	Y	Y	Y	Y
	One-and two- family dwellings	Y	Y	Y	Y	Y	Y
Within Buildings in Other Than Air-Handling Spaces and Risers	General	Y	Y	Y	Y	Y	Y
	One- and two-family dwellings	Y	Y	Y	Y	Y	Y
	Multifamily dwellings	Y	Y	Y	Y	Y	Y
	Nonconcealed spaces	Y	Y	Y	Y	Y	Y
	Cable trays	Y	Y	Y	N	N	N
	Distributing frames and cross-connect arrays	Y	Y	Y	N	Y	Y
	Chapter 3 raceway	Y	Y	Y	Y	N	N
	Plenum communications raceways	Y	Y	Y	N	N	N
	Riser communications raceways	Y	Y	Y	N	N	N
	General-purpose communications raceways	Y	Y	Y	N	N	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 820.113.

16-172 Ivans BE

Table 800.154(B) Cable Substitutions

Cable type	Permitted Substitutions
CMR	CMP
CMG, CM	CMP, CMR
CMX	CMP, CMR, CMG, CM

16-172 Ivans BE

16-175 Log #129 NEC-P16 **Final Action: Accept in Principle**
(800.154(A))

Submitter: Gerald Lee Dorna, Belden
Recommendation: Add the following text at the end of 800.154(A):
Metallic cable trays and metallic cable tray systems shall be permitted to be installed in other spaces used for environmental air. Type CMP cables and communications plenum raceways shall be permitted to be installed in these cable trays and cable tray systems. Type CMR, CMG, CM and CMX cables, and communications riser and general-purpose raceways shall not be permitted to be installed in these cable trays and cable tray systems.
Substantiation: Article 392, Cable Trays, has requirements for cable trays in air handling spaces in section 392.4.
392.4 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.
Section 300.22 has provisions for cable trays in 300.22(C), Other Space Used For Environmental Air.
(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.
FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.
Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.
(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.
Section 300.22(C)(1) permits only solid bottom metal cable tray with solid metal covers. Optical fiber, communications, CATV, signaling and fire-alarm plenum cables, and plenum raceways are often installed in metal cable trays and metal cable tray systems in plenums (other spaces used for environmental air). These installations are "neat and workmanlike" and safe. They should be permitted.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-160.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-176 Log #4180 NEC-P16 **Final Action: Reject**
(800.154(A))

Submitter: William A. Wolfe, Steel Tube Institute of North America
Recommendation: Change the last sentence as follows:
Only Type CMP cable shall be permitted to be installed in these raceways.
Substantiation: The current text can be interpreted to mean that only CMP cables are permitted in any type of raceway used in plenums, which is incorrect. The intent is that only CMP cable is to be used in the plenum communications raceways. This proposal simply matches the text used in 800.154(B)(1) and (C)(1): e.g. "*Only type CMR and CMP cables shall be permitted to be installed in **these** raceways.*"
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 16-160, which clarifies the issue. See panel action on Proposal 16-48, which permits optical fiber plenum cable to be run in communications plenum raceway.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-177 Log #4509 NEC-P16 **Final Action: Reject**
(800.154(A))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
800.154 (A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CMP, CMR, CMG, CM or CMX, or be communications wire installed in compliance with 300.22. Abandoned cables shall not be permitted to remain. ~~Types CMP, CMR, CMG, CM, and CMX and communications wire installed in compliance with 300.22 shall be permitted.~~ Listed plenum communications raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CMP cable shall be permitted to be installed in raceways.
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
The first sentence establishes the one Type of cable that is allowed – Type CMP. The third sentence then allows several other types of cable, seemingly negating the first sentence. This revision clarifies which types of cables are allowed.
Panel Meeting Action: Reject
Panel Statement: Cable types CMR, CMG, and CM are not listed for use in ducts, plenums, and other spaces used for environmental air.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-178 Log #4545 NEC-P16 **Final Action: Accept**
(800.154(A))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
800.154 Applications of Listed Communications Wires and Cables and Communications Raceways.
Communications wires and cables shall comply with the requirements of 800.154(A) through (D), 800.154(F), and 800.154(G), or where cable substitutions are made in accordance with 800.154(E).
(A) Plenum. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CMP. ~~Abandoned cables shall not be permitted to remain.~~ Types CMP, CMR, CMG, CM, and CMX and communications wire installed in compliance with 300.22 shall be permitted. Listed plenum communications raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CMP cable shall be permitted to be installed in raceways.
Substantiation: The text proposed for deletion is duplicative of the text in section 800.25 and potentially in conflict with it.
For information, see section 800.25:
800.25 Abandoned Cables.
The accessible portion of abandoned communications cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-179 Log #2211 NEC-P16 **Final Action: Accept in Principle**
(800.154(B)(1))

Submitter: Robert W. Jensen, dbi / Rep. BICSI
Recommendation: Revise text as follows:
Cables installed in vertical runs and penetrating one or more floors ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type CMR. Floor penetrations requiring Type CMR shall contain only cables suitable for riser or plenum use. Listed riser communications raceways and listed plenum communications raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CMR and CMP cables shall be permitted to be installed in these raceways.
Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-160.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: The current riser requirements are so complicated that they could be considered to be a "vague and unenforceable".
Section 800.154(B)(1) requires that "Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CMR. Floor penetrations requiring Type CMR shall contain only cables suitable for riser or plenum use". Consequently at least two floor penetrations are required, one for plenum and riser cables and another for general-purpose cables.
The panel action on this proposal greatly simplifies the installation rules for cables in risers in other than one and two-family dwellings. The installation rules for one and two-family dwellings are already simplified since any listed cable is permitted.

16-180 Log #4510 NEC-P16 **Final Action: Accept in Principle**
(800.154(B)(1))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
800.154(B)(1) Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CMR. Cables installed in vertical runs and penetrating more than one fFloor ~~penetrations requiring Type CMR~~ shall contain only cables suitable for riser or plenum use. Listed riser communications raceways and listed plenum communications raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CMR and CMP cables shall be permitted to be installed in these raceways.
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
The second sentence is not clear and has been proposed for revision. The first sentence already requires the use of Type CMR cables in this situation so CMR cables do not need to be repeated. We believe that the revision clarifies what the second sentence is trying to require.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action of Proposal 16-160, which moved the installation rules to 800.113 and revised the requirements to make this recommendation unnecessary.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-181 Log #4511 NEC-P16 **Final Action: Reject**
(800.154(B)(2))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Revise text to read as follows:
800.154(B)(2) Metal Raceways or ~~Fireproof~~ Fire-resistive Shafts. Except as allowed in 800.154(B)(1), lListed communications cables shall be encased in a metal raceway or located in a ~~fireproof~~ fire-resistive shaft. Metal raceways shall be provided with ~~having~~ firestops at each floor.
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee's endorsement.
This subsection requires rated cable to be in "fireproof shafts" or raceways for rises. However, 800-154(B)(1) says that Type CMR cable is allowed in vertical runs penetrating more than one floor without a shaft or raceway. This revision clarifies this provision, particularly for Type CMR cable.

Additionally, the term "fireproof shafts" is not defined. This also implies that building floors run through shafts at each level. The building code generally considers building floors to end at shaft walls, such that there are no intermittent floors within a shaft. Further, the term "fireproof" for building construction is considered archaic. This revision revises the term "fireproof shaft" to "fire-resistive shaft".

Consideration should be given to changing the term "fireproof shaft" to "fire-resistive shaft" throughout the NEC.

Panel Meeting Action: Reject

Panel Statement: Both terms "fireproof" and "fire-resistive" are presently not defined in the NEC. The panel suggests the submitter consider submitting a definition of the term "fire-resistive" to Article 100. For correlation it is also suggested that proposals be submitted to change the term throughout the NEC.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-182 Log #199 NEC-P16 **Final Action: Accept in Principle**
(800.154(E))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

800.154(E) Cable Substitutions. The uses and substitutions for communications cables listed in Table 800.154(E) and illustrated in Figure 800.154(E) shall be permitted. Communications cables shall be permitted to substitute for class 2 and class 3 cables in accordance with 725.154(G), and to substitute for power-limited fire alarm cables in accordance with 760.154(D). Coaxial communications cables shall be permitted to substitute for community antenna television coaxial cables in accordance with 820.154(E).

~~FPN: For information on Types CMP, CMR, CMG, CM, and CMX cables, see 800.179.~~

Substantiation: Article 725 permits communications cables to substitute for class 2 and 3 cables, and article 760 permits communications cables to substitute for power-limited fire alarm cables. However, a correlating reference in Article 800 to the cable substitution provisions of Articles 725 and 760 is necessary because 90.3 Code Arrangement states, "Chapter 8 covers communications systems and is not subject to the requirements of Chapters 1 through 7 except where the requirements are specifically referenced in Chapter 8. The reference to Article 820 is included for completeness.

Deletion of the FPN is proposed because the note is superfluous.

Panel Meeting Action: Accept in Principle

Panel Statement: See panel action on Proposal 16-172, which accomplished the submitter's recommendation.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-183 Log #4008 NEC-P16 **Final Action: Reject**
(800.154(H) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 800.154(H).

<u>(H) Communications Cables With Suffix Markings. Communications cables with single or multiple suffix markings shall be permitted where required to meet special applications.</u>

<u>(1) Communications Circuit Integrity (CI) Cables or Electrical Circuit Protective System. Circuit integrity (CI) cables or a listed electrical circuit protective system shall be permitted for use in communications systems that supply critical circuits to ensure survivability for continued circuit operation for a specified time under fire conditions. Circuit integrity cable shall be marked in accordance with 800.179(G).</u>

<u>(2) Communications Cables for Dry, Damp, or Wet Locations. Communications cables installed in dry, damp, or wet locations shall be marked in accordance with 800.179.(K).</u>

<u>(3) Communications Cables Exposed to Direct Sunlight. Communications cables installed exposed to direct sunlight shall be marked in accordance with 800.179(L).</u>

<u>(4) Communications Cables in Corrosive Locations. Communications cables installed in corrosive locations shall be marked in accordance with 800.179(N).</u>

<u>(5) Communications Very-Low-Smoke Producing Cables. Communications very-low-smoke producing cables installed to provide low flame spread and very-low-smoke emissions shall be marked in accordance with 800.179(O).</u>

<u>(6) Communications Fire Hazard Cables. Communications fire hazard cables installed to provide low flame spread, very-low-smoke, and known potential heat release shall be marked in accordance with 800.179(P).</u>

Substantiation: This proposal permits cables identified in 800.154(A), (B), and (C) to have suffix markings.

This proposal establishes 800.154(H) for cables with suffixes for installation in locations requiring special cable characteristics.

Panel Meeting Action: Reject

Panel Statement: 800.154, Applications of Listed Communications Wires and Cables and Communications Raceways, provides information as to where a particular cable can be installed. This proposal does not provide any applications or installation requirements for any of the proposed cables.

All of the suggested changes are dealing with suffix markings, which would be more appropriately addressed in 800.179, Listing Requirements Communications Wires and Cables.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-184 Log #1475 NEC-P16 **Final Action: Accept in Principle**
(800.156)

Submitter: John Kacperski, Tele Design Services / Rep. BICSI

Recommendation: Revise text to read as follows:

For new construction, a minimum of one communications outlet shall be installed within the dwelling <u>in a readily accessible area of the finished living space</u> and cabled to the service provider demarcation point.

Substantiation: There is no clarity in the existing text that the outlet shall be in a useable area of the dwelling and thus adding benefit to the occupants for the life of the structure.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

For new construction, a minimum of one communications outlet shall be installed within the dwelling in a readily accessible area and cabled to the service provider demarcation point.

Panel Statement: The panel action meets the submitter's intent.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-185 Log #169 NEC-P16 **Final Action: Accept**
(800.170)

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Change "telecommunications" to "communications".

Substantiation: Throughout Article 800 the term "communications" is used rather than "telecommunications". Also, Article 100 defines "Communications Equipment" not "Telecommunications Equipment". Use of terminology should be consistent throughout the article.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-186 Log #4870 NEC-P16 **Final Action: Reject**
(800.170, FPN)

Submitter: T. David Mills, T. David Mills Associates

Recommendation: Modify the fine print note as follows:

FPN: One way to determine applicable requirements is to refer to ~~UL 60950-1-2003, Standard for Safety of Information Technology Equipment; UL 1459-1995, Standard for Safety, Telephone Equipment; or~~ UL 1863-2004, Standard for Safety, Communications Circuit Accessories. ~~For information on listing requirements for communications raceways, see UL 2024-2004, Standard for Optical Fiber and~~
~~Communication Cable Raceways.~~ <u>See {2} and {9}, Annex I.</u>

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

See my proposal for new Annex I. (An additional item could be added for UL 1863-2004, Standard for Safety, Communications Circuit Accessories as {12})

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject

Panel Statement: The FPNs are more user-friendly in current locations.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-187 Log #3991 NEC-P16 **Final Action: Reject**
(800.179 and 800.179(J) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Revise 800.179

Add new 800.179(J)

Table 800.179 does not change.

800.179 Communications Wires and Cables.

Communications wires and cables shall be listed in accordance with 800.179(A) through (I) and (K) through (P), and marked in accordance with Table 800.179. Conductors in communications cables, other than in a coaxial cable, shall be copper.

Communications wires and cables shall have a voltage rating of not less than 300 volts. The insulation for the individual conductors, other than the outer conductor of a coaxial cable, shall be rated for 300 volts minimum. ~~The cable voltage rating shall not be marked on the cable or on the undercarpet communications wire. Communications wires and cables shall have a temperature rating of not less than 60°C.~~

~~Exception: Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.~~

~~FPN No. 1: Voltage markings on cables may be misinterpreted to suggest that the cables may be suitable for Class 1, electric light, and power applications.~~

FPN No. 2: See 800.170 for listing requirement for equipment.

(J) Marking. Cables shall be marked in accordance with Table 800.179 and 800.179(J)(1) through (4).

(1) Voltage ratings shall not be marked on the cables.

FPN: Voltage markings on cables may be misinterpreted to suggest that the cables may be suitable for Class 1 electric light and power applications.

Exception: Voltage markings shall be permitted where the cable has multiple listings and a voltage marking is required for one or more of the listings.

(2) Temperature ratings greater than 60ºC shall be marked on the cable.

(3) Cables listed as suitable for installation at temperatures lower than 60ºC shall have the lowest permitted temperature marked on the cable.

(4) Cables listed as meeting the requirements of 800.179.(A) through (E) shall be permitted to have additional suffixes that comply with other 800.179 subsections.

Substantiation: The revision to the first paragraph of 800.179 is editorial and accommodates new cable listing requirements.

The proposed new 800.179(J) provides a separate subsection for cable marking, which parallels the requirements in Articles 725 and 760. Communications cables are permitted to substitute for Class 2, Class 3, and fire alarm power-limited cables, so it is important to have equivalent requirements.

There is no marking on cables rated at 60ºC (140ºF). Article 310 does an excellent job of identifying temperature rating of conductors. This proposal provides equivalent requirements.

The subsections in 800.179(J) correlate with markings identified in other subsections of 800.179 [e.g., 800.179(G) provides for a "-CI" suffix that can be added to any of the cables identified in 800.179(A) through (E)].

Communications cables are permitted to substitute for cables covered by Articles 725 and 760. It is important that communications cables have the same listing requirements and suffixes as permitted for cables in Articles 725 and 760.

Panel Meeting Action: Reject
Panel Statement: Articles 725 and 760 do not have any applications or installation requirements or allowances for suffix markings that are not also currently addressed for Article 800 cables.

800.154, Applications of Listed Communications Wires and Cables and Communications Raceways, does not contain any application for the newly proposed cable listing suffixes. This proposal does not provide any applications or installation requirements for the newly proposed cable listing suffixes. Adding listing requirements without application or installation requirements is not in keeping with the 2003 NEC Style Manual Section, 1.3 Regulatory Adoption, which states "Because the National Electrical Code is intended to be suitable for adoption as a regulatory document, it is important that it contain clearly stated mandatory requirements in the Code text."

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-188 Log #1670 NEC-P16 **Final Action: Reject**
(800.179(A), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 800.179(A) FPN as follows:

FPN: One method of ~~defining~~ determining fire resistance and low smoke-producing characteristics of a cable is testing ~~that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested~~ in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject
Panel Statement: The panel recognizes the intent of the submitter but notes that NFPA-262 is a test method that has no inherent pass/fail criteria. The FPN does provide explanatory information. It provides one set of criteria. It does not set requirements.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-189 Log #4871 NEC-P16 **Final Action: Reject**
(800.179(A), FPN)

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Modify the fine print note as follows:

FPN: ~~One method of defining a cable that is low smoke producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.~~ See {3}, Annex I.

Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.

See my proposal for new Annex I.

I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.

Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-190 Log #35 NEC-P16 **Final Action: Reject**
(800.179(B))

NOTE: This proposal appeared as Comment 16-167 on Proposal 16-213 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-213 was:

Change cable to cables as shown:

(B) Type CMR. Type CMR communications riser cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*

Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN as shown:

FPN: One method of determining ~~defining~~ fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the raceways pass the requirements of the test for Flame Propagation (riser) in~~ ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*

Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The FPN defines the damage and specifies performance requirements.

Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-191 Log #1671 NEC-P16 **Final Action: Reject**
(800.179(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 820.179(B) FPN as follows:
FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the cables pass the requirements of~~ testing the cable in accordance with ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-192 Log #36 NEC-P16 **Final Action: Reject**
(800.179(C), FPN)

NOTE: This proposal appeared as Comment 16-168 on Proposal 16-214 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-214 was:
Revise text to read as follows:
FPN: One method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-~~1985~~ 2001, Test Methods for Electrical Wires and Cables.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-193 Log #1672 NEC-P16 **Final Action: Reject**
(800.179(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 800.179(C) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-194 Log #37 NEC-P16 **Final Action: Reject**
(800.179(D))

NOTE: This proposal appeared as Comment 16-169 on Proposal 16-215 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-215 was:
Change cable to cables as shown:
(D) Type CM. Type CM communications cables shall be listed as being suitable for general-purpose communications use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the vertical-tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*. Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Method for Electrical Wires and Cables*.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to the spread of fire is ANSI/UL 1581-2001, *Reference Standard for Electrical Wires, Cables and Flexible Cords.*
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.
The date of the latest edition of the UL standard was corrected from 1991 to 2001 and for the CSA standard from 1985 to 2001.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-195 Log #38 NEC-P16 **Final Action: Reject**
(800.179(D))

NOTE: This proposal appeared as Comment 16-170 on Proposal 16-216 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-216 was:
Change cable to cables as shown:
((D) Type CM. Type CM communications cables shall be listed as being suitable for general-purpose communications use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the vertical-tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*. Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Method for Electrical Wires and Cables*.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to the spread of fire is ANSI/UL 1581-2001, *Reference Standard for Electrical Wires, Cables and Flexible Cords.*
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.
The date of the latest edition of the UL standard was corrected from 1991 to 2001 and for the CSA standard from 1985 to 2001.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-196 Log #39 NEC-P16 **Final Action: Reject**
(800.179(D), 800.179(I) and 800.179(J) FPNs,)

NOTE: This proposal appeared as Comment 16-171 on Proposal 16-217 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-217 was:
Revise text to read as follows:
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in ~~ANSI/UL 1581-2001, Standard for Electrical Wires, Cables, and Flexible Cords.~~ UL 1685-2000 Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-~~1985~~ 2001, Test Methods for Electrical Wires and Cables.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-197 Log #1673 NEC-P16 **Final Action: Reject**
(800.179(D), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 800.179(D) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-198 Log #40 NEC-P16 **Final Action: Reject**
(800.179(F))

NOTE: This proposal appeared as Comment 16-172 on Proposal 16-219 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-219 was:
Change cable to cables as shown:
(F) Type CMUC Undercarpet Wire and Cable. Type CMUC undercarpet communications wires and cables shall be listed as being suitable for undercarpet use and shall also be listed as being resistant to flame spread.
FPN: One method of determining that cable is resistant to flame spread is by testing the cable to the VW-1 (vertical-wire) flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to flame spread is the VW-1 (vertical-wire) flame test in ANSI/UL 1581-2001, *Reference Standard for Electrical Wires, Cables and Flexible Cords.*
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The FPN as submitted in the Proposal includes mandatory language by requiring that the cable be tested to UL 1581. The revised wording provides explanatory information without any requirements.
The date of the latest edition of the UL standard was corrected from 1991 to 2001.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-199 Log #41 NEC-P16 **Final Action: Reject**
(800.179(G))

NOTE: This proposal appeared as Comment 16-175 on Proposal 16-221 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-221 was
Delete the following:
~~(G) Multipurpose (MP) Cables. Until July 1, 2003, cables that meet the requirements for Types CMP, CMR, CMG, and CM and also satisfy the requirements of 760.82(B) for multiconductor cables and 760.82(H) for coaxial cables shall be permitted to be listed and marked as multipurpose cable Types MPP, MPR, MPG, and MP, respectively.~~
Re-letter the remaining subsections as shown:
(G~~H~~) Communications Circuit Integrity (CI) Cable. Cables suitable for use in communications systems to ensure survivability of critical circuits during a specified time under fire conditions shall be listed as circuit integrity (CI) cable. Cables identified in 800.90(A), (B), (C), (D), and (E) that meet the requirements for circuit integrity shall have the additional classification using the suffix "CI."
FPN: One method of defining circuit integrity (CI) cable is by establishing a minimum 2-hour fire resistance rating for the cable when tested in accordance with UL 2196-1995, *Standard for Tests of Fire Resistive Cables*.
(H~~I~~) Communications Wires. Communications wires, such as distributing frame wire and jumper wire, shall be listed as being resistant to the spread of fire.
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the vertical-tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*. Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Methods for Electrical Wires and Cables*.
(I~~J~~) Hybrid Power and Communications Cable. Listed hybrid power and communications cable shall be permitted where the power cable is a listed Type NM or NM-B conforming to the provisions of Article 334, and the communications cable is a listed Type CM, the jackets on the listed NM or NM-B and listed CM cables are rated for 600 volts minimum, and the hybrid cable is listed as being resistant to the spread of fire.
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the vertical-tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*. Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Methods for Electrical Wires and Cables*.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle in Part by accepting and rewording the FPNs in the sections indicated to read as shown below. The balance of the Proposal should be Rejected in accordance with the Panel Statement.
(G) – FPN: One method of determining circuit integrity is ANSI/UL 2196-2001, *Standard for Safety for Tests for Fire Resistive Cables.*
(H) – FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables.*
(I) – same text as (H) above.
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.

The number, title, and the date of the latest edition of the UL standard were corrected to reflect the current applicable standard. The reference in the CSA standard and the date of the CSA standard were also corrected.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-200 Log #1674 NEC-P16 **Final Action: Reject**
(800.179(G), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 800.179(G) FPN as follows:
FPN: One method of ~~defining~~ determining circuit integrity (CI) cable is by ~~establishing a minimum 2-hour fire resistance rating for the cable when tested~~ testing in accordance with UL 2196-1995, Standard for Tests of Fire Resistive Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-201 Log #1675 NEC-P16 **Final Action: Reject**
(800.179(H), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 800.179(H) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-202 Log #1676 NEC-P16 **Final Action: Reject**
(800.179(I), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 800.179(I) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.
Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-203 Log #42 NEC-P16 **Final Action: Reject**
(800.179(J))

NOTE: This proposal appeared as Comment 16-176 on Proposal 16-222 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-222 was:
Change cable to cables as shown:
(J) Hybrid Power and Communications Cables. Listed hybrid power and communications cables shall be permitted where the power cable is a listed Type NM or NM-B conforming to the provisions of Article334, and the communications cable is a listed Type CM, the jackets on the listed NM or NM-B and listed CM cables are rated for 600 volts minimum, and the hybrid cable is listed as being resistant to the spread of fire.
FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the vertical-tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*. Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Methods for Electrical Wires and Cables*.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables.*
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
The Proposal as submitted defines the damage and specifies performance requirements.
The number, title, and the date of the latest edition of the UL standard were corrected to reflect the current applicable standard. The reference in the CSA standard and the date of the CSA standard were also corrected.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-204 Log #3996 NEC-P16 **Final Action: Reject**
(800.179(J))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 800.179(P)
(P) Fire Hazard Cables. Communications cables used to provide low combustible loading shall be listed as fire hazard cable (FHC) and shall be listed as having low flame spread characteristics, very-low-smoke producing characteristics, and a low potential heat release value. Cables specified in 800.154(A), (B), and (C) shall have the additional classification using the suffix "-FHC".
FPN: One method of defining a low flame spread and very low smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core. One method of defining a low potential heat cable is that the cable exhibits a maximum potential heat value of exceeding 8141 kJ/kg (3500 BTU/lb) when tested in accordance with NFPA 259, *Standard Test Method for Potential Heat of Building Materials.*
Substantiation: This proposal establishes a listing and marking for cable permitted as an electrical wiring option in concealed spaces where a smoke developed index no greater than 50 is required or large quantities of cable may cause combustible loading. The proposed cable has low flame spread characteristics, very-low-smoke-producing characteristics, and a low potential heat release value.
The testing criteria are based on the requirements found in NFPA 13 and the International Mechanical Code, as revised.
NFPA 13, Section 8.14.1.2.1 follows: "Noncombustible and limited combustible concealed spaces with no combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum." The proposed cable has a very low heat of combustion. While the term "combustible loading" is not defined, the fuel load can be calculated to determine the potential hazard from large quantities of cable.
The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.

Establishing a listing and marking for cables listed for a "FHC" suffix provides cables with physical parameters (flame spread index, smoke developed index, potential heat release) that is consistent with requirements in other codes.

NFPA 13-2007

8.15 Special Situations.

8.15.1 Concealed Spaces.

8.15.1.1 Concealed Spaces Requiring Sprinkler Protection. All concealed spaces enclosed wholly or partly by exposed combustible construction shall be protected by sprinklers except in concealed spaces where sprinklers are not required to be installed by 8.15.1.2.1 through 8.15.1.2.16 and 8.15.6.

8.15.1.2* Concealed Spaces Not Requiring Sprinkler Protection.

8.15.1.2.1* Concealed spaces of noncombustible and limited-combustible construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. (For additional information on combustible loading, see A.8.15.1.2.1.)

8.15.1.2.2 Concealed spaces of noncombustible and limited-combustible construction with limited access and not permitting occupancy or storage of combustibles shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

8.15.1.2.3 Concealed spaces formed by studs or joists with less than 6 in. (152 mm) between the inside or near edges of the studs or joists shall not require sprinkler protection. (See Figure 8.6.4.1.5.1.)

8.15.1.2.4 Concealed spaces formed by bar joists with less than 6 in. (152 mm) between the roof or floor deck and ceiling shall not require sprinkler protection.

8.15.1.2.5 Concealed spaces formed by ceilings attached directly to or within 6 in. (152 mm) of wood joist construction shall not require sprinkler protection.

Panel Meeting Action: Reject

Panel Statement: 800.154, Applications of Listed Communications Wires and Cables and Communications Raceways, does not contain any application for the newly proposed cable listing suffix. This proposal does not provide any applications or installation requirements for the newly proposed cable listing suffixes. Adding listing requirements without application or installation requirements is not in keeping with the 2003 NEC Style Manual Section 1.3, Regulatory Adoption, which states "Because the National Electrical Code is intended to be suitable for adoption as a regulatory document, it is important that it contain clearly stated mandatory requirements in the Code text."

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-205 Log #4003 NEC-P16 **Final Action: Reject**

(800.179(K) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 800.179(K)

<u>(K) Cables in Dry, Damp, or Wet Locations. Cables specified in 800.154(A), (B), and (C) shall be listed for installation in dry, damp, or wet locations, or shall have a moisture-impervious metal sheath, and shall be marked with a suffix as required in 800.179(K)(a), (b), or (c).</u>

<u>(a) Cables installed in dry location shall not be required to have an additional suffix marking.</u>

<u>(b) Conductors and cables suitable for installation in damp locations shall be identified with the suffix "-DAMP". Conductors and cables listed for damp locations shall be suitable for installation in dry locations.</u>

<u>FPN: One method of defining suitability for installation in damp locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*</u>

<u>(c) Cables suitable for installation in wet locations shall be identified with the suffix "-WET". Conductors and cables listed for damp locations shall be suitable for installation in dry or damp locations.</u>

<u>FPN: One method of defining suitability for installation in wet locations is by testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*</u>

Substantiation: Presently, there is no marking that identifies which Communications cables are suitable for dry, damp, or wet locations. Cables suitable for installation in dry locations that are installed in damp or wet locations have the potential to cause system malfunction.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 16-204.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-206 Log #4005 NEC-P16 **Final Action: Reject**

(800.179(L) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 800.179(L)

<u>(L) Communications Cables Exposed to Direct Sunlight. Communications cables installed exposed to direct sunlight shall be listed as sunlight resistant cable. Cables specified in 800.154(A), (B), and (C), and used for installations exposed to direct sunlight shall have the additional classification using the suffix "-SR".</u>

<u>FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*</u>

Substantiation: Presently, there is no marking that identifies communications cables as being suitable for installation exposed to direct sunlight. Cables that are not listed for exposure to direct sunlight and are installed exposed to direct sunlight have the potential to cause system malfunction. There have been job failures where cables supported by an aerial messenger wire failed due to sunlight exposure.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 16-204. The submitter's substantiation that cables are not marked for exposure to direct sunlight is incorrect. There are cables marked as suitable for installation in direct sunlight.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-207 Log #4006 NEC-P16 **Final Action: Reject**

(800.179(M) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 800.179(M)

<u>(M) Communications Cable Temperature Ratings. Communications cables shall be listed for a temperature rating of not less than 60ºC (140ºF). Communications cables shall be permitted to have an additional temperature rating for the lowest permitted temperature.</u>

Substantiation: Communications are often installed in areas where the temperature exceeds the 60ºC (140ºF) rating, which is not marked on the cable. For example, cable installed in conduit on a rooftop could have a temperature internal to the conduit in excess of 160 ºF.

Additionally, Communications cables are sometimes installed in cold areas (e.g., walk-in freezer or home fire alarm/security system pre-wire installation), so an indication of the minimum permitted temperature is important.

There is a companion proposal to add temperature marking requirements.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 16-204.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-208 Log #4002 NEC-P16 **Final Action: Reject**

(800.179(N) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.

Recommendation: Add new 800.179(N)

<u>(N) Communications Cables Installed in Corrosive Locations. Communications cables installed in corrosive locations shall be listed as suitable for corrosive locations. Cables specified in 800.154(A), (B), and (C), and used for installation in corrosive locations shall have the additional classification using the following suffixes: "-PR" for oil resistant, and "-GR" for gasoline and oil resistant.</u>

<u>FPN: One method of defining corrosion resistance is testing to the requirements of UL 1581, *Reference Standard for Electrical Wires, Cables, and Flexible Cords.*</u>

Substantiation: Presently, there is no marking that identifies which communications cables as being suitable for installation in corrosive locations. Corrosive locations have the potential to degrade cable and conductor insulation and cause system malfunction.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 16-204.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-209 Log #4007 NEC-P16 **Final Action: Reject**
(800.179(O) (New))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 800.179(O)
<u>(O) Very-Low-Smoke Producing Cables. Communications cables used to provide very-low-smoke producing characteristics shall be listed as very-low-smoke producing (50) and shall be listed as having low flame spread characteristics and very-low-smoke producing characteristics. Cables specified in 800.154(A), (B), and (C) shall have the additional classification using the suffix "-50".</u>
<u>FPN: One method of defining a very-low-smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core.</u>
Substantiation: This proposal establishes a listing and marking for cable for installation where minimal smoke generations is required. This cable meets the requirement for installation in concealed spaces that permit a maximum flame spread index of 25 and a maximum smoke developed index of 50. The proposed cable has low flame spread characteristics and very-low-smoke-producing characteristics. Presently, a number of manufacturers have cables listed as meeting the proposed requirements, but do not have a unique marking permitted by the NEC.

The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.

Establishing a listing and marking for cables listed for a "-50" suffix provides cables with physical parameters (flame spread index, smoke developed index) that is consistent with requirements in other codes.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-204.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-210 Log #4004 NEC-P16 **Final Action: Reject**
(800.179(P))

Submitter: Thomas P. Hammerberg, Automatic Fire Alarm Association, Inc.
Recommendation: Add new 800.179(P)
<u>(P) Fire Hazard Cables. Communications cables used to provide low combustible loading shall be listed as fire hazard cable (FHC) and shall be listed as having low flame spread characteristics, very-low-smoke producing characteristics, and a low potential heat release value. Cables specified in 800.154(A), (B), and (C) shall have the additional classification using the suffix "-FHC".</u>
<u>FPN: One method of defining a low flame spread and very low smoke-producing cable is that the cable exhibits a maximum flame spread index of 25 and maximum smoke developed index of 50 when tested in accordance with UL 723, *"Test for Surface Burning Characteristics of Building Materials"* with the cable unslit (intact) and cut through to expose the cable core. One method of defining a low potential heat cable is that the cable exhibits a maximum potential heat value of exceeding 8141 kJ/kg (3500 BTU/lb) when tested in accordance with NFPA 259, *Standard Test Method for Potential Heat of Building Materials.*</u>
Substantiation: This proposal establishes a listing and marking for cable permitted as an electrical wiring option in concealed spaces where a smoke developed index no greater than 50 is required or large quantities of cable may cause combustible loading. The proposed cable has low flame spread characteristics, very-low-smoke-producing characteristics, and a low potential heat release value. Presently, a number of manufacturers have cables listed to the proposed requirements.

The testing criteria are based on the requirements found in NFPA 13 and the International Mechanical Code, as revised.

NFPA 13, Section 8.14.1.2.1 follows: "Noncombustible and limited combustible concealed spaces with no combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum." The proposed cable has a very low heat of combustion. While the term "combustible loading" is not defined, the fuel load can be calculated to determine the potential hazard from large quantities of cable.

The International Mechanical Code, 602.2.1, requires materials in plenums to be noncombustible or have a flame spread index no greater 25 and a smoke index no greater than 50.

Establishing a listing and marking for cables listed for a "FHC" suffix provides cables with physical parameters (flame spread index, smoke developed index, potential heat release) that is consistent with requirements in other codes.

NFPA 13-2007

8.15 Special Situations.

8.15.1 Concealed Spaces.

8.15.1.1 Concealed Spaces Requiring Sprinkler Protection. All concealed spaces enclosed wholly or partly by exposed combustible construction shall be protected by sprinklers except in concealed spaces where sprinklers are not required to be installed by 8.15.1.2.1 through 8.15.1.2.16 and 8.15.6.

8.15.1.2* Concealed Spaces Not Requiring Sprinkler Protection.

8.15.1.2.1* Concealed spaces of noncombustible and limited-combustible construction with minimal combustible loading having no access shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum. (For additional information on combustible loading, see A.8.15.1.2.1.)

8.15.1.2.2 Concealed spaces of noncombustible and limited-combustible construction with limited access and not permitting occupancy or storage of combustibles shall not require sprinkler protection. The space shall be considered a concealed space even with small openings such as those used as return air for a plenum.

8.15.1.2.3 Concealed spaces formed by studs or joists with less than 6 in. (152 mm) between the inside or near edges of the studs or joists shall not require sprinkler protection. (See Figure 8.6.4.1.5.1.)

8.15.1.2.4 Concealed spaces formed by bar joists with less than 6 in. (152 mm) between the roof or floor deck and ceiling shall not require sprinkler protection.

8.15.1.2.5 Concealed spaces formed by ceilings attached directly to or within 6 in. (152 mm) of wood joist construction shall not require sprinkler protection.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-204.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-211 Log #2268 NEC-P16 **Final Action: Accept in Principle**
(800.182)

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:
800.182 Communications Raceways <u>and Optical Fiber/Communications Cable Routing Assemblies</u>.
Communications raceways shall be listed in accordance with <u>800.182(A)</u> through (C).
(A) (A) Plenum Communications Raceways. (Text unchanged).
(B) Riser Communications Raceways <u>and Optical Fiber/Communications Cable Routing Assemblies</u>. Riser communications raceways <u>and riser optical fiber/communications cable routing assemblies shall</u> be listed as having adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, *Standard for Optical Fiber Cable Raceway*<u>, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*</u>
(C) General-Purpose Communications Raceways <u>and Optical Fiber/Communications Cable Routing Assemblies</u>. General-purpose communications raceways <u>and optical fiber/communications cable routing assemblies</u> shall be listed as being resistant to the spread of fire.

FPN: One method of defining *resistance to the spread of fire* is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, *Standard for Optical Fiber Cable Raceway*<u>, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*</u>
Substantiation: This is a companion proposal to provide for the use of optical fiber /communications cable routing assemblies. Please refer to the substantiation for the companion proposals for 770.154 and 770.182.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
800.182 Communications Raceways <u>and Cable Routing Assemblies</u>.
Communications raceways shall be listed in accordance with <u>800.182(A)</u> through (C).
(A) Plenum Communications Raceways. (Text unchanged).
(B) Riser Communications Raceways <u>and Cable Routing Assemblies</u>. Riser communications raceways <u>and riser cable routing assemblies shall</u> be listed as having adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, *Standard for Optical Fiber Cable Raceway*<u>, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*</u>
(C) General-Purpose Communications Raceways <u>and Cable Routing Assemblies</u>. General-purpose communications raceways <u>and cable routing assemblies</u> shall be listed as being resistant to the spread of fire.

FPN: One method of defining *resistance to the spread of fire* is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, *Standard for Optical Fiber Cable Raceway*<u>, or UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies as applicable.*</u>
Panel Statement: The panel struck "optical fiber/communications" because it was removed from the definitions. See panel action on Proposals 16-12, 16-108, and 16-232.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

ARTICLE 810 — RADIO AND TELEVISION EQUIPMENT

16-212 Log #4186 NEC-P16 **Final Action: Accept**
(810)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Replace the term "grounding conductor" with "grounding electrode conductor" throughout this Article.
Substantiation: The term "Grounding Conductor" is being proposed to be deleted because it is almost identical to the term "grounding electrode conductor". The defined term "grounding electrode conductor" includes the ability of connecting to a point on the grounding electrode system. This has been submitted as a single proposal to the Article instead of numerous proposals to allow the panel to ensure the resulting language still meets their intent in each specific section.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-91.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
JANIKOWSKI, R.: I agree with the submitter that the term "grounding conductor" and "grounding electrode conductor" are all but identical. The term "grounding electrode conductor" will not be mistaken in the field for the grounded conductor and refers to any point on the grounding electrode system.
Comment on Affirmative:
BRUNSSEN, J.: This is a correlation issue with Panel 5. Although the deletion of the term "grounding conductor" is appropriate for articles covered by Panel 5, the term is used over 120 times in Chapter 8 articles covering low power communications circuits and elsewhere in the code. The term "Grounding Conductor" has proven a useful and well understood term within the communications articles and a definition should be retained in Article 100. Substitution of "Grounding Conductor" with "Grounding Electrode Conductor" is not appropriate for all uses in Chapter 8 articles. The definition of "Grounding Conductor" could be modified to make it more specific to communications circuits as follows: "G**rounding Conductor.** A conductor used to connect communications equipment and cable shield, as required, to a grounding electrode system or grounding electrode(s)." This definition would meet the needs of Chapter 8.

16-213 Log #3241 NEC-P16 **Final Action: Accept**
(810.1)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence as follows:
This article covers antennas such as <u>wire-strung type</u>, multi-element, vertical rod and dish... (remainder unchanged).
Substantiation: Edit. Antenna types covered in 810.16 should be noted.
Panel Meeting Action: Accept
Panel Statement: The panel recognizes that the TCC is responsible for the scope. The panel recommends that the TCC accept this proposal.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-214 Log #3423 NEC-P16 **Final Action: Accept**
(810.13)

TCC Action: The Technical Correlating Committee directs that the panel clarify that the panel action intends to delete "of less than 250 volts between conductors".
In addition, the Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
This shall be considered as a public comment.

Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
810.13 Avoidance of Contacts with Conductors of Other Systems. Outdoor antennas and lead-in conductors from an antenna to a building shall not cross over open conductors of electric light or power circuits and shall be kept well away from all such circuits so as to avoid the possibility of accidental contact. Where proximity to open electric light or power service<u>-entrance</u> conductors cannot be avoided, the installation shall be such as to provide a clearance of at least 600 mm (2 ft). (The remainder of the text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service<u>-Entrance</u> Cable. Service<u>-entrance</u> conductors made up in the form of a cable.
Service<u>-Entrance</u> Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service<u>-entrance</u> conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-<u>entrance</u> conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
IVANS, R.: The proposed change does not add any clarity to the interpretation or readability of the NEC regarding the use of the term "Service." The submitter has not substantiated what value has been added by inserting the word "entrance".

16-215 Log #4914 NEC-P16 **Final Action: Reject**
(810.15)

Submitter: Nisar Chaudhry, TII Network Technologies, Inc.
Recommendation: Add new text as follows:
810.15 Grounding.
Masts and metal structures supporting antennas shall be grounded in accordance with <u>810.21</u>.
Add a new Exception.
<u>**Exception:** Dish Antennas mounted where no part of the antenna is higher than the highest point of the structure.</u>
Substantiation: The coax cable from Satellite Dish is electrically isolated from the metallic dish reflector and mounting hardware (See document provided). When the Dish Antenna is installed below the roof level of the premises, the dish antenna does not attract any lightning discharges. The induced voltages on the antenna are similar to the ones that can be present on the inside premises wiring. This is based on the analysis done using a Rolling Sphere (See document provided). In addition, grounding of the totally isolated and confined within the premises, satellite dish antenna systems will not involve any power cross or lightning induced currents. A rolling sphere of 150 feet radius was chosen as the worst case situation as generally used in designing Lightning Protection Systems for the premises. These Dish Antennas mounted in this configuration should not be required to be grounded, as they do not fall under requirements set in Article 250 as "Likely to become energized".
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 16-251.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-215a Log #CP1607 NEC-P16 **Final Action: Accept**
(810.21(F)(1))

Submitter: Code-Making Panel 16,
Recommendation: Revise 810.21(F)(1) as follows:
"If the building or structure served has an intersystem bonding termination as required by 250.94, the grounding conductor shall...".
Substantiation: This change provides correlation with the revision to 800.100(B)(1) accepted by the Panel. See Panel action on Proposal 16-147.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-216 Log #1133 NEC-P16 **Final Action: Accept**
(810.21(F)(1), FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Add the FPN following 810.21(F) (1):
FPN: See Article 100 for the definition of *Intersystem Bonding Termination*.
Substantiation: *Intersystem Bonding Termination* is a new and unfamiliar term introduced in the 2008 NEC. The FPN reference to Article 100 will help ensure that NEC users not only become familiar with the new terminology, but encourage application of this preferred intersystem bonding arrangement as well.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-216a Log #CP1605 NEC-P16 **Final Action: Accept**
(810.21(F)(2)(4))

Submitter: Code-Making Panel 16,
Recommendation: Revise 810.21(F)(2)(4) as follows:
(4) The nonflexible metallic power service raceway...".
Substantiation: This change provides correlation with similar changes in 770, 800, 820 and 830. See panel action on Proposals 16-149 and 16-258.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-217 Log #3101 NEC-P16 **Final Action: Reject**
(810.21(F)(2)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(2) Text to remain unchanged.
(1) Text to remain unchanged.
(2) Text to remain unchanged.
~~(3) The power service accessible means external to the building, as covered in 250.94~~
~~(4)~~ (3) Text to remain unchanged.
~~(5)~~ (4) Text to remain unchanged.
~~(6)~~ (5) Text to remain unchanged.
A bonding device intended to provide a termination point for the grounding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is non-removable.
Substantiation: The item being discussed in (3) is the item covered in 810.21(F)(1), so there is no reason for it to be in 810.21(F)(2).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-34.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-218 Log #1142 NEC-P16 **Final Action: Accept**
(810.21(F)(3))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means~~,~~ as described in ~~810.21(F)(1)~~ 810.21(F)(2).
Substantiation: The title states "without intersystem bonding termination", hence it is the grounding means of 810.21(F)(2) that should be referenced. See similar requirements in 770.100(B)(3), 800.100(B)(3), 820.100(B)(3) and 830.100(B)(3). The comma is superfluous.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-219 Log #3100 NEC-P16 **Final Action: Reject**
(810.21(F)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 810.21(F)(1), the grounding conductor shall be connected to an electrode as described in 250.52.
~~(1) To any one of the individual electrodes described in 250.52; or~~
~~(2) If the building or structure served has no grounding means, as described in 810.21(F)(1) or (F)(2), to an effectively grounded metal structure.~~
Substantiation: The term "effectively grounded" is vague and unenforceable, as indicated by actions taken by the technical committees for the 2008 NEC. Furthermore, if this section is intending to address a metal building frame or underground metal structure, these items are already covered in 810.21(F)(2).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-39.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-220 Log #3728 NEC-P16 **Final Action: Reject**
(810.21(F)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 810.21(F)(3) as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 810.21(F)(1), one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and comply with the requirements of 250.56 being applicable to rod, pipe, and plate electrode installations.
~~(1) To any one of the individual electrodes described in 250.52; or~~
~~(2) If the building or structure served has no grounding means, as described in 810.21(F)(1) or (F)(2), to an effectively grounded metal structure.~~
Substantiation: The requirement in existing 810.21(F)(3)(1) to connect the grounding electrode conductor to "any of the individual electrodes described in 250.52" seems to suggest one or more of these electrodes are readily available but forgets that this section is titled **"Buildings or Structures Without …. Grounding Means."** This is not consistent with 250.50 that only requires the use of such electrodes where they are "present at each building or structure served." Subsection 810.21(F)(3)(2) also has similar issues as if a grounded metal structure exists there exists a "grounding means."
The requirements of this section should state that where a building or structure is without grounding means, it is to have such reasonable grounding means installed such as a ground ring, rod, pipe, plate, or other underground metal structure that is recognized by Article 250 and more specifically 250.52(A)(4), (A)(5), (A)(6), (A)(7), and (A)(8). This revision would bring the grounding of radio and television equipment circuits into line with the requirements of Articles 250 for both consistency and for technical application.
Panel Meeting Action: Reject
Panel Statement: Specific reference to 250.52(A)(4) through (A)(8) is unnecessary as all appropriate grounding connections are presently listed in 810.21(F)(1) and (2). The title of 810.21(F)(3), "In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means" must be considered in context with the preceding Section 810.21(F)(2) where specific grounding means at the building or structure are identified.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-221 Log #1134 NEC-P16 **Final Action: Accept**
(810.21(F)(3)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise text as follows:
(2) if the building or structure served has no intersystem bonding termination or has no grounding means, as described in ~~810.21(F)(1) or (F)(2)~~ 810.21(F)(2) or (F)(3)(1), to and effectively grounded metal structure.
Substantiation: The proposed revision correlates 810.21(F)(3)(2) with similar requirements in 770.100(B)(3), 800.100(B)(3), 820.100(B)(3) and 830.100(B)(3). It also emphasizes that the option provided by 810.21(F)(3)(1) should be pursued before resorting to 810.21(F)(3)(2).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-222 Log #1482 NEC-P16 **Final Action: Accept in Principle**
(810.51 through 810.58)

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
Submitter: David Bredhold, Eaton Corporation
Recommendation: Revise text as follows:
III. Amateur and Citizen Band Transmitting and Receiving Stations—Antenna
Substantiation: Citizen Band antennae are of like construction and require similar lead-in cable as amateur antennae. While Citizen Band antennae use shielded cable (typically enclosed in metallic sheath) for lead-in, other conditions are similar to those of amateur equipment. Citizen Band antennae are exposed to the same environmental and atmospheric conditions as are amateur antennae: lightning, wind-loading, and clearance requirements from overhead conductors are examples. Therefore, Citizen Band transmitting and receiving installations should be required to adhere to stipulations delineated in the NEC as are installations for amateur transmitting and receiving stations.
Panel Meeting Action: Accept in Principle
Revise 810.1 text as follows:
810.1 Scope.
This article covers antenna systems for radio and television receiving equipment, amateur, and citizens band radio transmitting and receiving equipment, and certain features of transmitter safety. This article covers antennas such as multi-element, vertical rod, and dish, and also covers the wiring and cabling that connects them to equipment. This article does not cover equipment and antennas used for coupling carrier current to power line conductors."
Revise III title text as follows:
III. Amateur and Citizen Band Transmitting and Receiving Stations—Antenna
Revise 810.51 text as follows:
810.51 Other Sections.
In addition to complying with Part III, antenna systems for amateur and citizen band transmitting and receiving stations shall also comply with 810.11 through 810.15.
Revise table 810.52 title as follows:
Table 810.52 Size of ~~Amateur Station~~ Outdoor Antenna Conductors
Revise 810.58 title as follows:
810.58 Grounding Conductors — Amateur and Citizens Band Transmitting and Receiving Stations.
Grounding conductors shall comply with 810.58(A) through (C).
Revise 810.58(A) as follows:
(A) Other Sections. All grounding conductors for amateur and citizens band transmitting and receiving stations shall comply with 810.21(A) through (K).
Panel Statement: The addition of the words "citizens band" throughout Article 810 meets the intent of the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-223 Log #4692 NEC-P16 **Final Action: Accept**
(810.70 Exception No. 1)

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal and the existing section 640.3(K).
This action will be considered by the panel as a public comment.
Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Delete this exception.
Substantiation: This exception is not in the form of a complete sentence and therefore of uncertain meaning, in violation of 3.1.4.1 of the Style Manual. This exception is almost certainly obsolete. It was in the NEC over 50 years ago when Article 640 was firmly rooted in the vacuum tube era, and it is unlikely to have any meaning with today's technology.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

ARTICLE 820 — COMMUNITY ANTENNA TELEVISION AND RADIO DISTRIBUTION SYSTEMS

16-224 Log #2286 NEC-P16 **Final Action: Reject**
(820)

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Revise the indicated Sections in Article 820 to read as follows:
820.2 Definitions. See Article 100. For the purposes of this article, the following additional definitions apply.
Coaxial Raceway (OFCR). A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of coaxial cables.
820.3 Other Articles. Circuits and equipment shall comply with 820.3(A) through (G).
(A) Hazardous (Classified) Locations. CATV equipment installed in a location that is classified in accordance with 500.5 shall comply with the applicable requirements of Chapter 5.
(B) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22, where installed in ducts, plenums, or other spaces used for environmental air, shall apply.
Exception: As permitted in 820.154(A).
(C) Installation and Use. Section 110.3 shall apply.
(D) Installations of Conductive and Nonconductive Optical Fiber Cables. Article 770 shall apply.
(E) Communications Circuits. Article 800 shall apply.
(F) Network-Powered Broadband Communications Systems. Article 830 shall apply.
(G) Alternate Wiring Methods. The wiring methods of Article 830 shall be permitted to substitute for the wiring methods of Article 820.
FPN: Use of Article 830 wiring methods will facilitate the upgrading of Article 820 installations to network-powered broadband applications.
(H) Coaxial Raceways (OFCR). Article 862 applies to the selection and installation of Coaxial Raceways (OFCR).
820.110 Raceways for Coaxial Cables. Where coaxial cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or Optical Fiber/Communication Raceway (OFCR) selected and installed per Article 862. The number of Communication Cables shall comply with 862.22~~listed plenum CATV raceway, listed riser CATV raceway, or listed general-purpose CATV raceway installed in accordance with 820.154, and with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.~~
~~*Exception: Conduit fill restrictions shall not apply.*~~
820.154 Applications of Listed CATV Cables and CATV Raceways. CATV cables shall comply with the requirements of 820.154(A) through (E) or where cable substitutions are made as shown in Table 820.154(E).
(A) Plenums. Coaxial cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CATVP. Abandoned cables shall not be permitted to remain. Types CATVP, CATVR, CATV, and CATVX cables installed in compliance with 300.22 shall be permitted. Listed plenum CATV raceways shall be permitted to be installed in ducts and plenums as described in ~~300.22(B)~~ 862.10(D) and in other spaces used for environmental air as described in ~~300.22(C)~~ 862.(E). Only Type CATVP cable shall be permitted to be installed in these raceways.
(B) Riser. Coaxial cables installed in risers shall comply with any of the requirements of 820.154(B)(1) through (B)(3).
(1) Coaxial Cables in Vertical Runs. Coaxial cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CATVR. Floor penetrations requiring Type CATVR shall contain only cables suitable for riser or plenum use. Listed riser CATV raceways and listed plenum CATV raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor as described in 862.10(F). Only Type CATVR and CATVP cables shall be permitted to be installed in these raceways.
(2) Metal Raceways or Fireproof Shafts. Types CATV and CATVX cables shall be permitted to be encased in a metal raceway or located in a fireproof shaft having fire- stops at each floor.
(3) One- and Two-Family Dwellings. Types CATV and CATVX cables shall be permitted in one- and two-family dwellings. Listed general-purpose coaxial raceways, listed riser coaxial raceways, and listed plenum coaxial raceways shall be permitted for use as described in 862.10(G) with Type CM and CMX cables.
FPN: See 820.3(A) for the firestop requirements for floor penetrations.
(C) Other Wiring Within Buildings. Cables installed in building locations other than the locations covered in 820.154(A) and (B) shall be in accordance with any of the requirements in 820.154(C)(1) through (C)(5).
(1) General. Type CATV shall be permitted. Listed CATV general-purpose raceways, listed riser CATV raceways, and listed plenum CATV raceways shall be permitted. Only Types CATV, CATVX, CATVR, or CATVP cables shall be permitted to be installed in these CATV raceways as described in 862.10(G).
(2) In Raceways. Type CATVX shall be permitted to be installed in a raceway.
(3) Nonconcealed Spaces. Type CATVX shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).
(4) One- and Two-Family Dwellings. Type CATVX cables less than 10 mm (0.375 in.) in diameter shall be permitted to be installed in one- and two-family dwellings.
(5) Multifamily Dwellings. Type CATVX cables less than 10 mm (0.375 in.) in diameter shall be permitted to be installed in multifamily dwellings.
(D) Cable Trays. Cables installed in cable trays shall be Types CATVP, CATVR, and CATV.
(E) Cable Substitutions. The uses and substitutions for CATV coaxial cables listed in

Table 820.154(E) Coaxial Cable Uses and Permitted Substitutions (not submitted)

820.182 ~~**CATV Raceways.** CATV raceways shall be listed in accordance with 820.182(A) through (C).).~~ **Nonmetallic Coaxial Raceways (OFCR).** Nonmetallic Coaxial Raceways (OFCR) shall be listed in accordance with Article 862.6.

~~**(A) Plenum CATV Raceways.** Plenum CATV raceways shall be listed for use in other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.~~

~~FPN: One method of defining that an optical fiber raceway is a low smoke-producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with the plenum test in UL 2024, Standard for Optical-Fiber Cable Raceway.~~

~~**(B) Riser CATV Raceways.** Riser CATV raceways shall be listed for use in risers and shall also be listed as having adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.~~

~~FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the Test for Flame Propagation (Riser) in UL 2024, Standard for Optical-Fiber Cable Raceway.~~

~~**(C) General-Purpose CATV Raceways.** General-purpose CATV raceways shall be listed suitable for general-purpose use and shall also be listed as being resistant to the spread of fire.~~

~~FPN: One method of defining resistance to the spread of fire is that the raceway passes the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, Standard for Optical-Fiber Cable Raceway.~~

Substantiation: This is a companion proposal to correlate with the proposal for a new optical fiber/communication raceway article. The new optical fiber/ communication raceway article was proposed to Panel 16 as Article 862.

Optical fiber/communication raceways (Type OFCR) are currently listed raceways for use in plenums, risers or general purpose applications for the management of signaling, optical fiber, communication and CATV cables. This new Article and the companion proposals will clarify the selection, and installation optical fiber/communication raceways including the construction specifications. It is not the intent of the submitter to revise or change any of the currently permitted uses by this proposal, but only to enhance the usability of the Code.

Panel Meeting Action: Reject

Panel Statement: This proposal was submitted in companion with Proposal 16-350, which was rejected. The submitter of this proposal assumes the acceptance of Proposal 16-350, which was rejected.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-225 Log #4187 NEC-P16 **Final Action: Reject**
(820)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase "grounding conductor" and revising it to "grounding electrode conductor."

Submitter: Paul Dobrowsky, Holley, NY

Recommendation: Replace the term "grounding conductor" with "grounding electrode conductor" throughout this Article.

Substantiation: The term "Grounding Conductor" is being proposed to be deleted because it is almost identical to the term "grounding electrode conductor". The defined term "grounding electrode conductor" includes the ability of connecting to a point on the grounding electrode system. This has been submitted as a single proposal to the Article instead of numerous proposals to allow the panel to ensure the resulting language still meets their intent in each specific section.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 16-91.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

JANIKOWSKI, R.: I agree with the submitter that the term "grounding conductor" and "grounding electrode conductor" are all but identical. The term "grounding electrode conductor" will not be mistaken in the field for the grounded conductor and refers to any point on the grounding electrode system.

Comment on Affirmative:

BRUNSSEN, J.: This is a correlation issue with Panel 5. Although the deletion of the term "grounding conductor" is appropriate for articles covered by Panel 5, the term is used over 120 times in Chapter 8 articles covering low power communications circuits and elsewhere in the code. The term "Grounding Conductor" has proven a useful and well understood term within the communications articles and a definition should be retained in Article 100. Substitution of "Grounding Conductor" with "Grounding Electrode Conductor" is not appropriate for all uses in Chapter 8 articles. The definition of "Grounding Conductor" could be modified to make it more specific to communications circuits as follows: "G**rounding Conductor.** A conductor used to connect communications equipment and cable shield, as required, to a grounding electrode system or grounding electrode(s)." This definition would meet the needs of Chapter 8.

16-226 Log #201 NEC-P16 **Final Action: Reject**
(820.1)

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Revise as follows:

<u>**Concealed Space.** That portion(s) of a building behind walls, over suspended ceilings, in pipe chases, attics, and in whose size might normally range from 44.45 mm (1 3/4 in.) stud spaces to 2.44 m (8 ft) interstitial truss spaces and that might contain combustible materials such as building structural members, thermal and/or electrical insulation, and ducting. [NFPA 96:3.3.42.1]</u>

<u>Nonconcealed space. That portion of a building that is not a concealed space.</u>

Substantiation: Section 820.154(C)(3) has application requirements for CATV cables in nonconcealed spaces. A definition of a concealed space is needed in order to define and understand what a nonconcealed space is. I have also submitted a proposal to clarify that the definition of "concealed" in Article 100 applies only to wiring methods.

Panel Meeting Action: Reject

Panel Statement: The terms "concealed spaces" and "nonconcealed spaces" are generally understood and do not require definitions.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-227 Log #1135 NEC-P16 **Final Action: Accept**
(820.1, FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)

Recommendation: Add the FPN following 820.1:

<u>FPN: See 90.2(B)(4) for installations of CATV and Radio Distribution Systems that are not covered.</u>

Substantiation: Adding the FPN reminds NEC users to check 90.2(B)(4), thereby avoiding misapplication of 820, and provides correlation between 820.1 and 830.1 that contains a similar FPN.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-228 Log #745 NEC-P16 **Final Action: Reject**
(820.2.Abandoned Coaxial Cable)

Submitter: Brian E. Rock, Hubbell Inc.

Recommendation: Delete text and the associated Fine Print Note to read as follows:

820.2 Definitions.

See Article 100. For the purposes of this article, the following additional definitions apply.

~~**Abandoned Coaxial Cable.** Installed coaxial cable that is not terminated at equipment other than a coaxial connector and not identified for future use with a tag.~~

~~FPN: See Article 100 for a definition of Equipment.~~

[remainder of 820.2 unchanged by this Proposal]

Substantiation: Companion proposals have been made to add a single generalized definition in Article 100 and to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.

NEC® Manual of Style 2.2.2.1. Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2. Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discreet definitions can be broadly consolidated into a single definition in Article 100.

The specific method by which identification for future use is achieved ("… with a tag") is conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 violates *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …") and is omitted in the generalized definition for "Abandoned" being added in Article 100. This identification-with-a-tag requirement in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 is redundant to the actual requirement statements in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Also, words regarding the possibility of ceasing connection to an electric supply have been added in the generalized definition for "Abandoned" to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).

Panel Meeting Action: Reject

Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-229 Log #815 NEC-P16 **Final Action: Reject**
(820.2.Abandoned Coaxial Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Coaxial Cable. Installed coaxial cable that is not terminated at equipment other than a coaxial connector and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-230 Log #4556 NEC-P16 **Final Action: Accept**
(820.2.Air Duct)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Delete the following text:
~~**820.2 Air Duct.** A conduit or passageway for conveying air to or from heating, cooling, air conditioning, or ventilating equipment, but not including the plenum.~~
Substantiation: The term "air duct" is not used in article 820 and should not be defined in the article, as per the manual of style of the National Electrical Code.
This has been proposed before but was caught in the NEC moratorium associated with plenum cables.
Panel Meeting Action: Accept
Panel Statement: See panel action and statement on Proposal 16-248. The term "air duct" has been included in Article 820 in Proposal 16-248.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-231 Log #212 NEC-P16 **Final Action: Reject**
(820.2.CATV Raceway (New))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add new definition to read as follows:
"CATV Raceway. A raceway listed as a Plenum CATV Raceway, or a Riser CATV Raceway, or a General-Purpose CATV Raceway."
Substantiation: The term "CATV Raceway" is used throughout Article 800 and therefore needs to be defined. The proposed definition is precise. Companion proposals have been submitted for Articles 770 and 800.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 16-289a where the listing of "CATV raceway" is deleted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-232 Log #3596 NEC-P16 **Final Action: Accept in Principle**
(820.2.Optical Fiber/Communications Cable Routing Assembly)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal by complying with 2.2.2 of the NEC Style Manual to not contain mandatory text, such as "listed."
This action will be considered by the panel as a public comment.
Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Add new text to read as follows:
<u>**Optical fiber /communications cable routing assembly**. A flame retardant, nonmetallic assembly of pliable lengths, rigid straight sections, elbows, bends and fittings such as expansion joints, female and male adapters, and couplings used to support and protect optical fiber, communications and data cables in applications with a high density of cabling such a information technology (computer) rooms, broadcast stations and telecommunications offices. Parts of the assembly may have hinged or removable covers. The assembly is designed for cables be laid or set in place after the enclosures have been installed as a complete system.</u>
Substantiation: Article 770 currently covers optical fiber raceways and provides applications and listing requirements for these raceways. UL lists these raceways to UL 2024, Optical Fiber and Communication Cable Raceway. UL lists optical fiber /communications cable routing assemblies to UL2024a, Outline of Investigation for Optical Fiber Cable Routing Assemblies. Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.)
For further information see the attached application guide from one of the manufacturers or got to http://www.storage-expo.com/ExhibitorLibrary/302/FiberRunner_6.pdf on the web.
The significant difference between optical fiber /communications cable routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
Since users of the code may not be familiar with optical fiber / communications cable routing assemblies we are submitting this proposal to define them. We have submitted companion proposals to provide for a change of the scope of Article 770 to include optical fiber /communications cable routing assemblies and to provide listing and application for requirements for them. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
Cable Routing Assembly. A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support listed cables.
Panel Statement: The panel action meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
GUBISCH, R.: The proposed definition contains a requirement which conflicts with 2.2.2 of the NEC Style Manual.
Comment on Affirmative:
BRUNSSEN, J.: The definition as stated in the Panel Meeting Action is incomplete as it fails to identify the types of cable to be supported and protected. Revise the Panel Meeting Action as follows: "**Cable Routing Assembly.** A unit or assembly of units or sections and associated fittings that are listed and form a structural system used to support <u>and protect optical fiber, communications and data</u> listed cables."
DORNA, G.: See my comment on proposal 16-12.

16-233 Log #125 NEC-P16 **Final Action: Reject**
(820.3)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Add new text to read:
<u>CATV Raceway. A raceway listed as a Plenum CATV Raceway, or a Riser CATV Raceway, or a General-Purpose CATV Raceway.</u>
Substantiation: The term "CATV Raceway" is used throughout Article 800 and therefore needs to be defined. The proposed definition is precise. Companion proposals have been submitted for Articles 770 and 800.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 16-289a where the listing of "CATV Raceway" is deleted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-234 Log #2460 NEC-P16 **Final Action: Accept in Principle**
(820.3)

Submitter: Joseph P. Savage, FIFTH Council North America
Recommendation: Add the following line to 820.3
<u>**(G) Premise-Powered Broadband Communications Systems.** Article 8XX shall apply.</u>
(~~G~~ H) Alternate Wiring Methods. The wiring methods of Article <u>830</u> shall be permitted to substitute for the wiring methods of Article <u>820</u>.
Substantiation: A submission has been made for a new Article to Chapter 8. If this Article is accepted, then Article 820.3 should include the above added reference.
Panel Meeting Action: Accept in Principle
Revise text and insert the following new subparagraphs to 820.3 to read as follows:
(F) Premises-Powered Broadband Communications Systems. Article 840 shall apply.
(G) Alternate Wiring Methods. The wiring methods of Article 830 shall be permitted to substitute for the wiring methods of Article 820.
Panel Statement: See panel action on Proposal 16-349. See panel action on Proposal 16-235 that deleted one of the existing subparagraphs.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
PREZIOSO, L.: There is no need to substitute the new article's wiring methods if the new article is not Accepted.

16-235 Log #2117 NEC-P16 **Final Action: Accept**
(820.3 and 820.3(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Make the following changes:
~~**(B) Ducts, Plenums, and Other Air-Handling Spaces.** Section 300.22, where installed in ducts, plenums, or other spaces used for environmental air, shall apply.~~
~~*Exception: As permitted in 820.154(A).*~~
Revise 820.3 introductory sentence as follows:
820.3 Other Articles. Circuits and equipment shall comply with 820.3 (A) through ~~(G)~~ (F).
Reletter existing items (C) through (G) as (B) through (F).
Substantiation: This is an editorial and clarification proposal.
Section 820.3(B) provides no additional guidance or requirements that are not already in 820.154(A). Section 300.22 conflicts with Article 820 because Article 820 requires listed coaxial cables whereas 300.22 permits various electrical power and control cables that are not permitted to be used for CATV circuits in Article 820. Section 800.3 does not have a similar requirement.
Acceptance of this proposal, as well as companion proposals for 770.3 and 830.3, will make Articles 770, 800, 820 and 830 consistent and in compliance with section 3.3.5 of the NEC Style Manual, shown below:
3.3.5 Parallel Construction. Parallel construction means stating similar requirements in similar ways for greater consistency. This helps makes the *NEC* clear for users. Lack of consistency often creates confusion, causing users to ask: *Does this difference in wording represent a different requirement? Or is it simply two different ways of trying to say the same thing?* There are several kinds of parallel construction:
Organization and Numbering. If practicable, the subsections of similar articles should be numbered in the same order (see 2.4.1).
Sections. Different sections, within the same article, that reflect similar or closely related subjects, should have similar structures.
Lists. All items in a list should be parallel (that is, singular or plural, written in the same verb tense, using phrases or sentences but not a mix).
This proposal was submitted by the CMP 16 Special Editorial Task Group during the development of the 2008 NEC. This proposal was rejected in order to comply with the NFPA Standards Council Decision 05-24 (SC #05-7-4) dated 29 July 2005. The Standards Council Decision does not apply to the current NEC code cycle.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-236 Log #159 NEC-P16 **Final Action: Accept in Principle**
(820.3(A) (New))

TCC Action: The Technical Correlating Committee directs that the panel delete the subsection since 90.3 already provides the information and compliance with 4.1 of the NEC Style Manual is necessary.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: In section 820.3, re-letter the existing (A) to (B), (B) to (C), etc. and establish a new (A).
(A) **Chapters 1 through 7.** See 90.3. The requirements of Chapters 1 through 7 shall not apply to Article 820 except where the requirements are specifically referenced in Article 820.
Substantiation: Section 90.3 is extremely important to the application of Article 820. Adoption of this proposal will add clarity.
Panel Meeting Action: Accept in Principle
Re-letter the existing (A) to (B), (B) to (C), etc., and establish a new (A).
(A) Chapters 1 through 7. The requirements of Chapters 1 through 7 shall not apply to Article 800 except where the requirements are specifically referenced in Article 800. See 90.3.
Panel Statement: Field experience shows that 90.3 is often overlooked. The panel moved the reference to 90.3 to the end for clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: There is an error in the panel action. "Article 800" needs to be changed to "Article 820" twice.
IVANS, R.: There is an error in the panel action. "Article 800" needs to be changed to "Article 820" twice.

16-237 Log #2116 NEC-P16 **Final Action: Accept**
(820.3(A))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the following:
820.3(A) Hazardous (Classified) Locations. CATV equipment installed in a location that is classified in accordance with 500.5 and 505.5 shall comply with the applicable requirements of Chapter 5.
Substantiation: This is a clarification proposal. This proposal is editorial and technical.
CMP 16 was instructed by the Technical Correlating Committee during the 2008 NEC ROP process to consider not only the different hazardous location division applications (500.5) but also the different hazardous location zone applications (505.5). This directive was issued for 2008 Proposal 16-121 which dealt with 800.3(A). This reference of 505.5 should be added here as well to correlate with Articles 800 and 830.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-238 Log #123 NEC-P16 **Final Action: Accept**
(820.3(B))

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Deleted text:
~~**(B) Ducts, Plenums, and Other Air-Handling Spaces.** Section 300.22, where installed in ducts, plenums, or other spaces used for environmental air, shall apply.~~
~~*Exception: As permitted in 820.154(A).*~~
Substantiation: Section 820.3(B) provides no additional guidance or requirements that are not already in 820.154(A). It's redundant and perhaps confusing to send a CATV installer to section 300.22 to look for requirements that are already in Article 820. Section 800.3 does not have a similar requirement. Elimination of 820.3(B) will improve the parallelism between the articles.
Panel Meeting Action: Accept
Panel Statement: See panel action on Proposal 16-235.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-239 Log #3102 NEC-P16 **Final Action: Reject**
(820.24)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
820.24 Mechanical Execution of Work.
Community television and radio distribution systems shall be installed in a neat and workmanlike manner. Coaxial cables installed exposed on the surface of ceiling and sidewalls shall be supported by the building structure in such a manner that the cables will not be damaged by normal building use. Such cables shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform to 300.4~~(D)~~ and 300.11.
FPN: Text to remain unchanged.
Substantiation: This is one of a series of proposals intended to provide correlation with sections 640.6(B), 725.24, 760.24, 770.24, 800.24, 820.24 and 830.24. Due to the power limitations of these circuits, there is no reason that the requirements should be different.
Panel Meeting Action: Reject
Panel Statement: CATV coaxial cables contain no or limited power (60 V max) and do not present a potential electrical safety hazard. There is insufficient substantiation to justify a major increase in physical protection requirements for CATV coaxial cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-240 Log #3723 NEC-P16 **Final Action: Accept in Principle**
(820.24, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add the following Fine Print Note:
FPN: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in air-handling plenums in accordance with 300.22.
Substantiation: This proposal addresses new requirements in NFPA 90A having an influence on installations in NEC Section 820.24, as well as held comments from the 2008 NEC Cycle, ROC 16-29 and 16-30.
Imposing the requirement that such products be "listed" in this section of the NEC would result in additional requirements not included in NFPA 90A. The implication of requiring listing in this section of the NEC would impose the full scope of requirements in UL 1565 for cable ties and UL 2239 for other support hardware. This effort to correlate with NFPA 90A would create big correlation issues within NFPA 70 for the same products used for supporting all other cables and conduits outside of the jurisdiction of code-making panel 16, for no good reason. It is not necessary to repeat requirements from NFPA 90A in NFPA 70 especially when doing so imposes unsubstantiated additional requirements.
The NFPA 90A requirements are focused on smoke and heat generated from a fire in an air-handling plenum. The NFPA 90A-2009 requirement is as follows for discrete combustible components installed in air-handling spaces in accordance with NEC 300.22 (C) and (D): (The actual clause numbers in NFPA 90A-2009 may vary editorially)
NFPA clause 4.3.10.2.6.5 Loudspeakers, recessed lighting fixtures and other electrical equipment with combustible enclosures, including their assemblies and accessories, cable ties and other discrete products shall be permitted in the ceiling cavity plenum where listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with UL2043, *Standard for Safety Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.*
And very similar requirements in 4.3.10.6.5.6 apply in NFPA 90A for discrete combustible products installed in a "raised floor plenum".
Importantly, none of these requirements pertain to noncombustible products. There are many metallic products, including metallic cable ties, used to support power, data and communications conduits and cables and there has been no substantiation offered that these be required to be "listed".
Panel Meeting Action: Accept in Principle
Revise recommended fine print note text to read as follows:
FPN No. 2: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in accordance with 300.22(B) and (C).
Panel Statement: The panel removed the vague term "air-handling plenums" and added the references to 300.22(B) and (C). This meets the submitter's intent.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-241 Log #4553 NEC-P16 **Final Action: Reject**
(820.25)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
820.25 Abandoned Cables.
The accessible portion of abandoned coaxial cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. Removal of abandoned cables shall be performed in a neat and workmanlike manner.
Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 820.24. Moreover, section 110.12 would only apply if specifically referenced. It is important to point out that similar care must be taken when removing cables.
110.12 Mechanical Execution of Work.
Electrical equipment shall be installed in a neat and workmanlike manner.
FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.
Consistent wording is being proposed for other sections in the code.
For information, see relevant definitions in the NEC.
Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.
Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-24.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-242 Log #1598 NEC-P16 **Final Action: Reject**
(820.26)

Submitter: Russell LeBlanc, The Peterson School of Engineering
Recommendation: Add a third sentence to 820.26: Conduits or raceways entering enclosures of the ventilated type, shall be sealed or plugged with an approved fire stopping material at the point of entrance to the enclosure to prevent fire, smoke, or other products of combustion from passing through the raceway into other areas of the building or structure.
Substantiation: A fire in the area where the enclosure is located will produce smoke, poison gases, and other products of combustion which can easily be carried through the enclosure's vents and these unsealed raceways to other areas in the building. Essentially defeating any firewalls. I have not seen this particular problem addressed in building codes or fire resistance directories since these raceways are not "sleeves" which ARE required to be fire stopped, but rather they are complete raceway systems which generally require only sealing up around the OUTSIDE of the pipe where it penetrates a firewall. In this particular installation smoke could easily pass right through the INSIDE of the raceway because of the ventilation openings in the enclosure.
I have witnessed the results of this "chimney-effect" problem when the smoke from a fire in a basement electric room spread throughout the upper floors of a high rise building because the raceways leaving the switch gear acted like chimneys and transported heavy smoke from the basement directly to panelboards and switchboards on the upper floors of the building thus bypassing and defeating any fire walls that the raceways penetrated and completely filling the UPPER floors with smoke. Luckily nobody was injured. If the ends of the raceways were simply filled with some fire-stopping type caulk or similar material this situation would probably never have happened.
Once a fire starts to produce toxic fumes we almost have to think of that area as a Hazardous (classified) location similar to those in Article 500. We must try to prevent those hazardous gases passing from one area in a building to another.
Just as other sealing requirements throughout the code prevent moisture, condensation, dusts, gases or vapors from traveling through raceways, this requirement for some simple fire proof putty could prevent toxic fumes from spreading throughout the building. The seals required by this proposal are equally as important as any other seals required by the NEC such as 230.8, 300.5(G), 300.7(A), 300.50(E), 312.5(C) exception to (D), 324.40(A), 332.40(A), 368, 238, 372.7, 501.15, 502.15, 504.70, 505.16, 506.16, 680.24(B) and any other seals that may be required.
I am submitting companion proposals to sections 300.21, 770.26, 800.26, 820.26 and 830.26.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The proposed recommendation is impractical. The submitter has not supplied sufficient data for substantiation of a problem.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
IVANS, R.: The submitter is correct that vented enclosures connected via unsealed raceways and conduit can bypass fire breaks between floors. It would not be impractical to seal such raceways or conduit.

16-242a Log #CP1600 NEC-P16 **Final Action: Accept**
(820.44(B) Exception)

Submitter: Code-Making Panel 16,
Recommendation: Revise existing 820.44(B) Exception text:
Exception: Where proximity to electric light, power, Class 1, or non–power-limited fire alarm circuit ~~service~~ conductors cannot be avoided, the installation shall ~~be such as to~~ provide clearances of not less than 300 mm (12 in.) from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors ~~service drops~~.
The remainder of the text remains unchanged.
Substantiation: The panel identified the need for clarification in the exception. The panel recognizes that the term "fire alarm circuit service conductors" is not a defined term.
The panel notes that Proposal 16-126 relocated the existing 820.44(B) Exception to new 820.44(A)(4) Exception.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-243 Log #3418 NEC-P16 **Final Action: Reject**
(820.44(B) Exception)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
820.44(B)
Exception: Where proximity to electric light, power, Class 1, or non-power-limited fire alarm circuit service-entrance conductors cannot be avoided, the installation shall be such as to provide clearance not less than 300 mm (12 in.) from light, power, Class 1, or non-power-limited fire alarm circuit service-entrance conductors. (The remainder of the text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.

It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: There is no such thing as a fire alarm circuit service-entrance conductor, but the panel does recognize the exception needs revision. The panel has submitted a panel proposal to revise the existing text.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-244 Log #4508 NEC-P16 **Final Action: Reject**
(820.44(D))

Submitter: Rick Breezee, Airport Development Metropolitan Airports Commission / Rep. Building Code Development Committee (BCDC)
Recommendation: Delete text as follows:
~~(D) Above Roofs~~
~~Coaxial cables shall have a vertical clearance of not less than 2.5 (8 ft) from all points of roofs above which they pass.~~
~~Exception No. 1: Auxiliary buildings such as garages and the like.~~
~~Exception No. 2: A reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (1) not more than 1.2 m (4 ft) of communications service drop conductors pass above the roof overhang, and (2) they are terminated at a raceway mast or other approved support.~~
~~Exception No. 3: Where the roof has a slope of not less than 100 mm in 300 mm (4 in. in 12 in.), a reduction in clearance to not less than 900 mm (3 ft) shall be permitted.~~
Substantiation: Note: This proposal was developed by the proponent as a member of the NFPA Building Code Development Committee (BCDC) with the committee’s endorsement.

This is low voltage coaxial cable, which is allowed to run without restriction on the interior of a building. There is no reason that this type of low voltage cable should not be allowed to run on the surface of a roof as long as it is installed in a secure manner.
Panel Meeting Action: Reject
Panel Statement: CATV coaxial cable clearance requirements should be consistent with other Chapter 8 communications systems.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-244a Log #CP1602 NEC-P16 **Final Action: Accept**
(820.44(E))

Submitter: Code-Making Panel 16,
Recommendation: Revise existing 820.44(E) as follows:
“(E) Between Buildings. Coaxial cables extending between buildings or structures and also the supports or attachment fixtures shall be ~~acceptable~~ identified for the purpose and shall have sufficient strength to withstand the loads to which they may be subjected.
Substantiation: This panel proposal correlates this section with the panel action on Proposal 16-312. Note Proposal 16-126 moved section 820.44(E) to 820.44(D).
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-245 Log #2118 NEC-P16 **Final Action: Accept**
(820.47)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
820.47 Underground ~~Circuits~~ Coaxial Cables Entering Buildings.
Underground coaxial cables entering buildings shall comply with 820.47(A) and (B).
Substantiation: This is an editorial proposal. It will improve clarity. Coaxial cables enter the buildings to feed the circuits. The circuits themselves are not entering the building.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-246 Log #3522 NEC-P16 **Final Action: Reject**
(820.47(B))

Submitter: Tim Henry, Code Electrical Classes Inc.
Recommendation: Revise as follows:
820.47(B) Direct-Buried Cables and Raceways. Direct-buried coaxial cable shall be separated at least 300 mm (12 in.) from conductors of any light or power or Class 1 circuit and shall comply with the requirements of Table 300.5.
Substantiation: 820.47(B) Addresses direct-buried cables and raceways and there separation from conductors of any light or power or Class 1 circuit of at least 12 inches but doesn’t address the minimum cover requirements. To many times coax cable is cut in half when a homeowner is planting bushes, etc., because it is placed just under the sod. Then the homeowner, repairman etc., goes to repair the coax cable and cuts into a 120 volt energized cable or raceway which I feel is a real safety hazard. Thus indicating the need for a minimum burial depth for coax cables.
Panel Meeting Action: Reject
Panel Statement: Table 300.5 applies to power cables. CATV cabling, although it is allowed to contain low-energy powering, does not have the power levels associated with power circuits. The submitter did not provide sufficient substantiation to justify applying the stringent requirements associated with power circuits to these low power cable television installations. Cables containing higher levels of network power are covered in Article 830 and are required to meet minimum cover requirements.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-247 Log #3419 NEC-P16 **Final Action: Accept**
(820.47(B) Exception No. 1)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
820.47(B)
Exception No.1: Where electric service-entrance conductors or co-axial cables are installed in raceways or have metal cable armor.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
IVANS, R.: The proposed change does not add any clarity to the interpretation or readability of the NEC regarding the use of the term "Service." The submitter has not substantiated what value has been added by inserting the word "entrance".

16-248 Log #2119 NEC-P16 **Final Action: Accept in Principle**
(820.48)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
820.48 Unlisted Cables Entering Buildings.
Unlisted outside plant coaxial cables shall be permitted to be installed in building spaces other than risers, air ducts, plenums and other spaces used for environmental air, ~~locations as described in 820.154(D)~~, where the length of the cable within the building, measured from its point of entrance does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated at a grounding block.
Substantiation: This proposal is editorial clarification. The locations described in 820.154(D) are risers, air ducts, plenums and other spaces used for environmental air.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:
820.48 Unlisted Cables Entering Buildings. Unlisted outside plant coaxial cables shall be permitted to be installed in building spaces other than risers, ducts used for environmental air, plenums used for environmental air, and other spaces used for environmental air, where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated at a grounding block.
Panel Statement: The revised text adds clarity and meets the intent of the submitter.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-249 Log #2120 NEC-P16 **Final Action: Accept**
(820.93(D))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the following:
(D) Hazardous (Classified) Locations. Where a primary protector or equipment providing the primary protection function is used, it shall not be located in any hazardous (classified) location as defined in 500.5 and 505.5 or in the vicinity of easily ignitible material.
Exception: As permitted in 501.50, 502.150 and 503.150.
Substantiation: This is a clarification proposal. It is editorial and technical.
CMP 16 was instructed by the Technical Correlating Committee during the 2008 NEC ROP process to consider not only the different hazardous location division applications (500.5) but also the different hazardous location zone applications (505.5). This directive was issued for 2008 Proposal 16-121 which dealt with 800.3(A). This reference of 505.5 should be added here as well to correlate with all related sections that references these defined hazardous locations and hazardous location zones.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-250 Log #4562 NEC-P16 **Final Action: Reject**
(820.100 (New))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Add the following new text:
820.100 Grounding. Article 250 covers the general requirements for grounding and bonding of community antenna television and radio distribution systems and their associated electrical installations, and the specific requirements in (1) through (5), unless otherwise indicated in 820.101(A) through (D).
(1) Systems, circuits, and equipment required, permitted, or not permitted to be grounded
(2) Circuit conductor to be grounded on grounded systems
(3) Location of grounding connections
(4) Types and sizes of grounding and bonding conductors and electrodes
(5) Methods of grounding and bonding
820.101 ~~820.100~~ Cable Grounding. The shield of the coaxial cable shall be grounded as specified in 820.101(A) through (D) ~~820.100(A) through (D)~~.
(A) Grounding Conductor. *(no change to text except for renumbering section 820.100 to section 820.101)*
(B) Electrode. *(no change to text except for renumbering section 820.100 to section 820.101)*
(C) Electrode Connection. *(no change to text)*
(D) Bonding of Electrodes. *(no change to text)*
(E) Shield Protection Devices. *(no change to text)*
Substantiation: This proposal recommends wording to ensure that community antenna television and radio distribution systems appropriately comply with the grounding and bonding requirements of article 250, while recommending that Article 820 include specific requirements associated with community antenna television and radio distribution systems. This change is needed because Chapter 8 is independent of Chapters 1 through 4 and thus Article 250 on grounding. Please note that "medium power wiring" can be included with Article 820 wiring in raceways, cable trays and boxes in Article 820 and not just low power wiring and that brings some additional needs.
Panel Meeting Action: Reject

Panel Statement: The NEC Style Manual, Section 4.1.1, prohibits reference to complete articles. A blanket statement referencing Article 250 is redundant as communications grounding requirements are fully covered in Article 820, IV. Grounding Methods, with specific reference to the applicable sections of Article 250 contained throughout Sections 820.100(B) and (C).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-251 Log #4915 NEC-P16 **Final Action: Reject**
(820.100 (New))

Submitter: Nisar Chaudhry, TII Network Technologies, Inc.
Recommendation: Add new text as follows:

820.100 Cable Grounding. The shield of the coaxial cable shall be grounded as specified in 820.100(A) through (D).

Add new wording.

820.100 Cable Grounding.

(B) Electrode. The grounding conductor shall be connected in accordance with 820.100(B)(1) and (B)(2).

(1) **In Buildings or Structures with Grounding Means.** If the building or structure served has no intersystem bonding termination, the grounding conductor shall be connected to the nearest accessible location on the following: The building or structure grounding electrode system as covered in 250.50

(2) The grounded interior metal water piping system, within 1.52 m (5 ft) from its point of entrance to the building, as covered in 250.52

(3) The power service accessible means external to enclosures as covered in 250.94

(4) The metallic power service raceway

(5) The service equipment enclosure

(6) The grounding electrode conductor of the grounding electrode conductor metal enclosure, or

(7) The grounding conductor or the grounding electrode of a building or structure disconnecting means that is grounded to an electrode as covered in 250.32

*8) The grounding conductor of coax cable from non-exposed satellite dish is permitted to be grounded through a suitably grounded receptacle using a permanently connected device listed for the purpose.

Fine Print Note: Dish Antennas mounted where no part of the antenna is higher than the highest point of the structure are considered non-exposed.

Substantiation: Shield of the coaxial cable from Dish Antenna even though it is electrically connected to the set top box chassis and grounded through the power cord must also be grounded to the AC receptacle using a permanently attached grounding device. These connections should be sufficient to equalize any hazardous ground potential differences on the coaxial cable.
Panel Meeting Action: Reject
Panel Statement: Mounting a dish antenna below the highest point of the structure does not necessarily render the antenna “non-exposed” to lightning. While it is generally accepted that tall structures provide a “cone of protection” to surrounding lower structures against lightning strikes, it does not absolutely preclude a lightning strike. While lightning will typically strike at the top of a tall structure, it has been known to strike along the side of tall structures as well. Arcing and corona along the building surface are also of concern.

There is no substantiation of why a dish antenna not higher than a roofline should not be considered exposed. The standard model used for a zone of protection is the rolling sphere zone of protection and it would not include all space up to the roof line. In addition, this and other models assume that the building is already protected by a lightning protection system complying with NFPA 780. This is not often the case. The roof line is not the only criteria in using the rolling sphere model for exposure to lightning. Therefore, the proposal is incomplete.

Lightning hitting an unprotected building will travel down the building in an unpredictable path seeking ground. An antenna mounted outside that is not properly grounded by one of the methods currently described in the NEC, but provided with some other ground, such as an equipment grounding conductor, could “attract” the lightning and direct it into the premises with catastrophic results.

It is not acceptable to use an equipment grounding conductor to mitigate lightning since things like bends and splices are not controlled and these introduce very large impedances at lightning frequencies.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-252 Log #4916 NEC-P16 **Final Action: Accept in Principle**
(820.100 Exception (New))

Submitter: Nisar Chaudhry, TII Network Technologies, Inc.
Recommendation: Add new text as follows:

820.100 Cable Grounding. The shield of the coaxial cable shall be grounded as specified in 820.100(A) through (D).

Add a new Exception as follows:

Exception: For communication systems using coaxial cable confined within the premises and isolated from outside cable plant the shield is permitted to be grounded by a connection to an equipment grounding conductor as described in 250.118. Connecting to an equipment grounding conductor through a suitably grounded receptacle using a dedicated grounding conductor and permanently connected device listed for the purpose is permitted. Use of a cord and plug for the connection to an equipment grounding conductor is not permitted.

Substantiation: In the newer cable systems, as an example Fiber to the home, signals for the TV and data can be derived within the customer premises without ever needing any connections to the conventional CATV coaxial cables. The grounding of these totally isolated and confined within the premises cable systems will not involve any power cross or lightning induced currents. Therefore, connecting the coax cable shield of such isolated and confined systems to the AC receptacle ground will eliminate any stray ground potentials that could be present on the ungrounded coax cable shield. This will enhance the safety of the user and reliability of the system.
Panel Meeting Action: Accept in Principle
Revise text to read as follows:

Exception: For communication systems using coaxial cable confined within the premises and isolated from outside cable plant, the shield ~~is~~ shall be permitted to be grounded by a connection to an equipment grounding conductor as described in 250.118. Connecting to an equipment grounding conductor through a ~~suitably~~ grounded receptacle using a dedicated grounding conductor and permanently connected listed device ~~listed for the purpose is~~ shall be permitted. Use of a cord and plug for the connection to an equipment grounding conductor ~~is not~~ shall not be permitted.

Panel Statement: The comma is added to the first sentence for clarity. Use of the phrase “listed for the purpose” is discouraged as it is vague. Calling for a “listed” device is clear and consistent with the definition of “listed” in Article 100. The NEC Style Manual directs that the phrase “shall be permitted” and “shall not be permitted” be used to indicate allowed optional or alternate methods.

Intrabuilding coaxial cable shields that are not exposed to outside plant facilities do not need to be protected against lightning and power cross the way that coax entering a building from the outside network does.

There is still a concern about cumulative leakage currents from connected equipment on the network. Even though each individual set-top box, TV or computer limits leakage to extremely low levels, the cumulative affect can easily exceed perception levels and depending on the installed equipment, even let-go thresholds.

It should be the responsibility of the originating equipment (i.e. the NID creating the CATV network) to provide suitable grounding to mitigate this cumulative leakage.

It is common practice to deal with leakage currents using an equipment grounding conductor as described in 250.118.

It is not suitable to use the NID plug for the ground since unplugging the device eliminates the ground connection but does not eliminate the source(s) of the leakage current.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:

DORNA, G.: Some “communications systems” are outside the scope of Article 820. Article 820 only covers Community Antenna Television and Radio Distribution Systems; hence “communications systems” should be changed to “community antenna television and radio distribution systems”.

16-253 Log #3103 NEC-P16 **Final Action: Accept in Principle**
(820.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.

This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(1) Listing ~~Insulation~~. The grounding conductor ~~shall be insulated and~~ shall be listed.
Substantiation: There is no electrical reason that this conductor should be required to be insulated. This proposal provides consistency with nearly every other grounding/bonding related section of the code.
Panel Meeting Action: Accept in Principle

Revise 820.100(A)(1) to read as follows:

(1) Insulation. The grounding conductor shall be listed and shall be permitted to be insulated, covered, or bare.

Panel Statement: The grounding conductor does not need to be insulated but for esthetic reasons, such as exposed grounding conductors routed within a premises, insulation or covering may be appropriate. Adding “covered” accommodates Proposal 16-254. Permitting all three, “insulated, covered, or bare” will clarify that all three are now permitted since for many years only an insulated conductor was permitted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-254 Log #4395 NEC-P16 **Final Action: Accept in Principle in Part**
(820.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this Proposal.
This action will be considered by the panel as a public comment.
Submitter: Jake Killinger, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
820.100 Cable Grounding.
The shield of the coaxial cable shall be grounded as specified in 820.100(A) through (D).
(A) Grounding Conductor.
(1) ~~Insulation~~Insulated or Covered Conductors. The grounding conductor shall be permitted to be insulated, or covered and shall be listed as Protector Grounding Conductors.
(remaining text remains unchanged)
Substantiation: This is a sister proposal to 800.100.
The existing text would require fully insulated and Listed conductors for cable and primary protector grounding whereas in most other cases, bare conductors are usually adequate for most grounding purposes. Prior to the 1990 NEC, protective grounding conductors were required to have 30 mil rubber insulation and be covered by a fibrous covering. It also permitted conductors Listed for this use having less than 30 mil rubber insulation or having other kinds of insulation. In 1990 the NEC removed the thickness statements so that it read the grounding conductor shall be insulated and shall be listed as suitable for the purpose. In 2008, the suitable for the purpose clause was removed.
Discussions with past members of this CMP revealed that the reason for specifying insulated conductors was only to combat theft of uncovered copper wire. That being the case, thinner insulated conductor was permitted so long as it gave the same illusion of a conductor carrying power.
Listed Protector Grounding Conductors having less than the full insulation of Listed and insulated conductors exist today. These are based on the past allowances for thinner insulations. The 2008NEC text would literally not permit the use of these thinner walled insulated conductors and would make their certification obsolete.
If the reason for using the term 'insulated' was merely to provide a theft deterrent, then fully insulated wire is unnecessary. By definition in Article 100, only a "covered" conductor would be more than adequate. Therefore propose changing the text to permit both "insulated as well as "covered" conductors.
Also propose adding "Protector Grounding Conductor" to help identify the type of Listed products suitable in this application. These "Protector Grounding Conductors" are surface marked with this terminology to make it clear that they are listed only for this purpose and are not intended for general use with other Articles in the Code. They are presently certified under UL's KDER category, but may be relocated to the KDSH (Grounding and Bonding Equipment – Communication) category to make their restricted use more obvious.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: Accept in principle the part to add "covered". See panel action and statement on Proposal 16-253, which now permits the use of listed insulated, covered, or bare conductors. The title is left as "insulation" since the paragraph now deals with levels of insulation.
Reject the parts adding the phrases "permitted to be" and "as a protector grounding conductor". The panel does not want to restrict the listed wire to only listed "protector grounding conductors".
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-255 Log #1741 NEC-P16 **Final Action: Accept**
(820.100(A)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise second sentence: It shall have a current-carrying capacity ~~approximately equal to that~~ <u>not less than</u> that of the outer conductor of the coaxial cable.
Substantiation: Edit. "Ampacity" is a defined term generally used in the Code and required by 3.2.5.1 of the Style Manual. Conductors can have a capacity to carry current greater than their ampacity. There is no apparent safety reason the grounding conductor cannot have an ampacity greater than the outer conductor of the coaxial cable.
Panel Meeting Action: Accept
Panel Statement: The panel notes that the submitter's substantiation does not fully correlate with this proposal, but with his similar Proposal 16-322.
See panel statement on Proposal 16-322.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-256 Log #196 NEC-P16 **Final Action: Accept**
(820.100(B))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal as the existing numbering complies with the NEC Style Manual and is consistent with other lists in the code.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Renumber 820.100(B) as shown.
(B) Electrode. The grounding conductor shall be connected in accordance with 820.100(B)(1), (B)(2), or (B)(3).
(1) In Buildings or Structures with an Intersystem Bonding Termination. If the building or structure served has an intersystem bonding termination, the grounding conductor shall be connected to the intersystem bonding termination.
(2) In Buildings or Structures with Grounding Means. If the building or structure served has no intersystem bonding termination, the grounding conductor shall be connected to the nearest accessible location on the following:
(~~1~~a) The building or structure grounding electrode system as covered in 250.50
(~~2~~b) The grounded interior metal water piping system, within 1.52 m (5 ft) from its point of entrance to the building, as covered in 250.52
(~~3~~c) The power service accessible means external to enclosures as covered in 250.94
(~~4~~d) The metallic power service raceway
(~~5~~e) The service equipment enclosure
(~~6~~f) The grounding electrode conductor or the grounding electrode conductor metal enclosure, or
(~~7~~g) The grounding conductor or the grounding electrode of a building or structure disconnecting means that is connected to an electrode as covered in 250.32
A bonding device intended to provide a termination point for the grounding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is non-removable.
For purposes of this section, the mobile home service equipment or the mobile home disconnecting means, as described in 820.93, shall be considered accessible.
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 820.100(B)(2), the grounding conductor shall be connected to either of the following:
(~~1~~a) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), (A)(4); or,
(~~2~~b) If the building or structure served has no intersystem bonding termination or grounding means, as described in 820.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(5), (A)(7), and (A)(8).
Substantiation: The current numbering is not in compliance with the style manual. See section 2.1.5.3 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-257 Log #3313 NEC-P16 **Final Action: Reject**
(820.100(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (B)(2)(3): The electric power service accessible means external to enclosures as covered in 250.84 (B)(2)(4): The metallic nonflexible power service raceway.
Substantiation: Edit. "Power" may infer that a service only for lighting is not acceptable. Flexible service raceways do not seem suitable for connection of ground clamps.
Panel Meeting Action: Reject
Panel Statement: The panel does not understand the intent of the submitter. See panel action on Proposal 16-258 to see if it meets the intent of Proposal 16-257.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-257a Log #CP1608 NEC-P16 **Final Action: Accept**
(820.100(B)(1))

Submitter: Code-Making Panel 16,
Recommendation: Revise 820.100(B)(1) as follows:
"If the building or structure served has an intersystem bonding termination <u>as required by 250.94,</u> the grounding conductor shall...".
Substantiation: This change provides correlation with the revision to 800.100(B)(1) accepted by the Panel. See Panel action on Proposal 16-147.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-258 Log #1843 NEC-P16 **Final Action: Accept in Principle in Part**
(820.100(B)(1)(4) and (6))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (B)(1)(4): The ~~metallic~~ electric ~~power~~ service nonflexible metal service raceway
(B)(1)(6): The grounding electrode conductor or the nonflexible metal grounding electrode enclosure.
Substantiation: Flexible metal service raceways and flexible metal armor of grounding electrode conductors are not appropriate. "Power" may be deemed not to include services solely for lighting. "Power" and "Lighting" are common terms to distinguish systems or use.
Panel Meeting Action: Accept in Principle in Part
Revise existing 820.100(B)(2)(4) as follows:
(4) The nonflexible metallic power service raceway.
Reject the remainder of the recommendation.
Panel Statement: The panel understands that the submitter intended the revision to apply to 820.100(B)(2)(4) and (6).
The panel accepts in principle the part adding "nonflexible". The panel rejects the part replacing "power" with "electric". The panel rejects adding "nonflexible" to modify metal enclosures in (6) as it does not improve clarity.
See panel action and statement on Proposal 16-35.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-259 Log #1136 NEC-P16 **Final Action: Accept**
(820.100(B)(1), FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Add the FPN following 820.100(B) (1):
FPN: See Article 100 for the definition of *Intersystem Bonding Termination*.
Substantiation: *Intersystem Bonding Termination* is a new and unfamiliar term introduced in the 2008 NEC. The FPN reference to Article 100 will help ensure that NEC users not only become familiar with the new terminology, but encourage application of this preferred intersystem bonding arrangement as well.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-260 Log #3104 NEC-P16 **Final Action: Reject**
(820.100(B)(2)(3))

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(2) Text to remain unchanged.
(1) Text to remain unchanged.
(2) Text to remain unchanged.
~~(3) The power service accessible means external to enclosures as covered in 250.94~~
~~(4)~~ (3) Text to remain unchanged.
~~(5)~~ (4) Text to remain unchanged.
~~(6)~~ (5) Text to remain unchanged.
~~(7)~~ (6) Text to remain unchanged.
A bonding device intended to provide a termination point for the grounding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is non-removable.
For purposes of this section, the mobile home service equipment or the mobile home disconnecting means, as described in 820.93, shall be considered accessible.
Substantiation: The item being discussed in (3) is the item covered in 820.100(B)(1), so there is no reason for it to be in 820.100(B)(2).
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-34.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-261 Log #3729 NEC-P16 **Final Action: Reject**
(820.100(B)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 820.100(B)(3) as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 820.100(B)(2), one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and comply with the requirements of 250.56 being applicable to rod, pipe, and plate electrode installations. ~~the grounding conductor shall be connected to either of the following:~~
~~(1) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), (A)(4); or,~~
~~(2) If the building or structure served has no intersystem bonding termination or grounding means, as described in 820.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(5), (A)(7), and (A)(8).~~
Substantiation: The requirement in existing 820.100(B)(3)(1) to connect the grounding electrode conductor "to any of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), (A)(4)" seems to suggest one or more of these electrodes are readily available but forgets that this section is titled **"Buildings or Structures Without …. Grounding Means."** This is not consistent with 250.50 that only requires the use of such electrodes where they are "present at each building or structure served." Subsection 820.100(B)(3)(2) is more in line with the subject of this section and contains requirements for electrodes that could be installed and used but it is felt the continuing sentence structure as proposed is cleaner and is completely consistent with 250.50 and 250.52 where grounding electrodes have to be installed as opposed to being a natural part of a building or a structure such as a metal water line, concrete encased electrode or a grounding steel building frame.
This revision would bring the grounding of CATV and radio distribution systems circuits into line with the requirements of Articles 250 for both consistency and for technical application.
Panel Meeting Action: Reject
Panel Statement: Specific reference to 250.52(A)(4) through (A)(8) is unnecessary as all appropriate grounding connections are presently listed in 820.100(B)(1) and (2). The title of 820.100(B)(3), "In Buildings or Structures Without …… Grounding Means" must be considered in context with the preceding Section 820.100(B)(2) where specific grounding means at the building or structure are identified.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-262 Log #1137 NEC-P16 **Final Action: Accept**
(820.106(A)(1))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
"…the coaxial cable shield ground, or surge arrester ground, shall be connected to a grounding conductor in accordance with ~~820.100(B)(2)~~ 820.100(B)(3)."
Substantiation: The reference is incorrect. In the 2005 NEC 820.106(A)(1) referred to 820.100(B)(2). That information is now contained in 820.100(B)(3) in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-263 Log #1138 NEC-P16 **Final Action: Accept**
(820.106(A)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
"... the coaxial cable shield ground, or surge arrester ground, shall be connected to a grounding conductor in accordance with ~~820.100(B)(2)~~ 820.100(B)(3)."
Substantiation: The reference is incorrect. In the 2005 NEC 820.106(A)(1) referred to 820.100(B)(2). That information is now contained in 820.100(B)(3) in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-264 Log #43 NEC-P16 **Final Action: Accept in Principle**
(820.110)

NOTE: This proposal appeared as Comment 16-242 on Proposal 16-306 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-306 was:
Revise as follows:
820.110 Raceways for Coaxial Cables.
Where coaxial cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or listed plenum CATV raceway, listed riser CATV raceway, or listed general-purpose CATV raceway installed in accordance with 820.154, and ~~a listed nonmetallic raceway complying with 820.182(A), (B), or (C), as applicable, and installed in accordance~~ with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
Exception: Conduit fill restrictions shall not apply.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: The panel action on the Proposal should have been Accept in Principle with the following changes:
820.110 Raceways for Coaxial Cables. Where coaxial cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or a ~~listed plenum~~ CATV raceway~~, listed riser CATV raceway, or listed general purpose CATV raceway~~ listed in accordance with 820.182 and installed in accordance with 820.154~~, and with 362.24~~ and 362.22 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
Delete the Exception.
Substantiation: The revisions in the first sentence clarify that the listing requirements are specified in 820.182 and the installation requirements in 820.154. These revisions will also provide consistency with 770.110 and 800.110.
362.22 should also apply if the requirements for ENT are to be utilized.
Using the term “listed CATV raceways” will still permit the installation of CATV coaxial cables in CATV raceways (plenum, riser, or general-purpose) or in any type of listed raceway permitted in Chapter 3 without adding additional text to the Code. This revision will also permit the installation of other types of listed CATV coaxial cables and CATV raceways that may be included in future Codes without having to revise 820.110.
The Exception should have been deleted rather than including it as positive text in the last sentence. The first sentence in 820.110 already states “installed in accordance with Chapter 3” which would include all of Chapter 3 requirements pertaining to raceways including the maximum percentage fill limitations in Chapter 9. The Proposal and the panel action perpetuates conflicting requirements between that sentence and the Exception.
No substantiation was submitted to support the deletion of the conduit fill restrictions of Chapters 3 and 9. The fill restrictions are based on the physical limitations of being able to pull conductors or cables into raceways without damaging the conductors or cables, particularly when there are bends in the run, and to avoid conductor/cable jamming. The maximum percentage fill requirements are independent of whether they are electrical conductors or not; they could be empty tubes.
The maximum percentage fill requirements in Chapters 3 and 9 are an integral part of the permitted uses of the raceways contained in Chapter 3 and if CATV cables are to be installed in a Chapter 3 raceway, then the maximum percentage fill requirements must also apply.
Chapter 9, Table 1 permits 53 percent fill when one conductor or cable is installed in a raceway; 31 percent for two; and 40 percent for three or more.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-265, which revises this section for greater clarity and addresses the submitter’s concern.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-265 Log #2111 NEC-P16 **Final Action: Accept in Principle**
(820.110)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise 820.110 as follows:
820.110 Raceways for Coaxial Cables.
(A) Types of Raceways.
Coaxial cables shall be permitted to be installed in any raceway that complies with either (A)(1) or (A)(2).
(1) Chapter 3 Raceways. ~~Where~~ Coaxial cables shall be permitted to be ~~are~~ installed in ~~a~~ any raceway~~, the raceway shall be either of a type~~ included ~~permitted~~ in Chapter 3. The raceways shall be ~~and~~ installed in accordance with the requirements of Chapter 3.
(2) Other Permitted Raceways. ~~or~~ Coaxial cables shall be permitted to be installed in listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway selected in accordance with the provisions of ~~820.154~~ 820.113, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
(B) Raceway Fill for Coaxial Cables. Raceway ~~Conduit~~ fill requirements of Chapter 3 and Chapter 9 shall not apply to coaxial cables.
~~*Exception: Conduit fill restrictions shall not apply.*~~
Substantiation: This revision is both editorial and technical. The addition of the two first level subdivisions (A) Types of Raceways and (B) Raceway Fill for Coaxial Cables and their second level subdivisions provides more clarity and makes the section as self-sufficient as possible. To comply with the NEC Style Manual this revision deletes the Exception and changes it into positive text language.
Replacing of the word “conduit” with the word “raceway” will improve the parallelism of this section to 770.110 and 800.110. Conduit is a form of a raceway and all raceways can be used to install coaxial cables.
The word “requirements” is appropriate as Chapter 3 has no raceway tables. However, Chapter 3 provides the raceway fill requirements which direct the code user to Chapter 9 for the conduit fill tables. This proposal coordinates with the task group’s proposal to move the cable and raceway installation requirements from 820.154 to 820.113.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept in Principle
Revise 820.110 as follows:
820.110 Raceways for Coaxial Cables.
(A) Types of Raceways.
Coaxial cables shall be permitted to be installed in any raceway that complies with either (A)(1) or (A)(2).
(1) Chapter 3 Raceways. ~~Where~~ Coaxial cables shall be permitted to be ~~are~~ installed in ~~a~~ any raceway~~, the raceway shall be either of a type~~ included ~~permitted~~ in Chapter 3. The raceways shall be ~~and~~ installed in accordance with the requirements of Chapter 3.
(2) Other Permitted Raceways. ~~or~~ Coaxial cables shall be permitted to be installed in listed plenum communications raceway, listed riser communications raceway, or listed general-purpose communications raceway selected in accordance with the provisions of ~~820.154~~ 820.113, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.
(B) Raceway Fill for Coaxial Cables. Raceway ~~Conduit~~ fill requirements of Chapter 3 and Chapter 9 shall not apply to coaxial cables.
~~*Exception: Conduit fill restrictions shall not apply.*~~
Panel Statement: See panel action on Proposal 16-47. The mention of “optical fiber raceway” was in error for this proposal in Article 820. The panel has replaced “optical fiber” with “communications” because CATV raceways have been eliminated. See panel proposal 16-289a.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-266 Log #1745 NEC-P16 **Final Action: Reject**
(820.110 Exception)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change “conduit” to “conductor”.
Substantiation: Edit. If fill restrictions do not apply to conduit they should also not apply to EMT, wireways, auxiliary gutters, boxes, conduit bodies, and other enclosures.
Panel Meeting Action: Reject
Panel Statement: The exception deals with “conduit fill” not “conductor fill”.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-267 Log #2112 NEC-P16 **Final Action: Accept in Principle**
(820.113)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Add new text to read as follows:
820.113 Installation of Coaxial Cables and CATV Raceways. Installation of coaxial cables and CATV raceways shall comply with 820.113 (A) through (I).
(A) Listing. Coaxial cables installed in buildings shall be listed.
Exception: Coaxial cables that comply with 820.48 shall not be required to be listed.
(B) Air Ducts and Plenums. The following cables and raceways shall be permitted in air ducts and plenums as described in 300.22(B).
(1) Type CATVP
(2) Plenum CATV raceway installed in compliance with 820.110
(3) Type CATVP installed in plenum CATV raceway
(4) Types CATVP, CATVR, CATV and CATVX installed in raceways that are installed in compliance with 300.22(B)
(C) Other Spaces Used For Environmental Air. The following cables and raceways shall be permitted in other spaces used for environmental air as described in 300.22(C).
(1) Type CATVP
(2) Plenum CATV raceway installed in compliance with 820.110
(3) Type CATVP installed in plenum CATV raceway
(4) Types CATVP, CATVR, CATV and CATVX installed in raceways that are installed in compliance with 300.22(C)
(D) Risers- Cables in Vertical Runs. The following cables and raceways shall be permitted in vertical runs penetrating more than one floor and in vertical runs in a shaft:
(1) Types CATVP and CATVR
(2) Plenum and riser CATV raceways installed in compliance with 800.110
(3) Types CATVP and CATVR installed in plenum or riser CATV raceway
FPN: See 820.26 for firestop requirements for floor penetrations.
(E) Risers-Cables in Metal Raceways, Fireproof Shafts and One- and Two-Family Dwellings. The following cables and raceways shall be permitted in metal raceway, in a fireproof shaft with firestops at each floor and in one- and two-family dwellings:
(1) Types CATVP, CATVR, CATV and CATVX
(2) Plenum, riser and general-purpose CATV raceways installed in compliance with 800.110
(3) Types CATVP, CATVR and CATV installed in plenum, riser or general-purpose optical fiber raceway
FPN: See 820.26 for firestop requirements for floor penetrations.
(F) Cable Trays. The following cables and raceways shall be permitted to be installed in cable trays.
(1) Types CATVP, CATVR, and CATV
(2) Plenum, riser and general-purpose CATV raceways installed in compliance with 820.110
(3) Types CATVP, CATVR and CATV installed in plenum riser or general-purpose CATV raceway
(G) Distributing Frames and Cross-Connect Arrays. The following cables shall be permitted to be installed in distributing frames and cross-connect arrays.
(1) Types CATVP, CATVR and CATV
(H) Other Building Locations. The following wires, cables and raceways shall be permitted to be installed in building locations other than the locations covered in 820.113(B) through (F).
(1) Types CATVP, CATVR and CATV
(2) Plenum, riser and general-purpose CATV raceways installed in compliance with 820.110
(3) Types CATVP, CATVR, CATV and Type CATVX installed in plenum, riser or general-purpose CATV raceway
(4) Types CATVP, CATVR, CATV and Type CATVX installed in a raceway of a type included in Chapter 3
(5) A maximum of 3m (10 ft) of exposed Type CATVX in nonconcealed spaces
(I) One- and Two-Family and Multifamily Dwellings. The following cables and raceways shall be permitted to be installed in one- and two-family and multifamily dwellings in locations other than the locations covered in 820.113(B) through (G).
(1) Types CATVP, CATVR, CATV and Type CATVX less than 10 mm (0.375 in.) in diameter
(2) Plenum, riser and general-purpose CATV raceways installed in compliance with 820.110
(3) Types CATVP, CATVR and CATV installed in plenum riser or general-purpose CATV raceway
Substantiation: This proposal is editorial and technical.
The cable and raceway applications sections of articles 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 820.113.
Coaxial cables are used in cross connect applications, but Section 820.154 currently does not have a distributing frame and cross connect section. A new section for distributing frames and cross connects was added. Adding this section also improves parallelism with Article 800. No new requirements were added.
A companion proposal for section 820.154 greatly simplifies the statement of the applications of coaxial cables and raceways by using a table.
This proposal and its companion proposal for section 820.154 need to be considered together as a package.
Panel Meeting Action: Accept in Principle
Revise 820.113 text and replace in entirety as follows:
820.113 Installation of Coaxial Cables and Cable Routing Assemblies. Installation of coaxial cables and cable routing assemblies shall comply with 820.113 (A) through (J).
(A) Listing. Coaxial cables and cable routing assemblies installed in buildings shall be listed.
Exception: Coaxial cables that comply with 820.48 shall not be required to be listed.
(B) Fabricated Ducts and Plenums. The following cables shall be permitted in ducts and plenums as described in 300.22(B) if they are directly associated with the air distribution system:
(1) Up to 1.22 m (4 ft) of Type CATVP
(2) Types CATVP, CATVR, CATV, and CATVX installed in raceways that are installed in compliance with 300.22(B)
FPN: See 4.3.4 and 4.3.11.3.3 of NFPA 90A-2009, Standard for the Installation of Air-Conditioning and Ventilation Systems, for information on wire and cables in air ducts and apparatus casings plenums. See 3.3.22 for the definition of an apparatus casing plenum.
(C) Other Spaces Used For Environmental Air (Plenums). The following cables shall be permitted in other spaces used for environmental air as described in 300.22(C):
(1) Type CATVP
(2) Type CATVP installed in plenum communications raceway
(3) Type CATVP supported by metallic cable trays or cable tray systems
(4) Types CATVP, CATVR, CATV, and CATVX installed in raceways that are installed in compliance with 300.22(C)
FPN: See sections 4.3.11.2, 4.3.11.4, and 4.3.11.5 of NFPA 90A-2009, Standard for the Installation of Air-Conditioning and Ventilation Systems, for information on wire, cables, and raceways in ceiling cavity, raised floor, and air-handling unit room plenums. See 3.3.22 for plenum definitions.
(D) Risers - Cables in Vertical Runs. The following cables shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:
(1) Types CATVP and CATVR
(2) Types CATVP and CATVR installed in plenum or riser communications raceway
FPN: See 820.26 for firestop requirements for floor penetrations.
(E) Risers - Cables in Metal Raceways or Fireproof Shafts. The following cables shall be permitted in metal raceway or in a fireproof shaft with firestops at each floor:
(1) Types CATVP, CATVR, CATV, and CATVX
(2) Types CATVP, CATVR, and CATV installed in plenum, riser, or general-purpose communications raceway
FPN: See 820.26 for firestop requirements for floor penetrations.
(F) Risers - One- and Two-Family Dwellings. The following cables shall be permitted one- and two-family dwellings:
(1) Types CATVP, CATVR, CATV, and CATVX
(2) Types CATVP, CATVR, and CATV installed in plenum, riser, or general-purpose communications raceway
FPN: See 820.26 for firestop requirements for floor penetrations
(G) Cable Trays. The following cables shall be permitted to be installed in cable trays:
(1) Types CATVP, CATVR, and CATV
(2) Types CATVP, CATVR, and CATV installed in plenum riser or general-purpose communications raceway
(H) Distributing Frames and Cross-Connect Arrays. Types CATVP, CATVR, and CATV shall be permitted to be installed in distributing frames and cross-connect arrays.
(I) Other Building Locations. The following cables shall be permitted to be installed in building locations other than the locations covered in 820.113(B) through (H):
(1) Types CATVP, CATVR, and CATV
(2) A maximum of 3 m (10 ft) of exposed Type CATVX in nonconcealed spaces
(3) Types CATVP, CATVR, and CATV installed in plenum, riser, or general-purpose communications raceway
(4) Types CATVP, CATVR, CATV, and Type CATVX installed in a raceway of a type included in Chapter 3
(J) One- and Two-Family and Multifamily Dwellings. The following cables shall be permitted to be installed in one- and two-family and multifamily dwellings in locations other than the locations covered in 820.113(B) through (H):
(1) Types CATVP, CATVR, CATV
(2) Type CATVX less than 10 mm (0.375 in.) in diameter
(3) Types CATVP, CATVR, and CATV installed in plenum riser or general-purpose communications raceway.

Panel Statement: See panel statement on Proposal 16-160. The text is a combination of the text from Proposal 16-267, which has been modified to improve clarity, with text to incorporate panel actions to accept in principle Proposals 16-280 (metallic cable tray) and 16-282 (requiring riser cable for penetration of one floor) and by modifications to correlate with NFPA 90A-2009.

Section 4.3.11.2.6.4 and 4.3.11.5.5.4 of NFPA 90A provide for the listing and use of plenum optical fiber raceways and plenum communications raceways; plenum CATV raceways are not mentioned. Proposal 16-350 introduced the concept of consolidating the type of raceways. The panel has eliminated the use CATV raceways in the text of this proposal and substituted communications raceways. See also panel Proposal 16-289a which deletes section 820.182.

The revised text relocates the wire, cable, and raceway installation rules from 820.154 and also includes installation rules from 820.110.

The panel recognizes that this proposal is a companion proposal to Proposal 16-278 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DORNA, G.: See my comments on proposals 16-48, 16-56, 16-160 and 16-172.

The panel action on the revision of 820.113 changed the title to include cable routing assemblies but didn't add any specific applications. In order to correct this oversight the panel action should be revised as follows:

820.113 Installation of Coaxial Cables and Cable Routing Assemblies. Installation of coaxial cables and cable routing assemblies shall comply with 820.113 (A) through (K). Installation of raceways shall comply with 820.110.

(A) Listing. Coaxial cables and cable routing assemblies installed in buildings shall be listed.

Exception: Coaxial cables that comply with 820.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums. The following cables shall be permitted in ducts and plenums as described in 300.22(B) if they are directly associated with the air distribution system:

(1) Up to 1.22 m (4 ft) of Type CATVP
(2) Types CATVP, CATVR, CATV and CATVX installed in raceways that are installed in compliance with 300.22(B)

FPN: See sections 4.3.4 & 4.3.11.3.3 of NFPA 90A-2009 Standard for the Installation of Air-Conditioning and Ventilation Systems for information on wire and cables in air ducts and apparatus casings plenums. See section 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following cables shall be permitted in other spaces used for environmental air as described in 300.22(C).

(1) Type CATV
(2) Type CATVP installed in plenum communications raceway
(3) Type CATVP supported by metallic cable trays or cable tray systems
(4) Types CATVP, CATVR, CATV and CATVX installed in raceways that are installed in compliance with 300.22(C)

FPN: See sections 4.3.11.2, 4.3.11.4 & 4.3.11.5 of NFPA 90A-2009 Standard for the Installation of Air-Conditioning and Ventilation Systems for information on wire, cables and raceways in ceiling cavity, raised floor and air-handling unit room plenums. See section 3.3.22 for plenum definitions.

(D) Risers- Cables and Routing Assemblies in Vertical Runs. The following cables and cable assemblies shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:

(1) Types CATVP and CATVR
(2) Riser cable routing assemblies
(3) Types CATVP and CATVR installed in plenum or riser communications raceway
(4) Types CATVP and CATVR installed in a riser cable routing assembly

FPN: See 820.26 for firestop requirements for floor penetrations.

(E) Risers-Cables in and Raceways in Metal Raceways. The following cables shall be permitted in metal raceway or in a riser having with firestops at each floor:

(1) Types CATVP, CATVR, CATV and CATVX
(2) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway

FPN: See 820.26 for firestop requirements for floor penetrations.

(F) Risers-Cables and Cable Routing Assemblies in Fireproof Shafts. The following cables and cable routing assemblies shall be permitted to be installed in fireproof riser shafts with firestops at each floor:

(1) Types CATVP, CATVR, CATV and CATVX
(2) Riser and general-purpose cable routing assemblies
(3) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

FPN: See 8206 for firestop requirements for floor penetrations

(G) Risers- One- and Two-Family Dwellings. The following cables and cable routing assemblies shall be permitted one- and two-family dwellings:

(1) Types CATVP, CATVR, CATV and CATVX
(2) Type CATVX less than 10 mm (0.375 in.) in diameter
(3) Riser and general-purpose cable routing assemblies
(4) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

FPN: See 820.26 for firestop requirements for floor penetrations

(H) Cable Trays. The following cables shall be permitted to be installed in cable trays.

(1) Types CATVP, CATVR, and CATV
(2) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway

(I) Distributing Frames and Cross-Connect Arrays. The following cables, and cable routing assemblies shall be permitted to be installed in distributing frames and cross-connect arrays.

(1) Types CATVP, CATVR and CATV
(2) Riser and general-purpose cable routing assemblies
(3) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly

(J) Other Building Locations. The following cables and cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 820.113(B) through (I).

1) Types CATVP, CATVR and CATV
2) A maximum of 3m (10 ft) of exposed Type CATVX in nonconcealed spaces
3) Riser and general-purpose cable routing assemblies
4) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
5) Types CATVP, CATVR, CATV and Type CATVX installed in a raceway of a type included in Chapter 3

(J) One- and Two-Family and Multifamily Dwellings. The following cables and cable routing assemblies shall be permitted to be installed in one- and two-family and multifamily dwellings in locations other than the locations covered in 820.113(B) through (I).

(1) Types CATVP, CATVR and CATV
(2) Type CATVX less than 10 mm (0.375 in.) in diameter
(3) Riser and general-purpose cable routing assemblies
(4) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
(5)Types CATVP, CATVR, CATV and Type CATVX installed in a raceway of a type included in Chapter 3

IVANS, R.:

We agree with the revision proposal prepared by the CMP 16 Special Editorial Task Group.

See my comments on proposals 16-48, 16-56, 16-160 and 16-172.

The panel action on the revision of 820.113 changed the title to include cable routing assemblies but didn't add any specific applications. In order to correct this oversight the panel action should be revised as follows:

820.113 Installation of Coaxial Cables and Cable Routing Assemblies. Installation of coaxial cables and cable routing assemblies shall comply with 820.113 (A) through (K). Installation of raceways shall comply with 820.110.

(A) Listing. Coaxial cables and cable routing assemblies installed in buildings shall be listed.

Exception: Coaxial cables that comply with 820.48 shall not be required to be listed.

(B) Fabricated Ducts and Plenums. The following cables shall be permitted in ducts and plenums as described in 300.22(B) if they are directly associated with the air distribution system:

(1) Up to 1.22 m (4 ft) of Type CATVP
(2) Types CATVP, CATVR, CATV and CATVX installed in raceways that are installed in compliance with 300.22(B)

FPN: See sections 4.3.4 & 4.3.11.3.3 of NFPA 90A-2009 Standard for the Installation of Air-Conditioning and Ventilation Systems for information on wire and cables in air ducts and apparatus casings plenums. See section 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following cables shall be permitted in other spaces used for environmental air as

described in 300.22(C).
(1) Type CATV
(2) Type CATVP installed in plenum communications raceway
(3) Type CATVP supported by metallic cable trays or cable tray systems
(4) Types CATVP, CATVR, CATV and CATVX installed in raceways that are installed in compliance with 300.22(C)
FPN: See sections 4.3.11.2, 4.3.11.4 & 4.3.11.5 of NFPA 90A-2009 Standard for the Installation of Air-Conditioning and Ventilation Systems for information on wire, cables and raceways in ceiling cavity, raised floor and air-handling unit room plenums. See section 3.3.22 for plenum definitions.
(D) Risers- Cables and Routing Assemblies in Vertical Runs. The following cables and cable assemblies shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft:
(1) Types CATVP and CATVR
(2) Riser cable routing assemblies
(3) Types CATVP and CATVR installed in plenum or riser communications raceway
(4) Types CATVP and CATVR installed in a riser cable routing assembly
FPN: See 820.26 for firestop requirements for floor penetrations.
(E) Risers-Cables in and Raceways in Metal Raceways. The following cables shall be permitted in metal raceway or in a riser having with firestops at each floor:
(1) Types CATVP, CATVR, CATV and CATVX
(2) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
FPN: See 820.26 for firestop requirements for floor penetrations.
(F) Risers-Cables and Cable Routing Assemblies in Fireproof Shafts. The following cables and cable routing assemblies shall be permitted to be installed in fireproof riser shafts with firestops at each floor:
(1) Types CATVP, CATVR, CATV and CATVX
(2) Riser and general-purpose cable routing assemblies
(3) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
FPN: See 8206 for firestop requirements for floor penetrations
(G) Risers- One- and Two-Family Dwellings. The following cables and cable routing assemblies shall be permitted one- and two-family dwellings:
(1) Types CATVP, CATVR, CATV and CATVX
(2) Type CATVX less than 10 mm (0.375 in.) in diameter
(3) Riser and general-purpose cable routing assemblies
(4) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
FPN: See 820.26 for firestop requirements for floor penetrations
(H) Cable Trays. The following cables shall be permitted to be installed in cable trays.
(1) Types CATVP, CATVR, and CATV
(2)Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
(I) Distributing Frames and Cross-Connect Arrays. The following cables, and cable routing assemblies shall be permitted to be installed in distributing frames and cross-connect arrays.
(1) Types CATVP, CATVR and CATV
(2) Riser and general-purpose cable routing assemblies
(3) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
(J) Other Building Locations. The following cables and cable routing assemblies shall be permitted to be installed in building locations other than the locations covered in 820.113(B) through (I).
1) Types CATVP, CATVR and CATV
2) A maximum of 3m (10 ft) of exposed Type CATVX in nonconcealed spaces
3) Riser and general-purpose cable routing assemblies
4) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
5) Types CATVP, CATVR, CATV and Type CATVX installed in a raceway of a type included in Chapter 3
(J) One- and Two-Family and Multifamily Dwellings. The following cables and cable routing assemblies shall be permitted to be installed in one- and two-family and multifamily dwellings in locations other than the locations covered in 820.113(B) through (I).
(1) Types CATVP, CATVR and CATV
(2) Type CATVX less than 10 mm (0.375 in.) in diameter
(3) Riser and general-purpose cable routing assemblies
(4) Types CATVP, CATVR and CATV installed in:
a) plenum communications raceway
b) riser communications raceway
c) general-purpose communications raceway
d) riser cable routing assembly
e) general-purpose cable routing assembly
(5) Types CATVP, CATVR, CATV and Type CATVX installed in a raceway of a type included in Chapter 3

16-268 Log #3105 NEC-P16 **Final Action: Reject**
(820.113)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
820.113 <u>Listing Required.</u> ~~Installation of Coaxial Cables.~~
Coaxial cables installed in buildings shall be listed.
Exception: Coaxial cables that comply with 800.48 shall not be required to be listed.
Substantiation: The proposed title change more aptly describes the requirement, and it also gives a title that is not so similar to 820.133.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 16-273, which organized this section for clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-269 Log #44 NEC-P16 **Final Action: Reject**
(820.113 and 820.179)

NOTE: This proposal appeared as Comment 16-244 on Proposal 16-309 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-309 was:
Revise 820.179 and 820.113 as shown and transfer Table 820.113 and Table FPN's to 820.179.
820.179 Coaxial Cables.
Cables shall be listed in accordance with 820.179(A) through 820.179(D) <u>and marked in accordance with Table 820.179. The cable voltage rating shall not be marked on the cable.</u>
<u>FPN: Voltage markings on cables could be misinterpreted to suggest that the cables may be suitable for Class 1, electric light, and power applications.</u>
<u>Exception: Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.</u>
820.113 Installation and Marking of Coaxial Cables.
Listed coaxial cables shall be installed as wiring within buildings. ~~Coaxial cables shall be marked in accordance with Table 820.113. The cable voltage rating shall not be marked on the cable.~~
~~FPN: Voltage markings on cables could be misinterpreted to suggest that the cables may be suitable for Class 1, electric light, and power applications.~~
~~Exception No. 1: Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.~~
Exception No. 2: Listing and marking shall not be required where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated at a grounding block.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel action should have been to Accept in Part by not accepting the FPN to 820.179.
Substantiation: The FPN is not necessary since the reason for not marking the voltage rating on the cable is obvious. There are numerous other instances in the Code where similar requirements to the last sentence in 820.179 are included and there are no explanatory FPNs included with them.
Panel Meeting Action: Reject
Panel Statement: The existing 800.179 has the same requirement and includes the FPN. Since these cables are in fact rated for a voltage, questions do come up regarding why they cannot be and aren't marked. The FPN is useful information.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-270 Log #1744 NEC-P16 **Final Action: Accept in Principle**
(820.133)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "Boxes" in the heading to "Enclosures".
Substantiation: Edit. (A)(1)(a) addresses enclosures other than boxes.
Panel Meeting Action: Accept in Principle
Revise 820.133(A)(1) title to read as follows:
(1) In Raceways, Cable Trays, Boxes, and Enclosures.
Panel Statement: The panel revised the title to include "Enclosures" in order to provide consistency throughout the section.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-271 Log #1044 NEC-P16 **Final Action: Reject**
(820.133(A) and (B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete (A) and substitute:
(A) SEPARATION FROM OTHER CONDUCTORS. Coaxial cables shall not be installed in any raceway, cable tray, compartment, box, cabinet, or other enclosure with conductors of other systems except as follows:
(1) Where the coaxial cables are separated from other systems conductors (except Class 2) by an approved permanent barrier or identified divider.
(2) Where all the conductors of other systems are solely for connection to the coaxial cable distribution equipment and the installation complies with 820.133(A)(1) and exception.
Revise text of (B):
~~Raceways shall be used for their intended purpose.~~ Coaxial cables shall not be attached to the exterior of any ~~conduit or~~ raceway <u>containing conductors, cable or electrical conductor</u> as a means of support.
Exception: Overhead (aerial) spans of coaxial cables shall be permitted to be attached to exterior of an <u>identified</u> raceway mast <u>where the mast supports the coaxial cables, and does not support or contain conductors or cables other than for Class 2 or Class 3 systems, power-limited fire alarm systems, and optical fiber cables</u>.
Substantiation: Edit. Proposal is essentially a change of format incorporating present provisions with less verbiage.
Panel Meeting Action: Reject
Panel Statement: No additional clarity is provided by submitter's proposed editorial revision.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-272 Log #2262 NEC-P16 **Final Action: Accept in Principle**
(820.133(A)(1))

Submitter: Terry Peters, The Society of the Plastics Industry
Recommendation: Revise text to read as follows:
(1) In Raceways, <u>Routing Assemblies,</u> Cable Trays, and Boxes.
(a) *Other Circuits.* Coaxial cables shall be permitted in the same raceway, <u>or optical fiber/communications cable routing assembly,</u> cable tray, or enclosure with jacketed cables of any of the following:
(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Article 725
(2) Power-limited fire alarm systems in compliance with Article 760
(3) Nonconductive and conductive optical fiber cables in compliance with Article 770
(4) Communications circuits in compliance with Article 800
(5) Low-power network-powered broadband communications circuits in compliance with Article 830
Substantiation: Article 770 currently covers optical fiber raceways and provides listing requirements for plenum, riser and general-purpose versions. UL lists these raceways to UL 2024, *Optical Fiber and Communication Cable Raceway.* UL lists optical fiber routing assemblies to UL2024a, *Outline of Investigation for Optical Fiber Cable Routing Assemblies.* Routing assemblies are u-shaped wiring troughs that may or may not have covers. (If they always had covers, they would be raceways and this proposal would not be necessary.) UL 2024a provides for the listing of plenum, riser and general-purpose routing assemblies with the same fire testing requirements as UL 2024.
The significant difference between optical fiber routing assemblies and optical fiber raceways is that the routing assemblies are larger and open, therefore present a greater fire load.
We have submitted companion proposals to provide for a change of the scope of Article 770 to include routing assemblies and to provide listing and application for requirements for optical fiber routing assemblies. Since these routing assemblies are used for optical fiber, data and communications cables, proposals are being submitted for Articles 725, 770, 800 and 820.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-273.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-273 Log #2114 NEC-P16 **Final Action: Accept in Principle in Part**
(820.133(A)(1)(a))

TCC Action: The Technical Correlating Committee directs that the Chairs of Code-Making Panels 3 and 16 form a Task Group to correlate the actions taken on this proposal and Proposal 3-196.
Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
(a) *Other Circuits.* Coaxial cables shall be permitted in the same raceway, cable tray, or enclosure with jacketed cables of any of the following:
(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with <u>Parts I and III of</u> Article 725
(2) Power-limited fire alarm systems in compliance with <u>Parts I and III of</u> Article 760
(3) Nonconductive and conductive optical fiber cables in compliance with <u>Parts I and IV of</u> Article 770
(4) Communications circuits in compliance with <u>Parts I and IV of</u> Article 800
(5) Low-power network-powered broadband communications circuits in compliance with <u>Parts I and IV of</u> Article 830
<u>Exception: Only Types CATVP, CATVR, CATV and CATVX cables shall be permitted to be installed in plenum CATV raceways, riser CATV raceways and general-purpose CATV raceways.</u>
Substantiation: This is an editorial and technical proposal.
Section 820.154 restricts the applications of plenum, riser and general-purpose CATV raceways by permitting only Types CATVP, CATVR, CATV and CATVX cables in these raceways.
Section 820.133(A)(1)(a) conflicts with the restrictions of 820.154.
The purpose of this proposal is to remove the conflict. It is also a companion proposal to a proposal to simplify the applications requirements in 820.154 by replacing the text with a table.
The NEC Style Manual states:
4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as "grounded in accordance with Article 250" unless additional conditions are specified. References to parts within articles shall be permitted.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle in Part
Revise text to read as follows:
(1) In Raceways, <u>Routing Assemblies,</u> Cable Trays, and Boxes.
(a) *Other Circuits.* Coaxial cables shall be permitted in the same raceway, cable tray, <u>or</u> enclosure, <u>or cable routing assembly</u> with jacketed cables of any of the following:
(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with <u>Parts I and III of</u> Article <u>725</u>
(2) Power-limited fire alarm systems in compliance with <u>Parts I and III of</u> Article <u>760</u>
(3) Nonconductive and conductive optical fiber cables in compliance with <u>Parts I and IV of</u> Article <u>770</u>
(4) Communications circuits in compliance with <u>Parts I and IV of</u> Article <u>800</u>
(5) Low-power network-powered broadband communications circuits in compliance with <u>Parts I and IV of</u> Article <u>830</u>.
Panel Statement: The recommendation from Proposal 16-272 has been incorporated into this proposal, and the new exception has been deleted because of panel action on other proposals to consolidate the types of raceways. See the panel actions on Proposals 16-278 and 16-267. See panel proposal 16-289a that eliminated the listing of CATV raceways.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-274 Log #4693 NEC-P16 **Final Action: Reject**
(820.133(A)(2) Exception No. 3 (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add a third exception as follows:
Exception No. 3: Where all of the electric light, power, Class 1, non-power limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the coaxial cables through the use of sheathing that provides for system separation that does not rely on conductor or cable insulation alone, the combination of conductors comprising different systems shall be permitted to be combined into a listed hybrid cable assembly.
Substantiation: There is not and has never been any express permission to include CATV conductors within a common cable assembly with power conductors. Para (2) here comes the closest, because it recognizes a "continuous and firmly fixed nonconductor." This is crucial to the production of hybrid cables, where additional separation beyond the conductor insulation is applied to the power-limited conductors in accordance with the spirit of these principles. For example, 334.116(C) expressly recognizes this type of construction for Type NMS cable, and UL has been listing such constructions for many years. This topic must be addressed in the limited-power wiring articles, and this proposal is designed to raise the issue.
Panel Meeting Action: Reject
Panel Statement: The submitter has neither identified a specific application nor cited any technical rationale for an additional exception that appears to be covered in the present Exception No. 2.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-275 Log #1746 NEC-P16 **Final Action: Reject**
(820.133(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: Raceways shall be used ~~for their intended purpose~~ <u>in accordance with their required or permitted use.</u> Coaxial cables shall not be ~~strapped, taped, or~~ attached by any means to the exterior of any ~~conduit or~~ raceway, <u>electrical cable or conductor</u> as a means of support.
Exception: Overhead (aerial) spans of coaxial cable shall be permitted to be attached to the exterior of a raceway mast ~~intended for the attachment and support of such cables.~~ <u>The mast shall be permitted to support or enclose other conductors where in compliance with 820.133(A).</u>
Substantiation: The intended purpose for raceways is as required or permitted by the raceway articles. The "intended" use could be for fence posts which I have seen done which is not a Code violation. Raceways other than conduit, and cables and individual conductors such as grounding electrode conductors should be included. "Cable" should be designated as "electrical" since a messenger cable is appropriate for support of overhead spans of coaxial cable.
Panel Meeting Action: Reject
Panel Statement: Editorial changes proposed by the submitter provide no additional clarity. Permitting attachment to a mast containing power conductors is in conflict with 820.44(C).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-276 Log #2113 NEC-P16 **Final Action: Accept**
(820.133(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the title of 820.133 (B) as follows:
(B) Support of <u>Coaxial</u> Cables. Raceways shall be used for their intended purpose. Coaxial cables shall not be strapped, taped, or attached by any means to the exterior of any conduit or raceway as a means of support.
Exception: Overhead (aerial) spans of coaxial cables shall be permitted to be attached to the exterior of a raceway-type mast intended for the attachment and support of such cables.
Substantiation: This is an editorial change. The addition of the wording "coaxial" will add clarity to the title of 820.133(B) as this section deals with coaxial cables.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-277 Log #2287 NEC-P16 **Final Action: Reject**
(820.135 (New))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Add a new Section to read as follows:
<u>**820.135 Communication Device and Equipment Mounting.** Communication devices or equipment shall be mounted in listed boxes, brackets or assemblies designed for the purpose, and such boxes or assemblies shall be securely fastened in place. Boxes or brackets can be completly enclosed or backless.</u>
<u>**(A) Communication Devices and Equipment Mounted to Boxes or Brackets.** Communication devices or equipment shall be mounted to a listed boxes or bracket and installed per 314.20.</u>
<u>**(B) Communication Devices and Equipment Mounted on Covers.** Communication device and equipment mounted to and supported by a cover shall be held rigidly against the cover which is mounted to the box or bracket.</u>
Substantiation: This proposal adds a new section to Article 820 addressing the mounting of devices or equipment to listed boxes and brackets. Currently, depending on the quality of workmanship, coaxial devices or equipment have not been mounted to boxes or brackets that can support them. After several years device and/or covers that are mounted directly to the dry wall will become hazard because they have become loose and exposed. Coaxial cable can become energized by coming in incidental contact with electrical conductors.
820.135 was only a suggestion for the location of this new section. (A) addresses devices mounted directly to boxes or devices where as (B) address devices mounted to covers.
Panel Meeting Action: Reject
Panel Statement: Not all CATV equipment and devices need to be mounted in boxes, brackets, or assemblies.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
IVANS, R.: Loose and exposed cable or connectors can pose a risk of electric shock if improperly grounded. Loose cabling and connectors can come into contact with electric light and power conductors. There are boxes and brackets listed for this purpose using UL Subject 2269, "Outline of Investigation for Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes."
OHDE, H.: See our Negative Comment on Proposal 16-171.

16-278 Log #2115 NEC-P16 **Final Action: Accept in Principle**
(820.154)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
~~**820.154 Applications of Listed CATV Cables and CATV Raceways.**~~
~~CATV cables shall comply with the requirements of 820.154(A) through (E) or where cable substitutions are made as shown in Table 820.154(E).~~
~~**(A) Plenums.** Coaxial cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CATVP. Abandoned cables shall not be permitted to remain. Types CATVP, CATVR, CATV, and CATVX cables installed in compliance with 300.22 shall be permitted. Listed plenum CATV raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CATVP cable shall be permitted to be installed in these raceways.~~
~~**(B) Riser.** Coaxial cables installed in risers shall comply with any of the requirements of 820.154(B)(1) through (B)(3).~~
~~**(1)** Coaxial **Cables in Vertical Runs.** Coaxial cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CATVR. Floor penetrations requiring Type CATVR shall contain only cables suitable for riser or plenum use. Listed riser CATV raceways and listed plenum CATV raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CATVR and CATVP cables shall be permitted to be installed in these raceways.~~
~~**(2) Metal Raceways or Fireproof Shafts.** Types CATV and CATVX cables shall be permitted to be encased in a metal raceway or located in a fireproof shaft having fire- stops at each floor.~~
~~**(3) One- and Two-Family Dwellings.** Types CATV and CATVX cables shall be permitted in one- and two-family dwellings.~~
~~FPN: See 820.3(A) for the firestop requirements for floor penetrations.~~
~~**(C) Other Wiring Within Buildings.** Cables installed in building locations other than the locations covered in 820.154(A) and (B) shall be in accordance with any of the requirements in 820.154(C)(1) through (C)(5).~~
~~**(1) General.** Type CATV shall be permitted. Listed CATV general-purpose raceways, listed riser CATV raceways, and listed plenum CATV raceways shall be permitted. Only Types CATV, CATVX, CATVR, or CATVP cables shall be permitted to be installed in these CATV raceways.~~
~~**(2) In Raceways.** Type CATVX shall be permitted to be installed in a raceway.~~
~~**(3) Nonconcealed Spaces.** Type CATVX shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft).~~

~~**(4) One- and Two-Family Dwellings.** Type CATVX cables less than 10 mm (0.375 in.) in diameter shall be permitted to be installed in one- and two-family dwellings.~~

~~**(5) Multifamily Dwellings.** Type CATVX cables less than 10 mm (0.375 in.) in diameter shall be permitted to be installed in multifamily dwellings.~~

~~(D) Cable Trays. Cables installed in cable trays shall be Types CATVP, CATVR, and CATV.~~

~~(E) Cable Substitutions. The uses and substitutions for CATV coaxial cables listed in~~ Table 820.154(E) ~~and illustrated in~~ Figure 820.154(E) ~~shall be permitted.~~

<u>**820.154 Applications of Listed CATV Cables and CATV Raceways.** Permitted and non-permitted applications of listed coaxial cables and CATV raceways shall be as indicated in Table 820.154(A). The substitutions for coaxial cables listed in Table 820.154(B) and illustrated in Figure 820.154(B) shall be permitted.</u>

See Table 820.154(A) on page 1133

(Renumber Table 820.154(E) and Figure 820.154(E) to Table 820.154(B) and Figure 820.154(B) and insert them here.)

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800,820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal for section 820.154 greatly simplifies the statement of the applications of optical fiber cables and raceways by using a table where the permitted applications are indicated by a "Y" and the applications that are not permitted are indicted by an "x". A companion proposal moves the installation rules to section 820.113 Installation of CATV Cables.

This proposal makes no changes to the existing permitted and not permitted applications of CATV cables and raceways.

This proposal and its companion proposal for section 820.113 need to be considered together as a package.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle

See Table 820.154 on page 1134

Panel Statement: See panel statement on Proposals 16-160 and 16-172.

The table is a combination of the table from Proposal 16-278, which has been modified to improve clarity, with entries to incorporate panel actions to accept in principle Proposals 16-173 (cable routing assemblies), 16-175 (metallic cable tray), and 16-179 (requiring riser cable for penetration of one floor) and by modifications to correlate with NFPA 90A-2009.

The non-permitted applications were determined by considering the listing requirements for the cable. Other non-permitted applications were determined from existing code requirements as determined by the panel.

The panel recognizes that this proposal is a companion proposal to Proposal 16-267 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DORNA, G.: See my comments on proposals 16-48, 16-56, 16-160, 16-172 and 16-267

The heading of the last two columns should be revised to include cable routing assemblies to correlate with the panel action on proposals 16-232 and 16-273. See proposal 16-172 which includes cable routing assemblies.

The headings of the last two columns should be revised to read:

"In riser communications raceways and riser routing assemblies"

"In general-purpose communications raceways and general-purpose cable routing assemblies"

"Cable Type" needs to be revised to include cable routing assemblies and two rows for applications of cable routing assemblies need to be added to correlate with panel action on 16-267.

The revised 820.154 should appear as shown below:

820.154 Applications of Listed CATV Cables. Permitted and non-permitted applications of listed coaxial cables shall be as indicated in Table 820.154(A). The permitted applications are subject to the installation rules of 820.113. The substitutions for coaxial cables listed in Table 820.154(B) and illustrated in Figure 820.154 shall be permitted.

See Table 820.154 on page 1135

(E) Cable Substitutions. The uses and substitutions for CATV coaxial cables listed in <u>Table 820.154(B)</u> and illustrated in <u>Figure 820.154</u> shall be permitted.

Insert Table 820.154(E) and renumber as 820.154(B)

FPN: The substitute cables in <u>Table 820.154(B)</u> and <u>Figure 820.154</u> are only coaxial-type cables.

(Renumber figure 820.154(E) to 820.154 and insert it here.)

IVANS, R.: See my comments on proposals 16-48, 16-56, 16-160, 16-172 and 16-267.

The heading of the last two columns should be revised to include cable routing assemblies to correlate with the panel action on proposals 16-232 and 16-273. See proposal 16-172 which includes cable routing assemblies.

The headings of the last two columns should be revised to read:

"In riser communications raceways and riser routing assemblies"

"In general-purpose communications raceways and general-purpose cable routing assemblies"

"Cable Type" needs to be revised to include cable routing assemblies and two rows for applications of cable routing assemblies need to be added to correlate with panel action on 16-267.

The revised 820.154 should appear as shown below:

820.154 Applications of Listed CATV Cables. Permitted and non-permitted applications of listed coaxial cables shall be as indicated in Table 820.154(A). The permitted applications are subject to the installation rules of 820.113. The substitutions for coaxial cables listed in <u>Table 820.154(B)</u> and illustrated in <u>Figure 820.154</u> shall be permitted.

See Table 820.154(A) on page 1136

16-279 Log #124 NEC-P16 **Final Action: Accept**
(820.154(A))

Submitter: Stanley Kaufman, CableSafe Inc.

Recommendation: Delete the second sentence.

~~Abandoned cables shall not be permitted to remain.~~

Substantiation: Section 820.25 requires that "The accessible portion of abandoned communications cables shall be removed." The requirement in to remove all abandoned cables in 820.154(A) is an error from the 1999 NEC that the panel tried to correct in the last code cycle.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Table 820.154(A), Applications of Coaxial Cables and CATV Raceways

Cable or Raceway Type	Applications											
	In air ducts and plenums as described in 300.22(B)	In other spaces used for environmental air as described in 300.22(C)	In risers	In building locations other than air ducts, plenums, other spaces used for environmental air and, risers	In one- and two-family dwellings	In multifamily dwellings	In nonconcealed spaces	In cable trays	In any raceway in Chapter 3	In plenum CATV raceways	In riser CATV raceways	In general-purpose CATV raceways
CATVP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATV	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVX	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Plenum CATV Raceways	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-
Riser CATV Raceways	N	N	Y	Y	Y	Y	Y	Y	-	-	-	-
General-Purpose CATV Raceways	N	N	N	Y	Y	Y	Y	Y	-	-	-	-

Note. Applications indicated by "Y" shall be permitted. Applications indicated by an "N" shall not permitted. Applications with a "–" are not addressed.

16-278 Rec

Revise 820.154 and replace in entirety as follows:

820.154 Applications of Listed CATV Cables. Permitted and non-permitted applications of listed coaxial cables shall be as indicated in Table 820.154(A). The permitted applications are subject to the installation rules of 820.113. The substitutions for coaxial cables listed in Table 820.154(B) and illustrated in Figure 820.154 shall be permitted.

Table 820.154(A), Applications of Coaxial Cables

Cable Type	Applications													
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In risers in vertical runs	In risers in metal raceways or fire-proof shafts	In risers in one- and two-family dwellings	In building locations other than fabricated ducts and plenums, other spaces used for environmental air (plenums) and. risers	In one- and two-family dwellings	In multifamily dwellings	In nonconcealed spaces	In cable trays	In any raceway in Chapter 3	In plenum communications raceways	In riser communications raceways	In general-purpose communications raceways
CATVP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATV	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVX	N	N	N	Y	Y	N	Y	Y	Y	N	Y	N	N	N

Note: An ‘N’ in the table indicates that the cable type shall not be permitted to be installed in the application. A ‘Y’ indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 820.113.

(E) Cable Substitutions. The uses and substitutions for CATV coaxial cables listed in Table 820.154(B) and illustrated in Figure 820.154 shall be permitted.

***Insert Table 820.154(E) and renumber as 820.154(B)

FPN: The substitute cables in Table 820.154(B) and Figure 820.154 are only coaxial-type cables.

(Renumber Figure 820.154(E) to 820.154 and insert it here).

16-278 Meeting Action

Table 820.154, Applications of Listed Coaxial Cables and Cable Routing Assemblies

Cable and Cable Routing Assembly Types	Applications															
	In Air-Handling Spaces		In Risers				Within Buildings in Other Than Air-Handling Spaces and Risers									
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In vertical runs	In metal raceways	In fireproof shafts	In one- and two-family dwellings	General	In one- and two-family dwellings	In multifamily dwellings	In nonconcealed spaces	In cable trays	In distributing frames and cross-connect arrays	In any raceway in Chapter 3	In plenum communications raceways	In riser communications raceways and riser cable routing assemblies	In general-purpose communications raceways and general-purpose cable routing assemblies
CATVP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATV	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVX	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N
Riser Cable Routing Assemblies	N	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N
General-Purpose Cable Routing Assemblies	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 820.113.

16-278 Dorna BE

Table 820.154, Applications of Listed Coaxial Cables and Cable Routing Assemblies

Cable and Cable Routing Assembly Types	Applications															
	In Air-Handling Spaces		In Risers				Within Buildings in Other Than Air-Handling Spaces and Risers									
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In vertical runs	In metal raceways	In fireproof shafts	In one- and two-family dwellings	General	In one- and two-family dwellings	In multifamily dwellings	In nonconcealed spaces	In cable trays	In distributing frames and cross-connect arrays	In any raceway in Chapter 3	In plenum communications raceways	In riser communications raceways and riser cable routing assemblies	In general-purpose communications raceways and general-purpose cable routing assemblies
CATVP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATV	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
CATVX	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N
Riser Cable Routing Assemblies	N	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N
General-Purpose Cable Routing Assemblies	N	N	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N

16-278 Ivans BE

16-280 Log #130 NEC-P16 **Final Action: Accept in Principle**
(820.154(A))

Submitter: Gerald Lee Dorna, Belden
Recommendation: Add the following text at the end of 820.154(A):
Metallic cable trays and metallic cable tray systems shall be permitted to be installed in other spaces used for environmental air. Type CATVP cables and CATV plenum raceways shall be permitted to be installed in these cable trays and cable tray systems. Types CATVR, CATV and CATVX cables, and CATV riser and general-purpose raceways shall not be permitted to be installed in these cable trays and cable tray systems.
Substantiation: Article 392, Cable Trays, has requirements for cable trays in air handling spaces in section 392.4.
392.4 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.
Section 300.22 has provisions for cable trays in 300.22(C), Other Space Used For Environmental Air.
(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.
FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.
Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.
(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.
Section 300.22(C)(1) permits only solid bottom metal cable tray with solid metal covers. Optical fiber, communications, CATV, signaling and fire-alarm plenum cables, and plenum raceways are often installed in metal cable trays and metal cable tray systems in plenums (other spaces used for environmental air). These installations are "neat and workmanlike" and safe. They should be permitted.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-267.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-281 Log #4546 NEC-P16 **Final Action: Accept**
(820.154(A))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Revise text as follows:
820.154 Applications of Listed CATV Cables and CATV Raceways.
CATV cables shall comply with the requirements of 820.154(A) through (E) or where cable substitutions are made as shown in Table 820.154(E).
(A) Plenums. Coaxial cables installed in ducts, plenums, and other spaces used for environmental air shall be Type CATVP. ~~Abandoned cables shall not be permitted to remain.~~ Types CATVP, CATVR, CATV, and CATVX cables installed in compliance with 300.22 shall be permitted. Listed plenum CATV raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type CATVP cable shall be permitted to be installed in these raceways.
Substantiation: The text proposed for deletion is duplicative of the text in section 820.25 and potentially in conflict with it.
For information, see section 820.25:
820.25 Abandoned Cables.
The accessible portion of abandoned coaxial cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-282 Log #2212 NEC-P16 **Final Action: Accept in Principle**
(820.154(B)(1))

Submitter: Robert W. Jensen, dbi / Rep. BICSI
Recommendation: Revise text as follows:
Coaxial cables installed in vertical runs and penetrating one or more floors ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type CATVR. Floor penetrations requiring Type CATVR shall contain only cables suitable for riser or plenum use. Listed riser CATV raceways and listed plenum CATV raceways shall be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type CATVR and CATVP cables shall be permitted to be installed in these raceways.
Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-267.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: The current riser requirements are so complicated that they could be considered to be a "vague and unenforceable".
Section 820.154(B)(1) requires that "Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type CATVR. Floor penetrations requiring Type CATVR shall contain only cables suitable for riser or plenum use". Consequently at least two floor penetrations are required, one for plenum and riser cables and another for general-purpose cables.
The panel action on this proposal greatly simplifies the installation rules for cables in risers in other than one and two-family dwellings. The installation rules for one and two-family dwellings are already simplified since any listed cable is permitted.

16-283 Log #1677 NEC-P16 **Final Action: Reject**
(820.179(A), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 820.179(A) FPN as follows:
FPN: One method of ~~defining~~ determining fire resistance and low smoke-producing characteristics of a cable is testing ~~that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested~~ in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The panel recognizes the intent of the submitter but notes that NFPA-262 is a test method that has no inherent pass/fail criteria. The FPN does provide explanatory information. It provides one set of criteria. It does not set requirements.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-284 Log #45 NEC-P16 **Final Action: Reject**
(820.179(B))

NOTE: This proposal appeared as Comment 16-271 on Proposal 16-340 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-340 was:
Make the changes as shown:
(B) Type CATVR. Type CATVR community antenna television riser coaxial cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.
FPN: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN as shown:
FPN: One method of determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the raceways pass the requirements of the test for Flame Propagation (riser) in~~ ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*

Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The FPN defines the damage and specifies performance requirements.

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-285 Log #1678 NEC-P16 **Final Action: Reject**

(820.179(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 820.179(B) FPN as follows:

FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the cables pass the requirements of~~ testing the cable in accordance with ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-286 Log #46 NEC-P16 **Final Action: Reject**

(820.179(C))

NOTE: This proposal appeared as Comment 16-272 on Proposal 16-341 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-341 was:

Make the changes as shown:

(C) Type CATV. Type CATV community antenna television coaxial cables shall be listed as being suitable for general-purpose CATV use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.

FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the vertical-tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*.

Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Methods for Electrical Wires and Cables.*

Submitter: James Daly, Upper Saddle River, NJ

Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:

FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*

Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables.*

Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The Proposal as submitted defines the damage and specifies performance requirements.

The number, title, and the date of the latest edition of the UL standard were corrected to reflect the current applicable standard. The reference in the CSA standard and the date of the CSA standard were also corrected.

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-287 Log #47 NEC-P16 **Final Action: Reject**

(820.179(C), FPN)

NOTE: This proposal appeared as Comment 16-273 on Proposal 16-342 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-342 was:

Revise text to read as follows:

FPN: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in ~~ANSI/UL 1581-2001, Standard for Electrical Wires, Cables, and Flexible Cords.~~ UL 1685-2000 Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-~~1985~~ 2001, Test Methods for Electrical Wires and Cables.

Submitter: James Daly, Upper Saddle River, NJ

Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:

FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*

Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays", in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables*.

Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The Proposal as submitted defines the damage and specifies performance requirements.

The sentence "The smoke measurements in the test method are not applicable." is mandatory language.

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-288 Log #1679 NEC-P16 **Final Action: Reject**

(820.179(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Revise 820.179(C) FPN as follows:

FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ testing in accordance with "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of ~~defining resistant~~ determining resistance to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ testing in accordance with CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-289 Log #48 NEC-P16 **Final Action: Reject**
(820.179(D))

NOTE: This proposal appeared as Comment 16-274 on Proposal 16-343 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-343 was:
Make the changes as shown:
(D) Type CATVX. Type CATVX limited-use community antenna television coaxial cables shall be listed as being suitable for use in dwellings and for use in raceway and shall also be listed as being resistant to flame spread.
FPN: One method of determining that cable is resistant to flame spread is by testing the cable to the VW-1 (vertical-wire) flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword the FPN to read:
FPN: One method of determining that the cable is resistant to flame spread is the VW-1 (vertical-wire) flame test in ANSI/UL 1581-2001, *Reference Standard for Electrical Wires, Cables and Flexible Cords.*
Substantiation: 3.1.3 of the NEC Style Manual stipulates that “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
The FPN as submitted in the Proposal includes mandatory language by requiring that the cable be tested to UL 1581. The revised wording provides explanatory information without any requirements.
The date of the latest edition of the UL standard was updated from 1991 to 2001.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-289a Log #CP1610 NEC-P16 **Final Action: Accept**
(820.182)

Submitter: Code-Making Panel 16,
Recommendation: Delete 820.182 in entirety.
Substantiation: See panel statement on Proposal 16-267.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-290 Log #1680 NEC-P16 **Final Action: Reject**
(820.182(A), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 820.182(A) FPN as follows:
FPN: One method of ~~defining~~ determining the fire resistance and low smoke producing characteristics of ~~that~~ an optical fiber raceway is testing ~~a low smoke producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested~~ in accordance with the plenum test in UL 2024, Standard for Optical Fiber Cable Raceway.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
The arrangement of text provides consistency with other similar FPNs.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-291 Log #1681 NEC-P16 **Final Action: Reject**
(820.182(B), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 820.182(B) FPN as follows:
FPN: One method of ~~defining~~ determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the raceways pass the requirements of the~~ testing in accordance with the Test for Flame Propagation (Riser) in UL 2024, Standard for Optical-Fiber Cable Raceway.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-292 Log #1682 NEC-P16 **Final Action: Reject**
(820.182(C), FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 820.182(C) FPN as follows:
FPN: One method of ~~defining resistant~~ determining resistance to the spread of fire is ~~that the raceways pass the requirements of the~~ testing in accordance with the Vertical-Tray Flame Test (General Use) in UL 2024, Standard for Optical Fiber Cable Raceway.
Substantiation: 3.1.3 of the NEC Style Manual states “Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language.”
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

ARTICLE 830 — NETWORK-POWERED BROADBAND COMMUNICATIONS SYSTEMS

16-293 Log #4183 NEC-P16 **Final Action: Accept**
(830)

TCC Action: It was the action of the Technical Correlating Committee that a Task Group be formed including members from Code-Making Panels 5 and 16 to review and make recommendations on revising the use of the phrase “grounding conductor” and revising it to “grounding electrode conductor.”
Submitter: Paul Dobrowsky, Holley, NY
Recommendation: Replace the term “grounding conductor” with “grounding electrode conductor” throughout this Article.
Substantiation: The term “Grounding Conductor” is being proposed to be deleted because it is almost identical to the term “grounding electrode conductor”. The defined term “grounding electrode conductor” includes the ability of connecting to a point on the grounding electrode system. This has been submitted as a single proposal to the Article instead of numerous proposals to allow the panel to ensure the resulting language still meets their intent in each specific section.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-91.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
JANIKOWSKI, R.: I agree with the submitter that the term “grounding conductor” and “grounding electrode conductor” are all but identical. The term “grounding electrode conductor” will not be mistaken in the field for the grounded conductor and refers to any point on the grounding electrode system.
Comment on Affirmative:
BRUNSSEN, J.: This is a correlation issue with Panel 5. Although the deletion of the term “grounding conductor” is appropriate for articles covered by Panel 5, the term is used over 120 times in Chapter 8 articles covering low power communications circuits and elsewhere in the code. The term “Grounding Conductor” has proven a useful and well understood term within the communications articles and a definition should be retained in Article 100. Substitution of “Grounding Conductor” with “Grounding Electrode Conductor” is not appropriate for all uses in Chapter 8 articles. The definition of “Grounding Conductor” could be modified to make it more specific to communications circuits as follows: “G**rounding Conductor.** A conductor used to connect communications equipment and cable shield, as required, to a grounding electrode system or grounding electrode(s).” This definition would meet the needs of Chapter 8.

16-294 Log #1200 NEC-P16 **Final Action: Reject**
(830.2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Insert “is likely to” in place of “may”.
Substantiation: Edit. “May” is a term to be avoided per the Style Manual. “Likely” is defined as such a nature or circumstance as to make something probable and is used in many sections.
Panel Meeting Action: Reject
Panel Statement: The submitters recommendation is not editorial. The term “may” connotes “a possibility”; the term “likely” connotes “is probable”. The panel does not agree that these are probable events.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-295 Log #746 NEC-P16 **Final Action: Reject**
(830.2.Abandoned Network Powered Broadband Powered Communications Cable)

Submitter: Brian E. Rock, Hubbell Inc.
Recommendation: Delete text and the associated Fine Print Note to read as follows:
830.2 Definitions.
See Article 100. For the purposes of this article, the following additional definitions apply.
~~**Abandoned Network-Powered Broadband Communications Cable.** Installed network-powered broadband communications cable that is not terminated at equipment other than a connector and not identified for future use with a tag.~~
~~FPN: See Article 100 for a definition of Equipment.~~
[remainder of 830.2 unchanged by this Proposal]
Substantiation: Companion proposals have been made to add a single generalized definition in Article 100 and to delete the corresponding definitions for the various abandoned cables, supply circuits, etc., in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2.
NEC® Manual of Style 2.2.2.1. Consolidation into a new, single generalized definition in Article 100 of nearly identical definitions appear in multiple Articles, specifically in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2. Although these individual definitions served a valid transitional purpose to support the independent additions of individual requirements in 640.6(C), 645.5(F), 645.5(G), 725.25, 800.25, 820.25, and 830.25, these discreet definitions can be broadly consolidated into a single definition in Article 100.
The specific method by which identification for future use is achieved ("… with a tag") is conveyed in the definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 violates *NEC® Manual of Style* 2.2.2 ("Definitions shall not contain requirements …") and is omitted in the generalized definition for "Abandoned" being added in Article 100. This identification-with-a-tag requirement in these definitions in 640.2, 645.2, 725.2, 800.2, 820.2, and 830.2 is redundant to the actual requirement statements in 640.6(C), 645.5(G), 725.25, 800.25, 820.25, and 830.25, respectively. Also, words regarding the possibility of ceasing connection to an electric supply have been added in the generalized definition for "Abandoned" to correlate to 90.2(A)(3), since abandonment entails disconnection from either the terminating equipment or the electric supply (or both).
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-296 Log #816 NEC-P16 **Final Action: Reject**
(830.2.Abandoned Network Powered Broadband Powered Communications Cable)

Submitter: J. L. Richardson, Engineering Services Group, Inc.
Recommendation: Delete the following text:
~~Abandoned Network Powered Broadband Communications Cable. Installed network powered broadband communications cable that is not terminated at equipment other than a connector and not identified for future use with a tag.~~
Substantiation: To be replaced by general definition Article 100, Definitions.
Panel Meeting Action: Reject
Panel Statement: For the 2008 NEC, a TCC-directed task group, including representation from CMP-3, CMP-12 and CMP-16, determined there were enough differences in the installation of abandoned cables to justify them being addressed in individual articles. The current code wording is aligned with what was proposed by the task group.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-297 Log #2129 NEC-P16 **Final Action: Reject**
(830.2.Air Duct)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Add a definition of air duct:
<u>**Air Duct.** A conduit or passageway for conveying air to or from heating, cooling, air conditioning, or ventilating equipment, but not including the plenum. [**90A:**3.3.5].</u>
Substantiation: The term "air duct" is used in the task group's proposal for 830.154. It should be defined. It is defined in Articles 800 and 820. The task group is also proposing to define it in Article 770. A proposal has been submitted to define air duct in Article 100. If the proposal for Article 100 is accepted, the panel or the TCC can act to remove the definitions from panel sixteen's articles.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Reject
Panel Statement: The term "air duct" is not used in Article 830 and should not be defined in the article, in accordance with the NEC Style Manual.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-298 Log #2131 NEC-P16 **Final Action: Accept**
(830.3 and 830.3(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Delete the following:
~~**(B) Ducts, Plenums, and Other Air-Handling Spaces.** Section 300.22 shall apply where installed in ducts, plenums, or other spaces used for environmental air.~~
~~*Exception: As permitted in 830.154(B)*~~
Revise 830.3 Other Articles as follows:
830.3 Other Articles. Circuits and equipment shall comply with 830.3(A) through ~~(D)~~ <u>(C)</u>.
Reletter existing items (C) and (D) as (B) and (C).
Substantiation: This proposal is editorial and technical.
Section 830.3(B) provides no additional guidance or requirements that are not already in 830.154(A). Section 300.22 conflicts with Article 830 because Article 830 requires listed network-powered broadband cables whereas 300.22 permits various electrical power and control cables that are not permitted to be used for network-powered broadband circuits in Article 830. Section 800.3 does not have a similar requirement.
Acceptance of this proposal, as well as companion proposals for 770.3 and 820.3, will make Articles 770, 800, 820 and 830 consistent and in compliance with section 3.3.5 of the NEC Style Manual, shown below:
3.3.5 Parallel Construction. Parallel construction means stating similar requirements in similar ways for greater consistency. This helps makes the *NEC* clear for users. Lack of consistency often creates confusion, causing users to ask: *Does this difference in wording represent a different requirement? Or is it simply two different ways of trying to say the same thing?* There are several kinds of parallel construction:
Organization and Numbering. If practicable, the subsections of similar articles should be numbered in the same order (see 2.4.1).
Sections. Different sections, within the same article, that reflect similar or closely related subjects, should have similar structures.
Lists. All items in a list should be parallel (that is, singular or plural, written in the same verb tense, using phrases or sentences but not a mix).
This proposal was submitted by the CMP 16 Special Editorial Task Group during the development of the 2008 NEC. This proposal was rejected in order to comply with the NFPA Standards Council Decision 05-24 (SC #05-7-4) dated 29 July 2005. The Standards Council Decision does not apply to the current NEC code cycle.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-299 Log #157 NEC-P16 **Final Action: Accept in Principle**
(830.3(A) (New))

TCC Action: The Technical Correlating Committee directs that the panel reconsider its action on this proposal since there is no need to duplicate 90.3 in accordance with 4.1 of the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: In section 830.3, re-letter the existing (A) to (B), (B) to (C), etc. and establish a new (A).
(A) **Chapters 1 through 7.** See 90.3. The requirements of Chapters 1 through 7 shall not apply to Article 830 except where the requirements are specifically referenced in Article 830.
Substantiation: Section 90.3 is extremely important to the application of Article 830. Adoption of this proposal will add clarity.
Panel Meeting Action: Accept in Principle
Re-letter the existing (A) to (B), (B) to (C), etc. and establish a new (A).
(A) Chapters 1 through 7. The requirements of Chapters 1 through 7 shall not apply to Article 800 except where the requirements are specifically referenced in Article 800. See 90.3.
Panel Statement: Field experience shows that 90.3 is often overlooked. The panel moved the reference to 90.3 to the end for clarity.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: There is an error in the panel action. "Article 800" needs to be changed to "Article 830" twice.
IVANS, R.: There is an error in the panel action. "Article 800" needs to be changed to "Article 820" twice.

16-300 Log #2130 NEC-P16 **Final Action: Accept**
(830.3(A))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the following:
830.3(A) Hazardous (Classified) Locations. Network-powered broadband communications circuits and equipment installed in a location that is classified in accordance with 500.5 and 505.5 shall comply with the applicable requirements of Chapter 5.
Substantiation: This is a clarification proposal. This proposal is editorial and technical.
CMP 16 was instructed by the Technical Correlating Committee during the 2008 NEC ROP process to consider not only the different hazardous location division applications (500.5) but also the different hazardous location zone applications (505.5). This directive was issued for 2008 Proposal 16-121 which dealt with 800.3(A). This reference of 505.5 should be added here as well to correlate with Articles 800 and 820.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-301 Log #170 NEC-P16 **Final Action: Accept**
(830.15, FPN)

Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Change "telecommunications" to "communications".
Substantiation: Throughout Article 830 the term "communications" is used rather than "telecommunications". Also, Article 100 defines "Communications Equipment" not "Telecommunications Equipment". Use of terminology should be consistent throughout the Article.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-302 Log #3106 NEC-P16 **Final Action: Reject**
(830.24)

Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
830.24 Mechanical Execution of Work.
Network-powered broadband communications circuits and equipment shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform to 300.4~~(D)~~ and 300.11.
FPN: Text to remain unchanged.
Substantiation: This is one of a series of proposals intended to provide correlation with sections 640.6(B), 725.24, 760.24, 770.24, 800.24, 820.24 and 830.24. Due to the power limitations of these circuits, there is no reason that the requirements should be different.
Panel Meeting Action: Reject
Panel Statement: Physical protection is already covered in 830.157.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-303 Log #1204 NEC-P16 **Final Action: Reject**
(830.24 and Exception (New))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
~~Network powered broadband communication circuits and equipment shall be installed in a neat and workmanlike manner.~~ Cables ~~installed exposed on the surface of ceilings and sidewalls~~ shall be securely fastened and supported. Cables shall be located where not likely to be subject to physical damage or shall be protected by approved means. (remainder unchanged)
Add: Exception: Where fished between access points through concealed spaces in finished buildings or structures and fastening is not practicable.
Substantiation: "Workmanlike" is a term to be avoided per the Style Manual, is subjective and if the installation complies with the purpose of the Code (90.1 (A) there is no hazard. Whether exposed or concealed or on ceilings or sidewalls cables should be secured and supported. The means of support doesn't necessarily prevent physical damage. "Likely" is defined as such a nature or circumstance as to make something probable and is a term used in many sections. Proposed exception is similar to other such provisions in the Code.
Panel Meeting Action: Reject
Panel Statement: Physical protection is already covered under 830.157. "Neat and workmanlike manner" is recognized by other standards. The panel is aware of the guidance in the NEC Style Manual.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-304 Log #3724 NEC-P16 **Final Action: Accept in Principle**
(830.24, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add the following Fine Print Note:
FPN: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in air-handling plenums in accordance with 300.22.
Substantiation: This proposal addresses new requirements in NFPA 90A having an influence on installations in NEC Section 830.24, as well as held comments from the 2008 NEC Cycle, ROC 16-29 and 16-30.
Imposing the requirement that such products be "listed" in this section of the NEC would result in additional requirements not included in NFPA 90A. The implication of requiring listing in this section of the NEC would impose the full scope of requirements in UL 1565 for cable ties and UL 2239 for other support hardware. This effort to correlate with NFPA 90A would create big correlation issues within NFPA 70 for the same products used for supporting all other cables and conduits outside of the jurisdiction of code-making panel 16, for no good reason. It is not necessary to repeat requirements from NFPA 90A in NFPA 70 especially when doing so imposes unsubstantiated additional requirements.
The NFPA 90A requirements are focused on smoke and heat generated from a fire in an air-handling plenum. The NFPA 90A-2009 requirement is as follows for discrete combustible components installed in air-handling spaces in accordance with NEC 300.22 (C) and (D): (The actual clause numbers in NFPA 90A-2009 may vary editorially)

NFPA clause 4.3.10.2.6.5 Loudspeakers, recessed lighting fixtures and other electrical equipment with combustible enclosures, including their assemblies and accessories, cable ties and other discrete products shall be permitted in the ceiling cavity plenum where listed as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with UL2043, *Standard for Safety Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces.*

And very similar requirements in 4.3.10.6.5.6 apply in NFPA 90A for discrete <u>combustible</u> products installed in a "raised floor plenum".

Importantly, none of these requirements pertain to noncombustible products. There are many metallic products, including metallic cable ties, used to support power, data and communications conduits and cables and there has been no substantiation offered that these be required to be "listed".

Panel Meeting Action: Accept in Principle

Revise fine print note text to read as follows:

FPN No. 2: See NFPA 90A, Standard for Installation of Air-Conditioning and Ventilation Systems, for discrete combustible components installed in accordance with 300.22(B) and (C).

Panel Statement: The panel removed the vague term "air-handling plenums" and added the references to 300.22(B) and (C). This meets the submitter's intent.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-305 Log #4554 NEC-P16 **Final Action: Reject**
(830.25)

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council

Recommendation: Revise text as follows:

830.25 Abandoned Cables.

The accessible portion of abandoned network-powered broadband cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. <u>Removal of abandoned cables shall be performed in a neat and workmanlike manner.</u>

Substantiation: This proposal recommends added wording to ensure that abandoned cables are removed appropriately. Section 110.12 addresses installation and so does section 830.24. Moreover, section 110.12 would only apply if specifically referenced. It is important to point out that similar care must be taken when removing cables.

110.12 Mechanical Execution of Work.

Electrical equipment shall be installed in a neat and workmanlike manner.

FPN: Accepted industry practices are described in ANSI/NECA 1-2006, Standard Practices for Good Workmanship in Electrical Contracting, and other ANSI-approved installation standards.

Consistent wording is being proposed for other sections in the code.

For information, see relevant definitions in the NEC.

Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Concealed. Rendered inaccessible by the structure or finish of the building. Wires in concealed raceways are considered concealed, even though they may become accessible by withdrawing them.

Panel Meeting Action: Reject

Panel Statement: See panel statement on Proposal 16-24.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-306 Log #1599 NEC-P16 **Final Action: Reject**
(830.26)

Submitter: Russell LeBlanc, The Peterson School of Engineering

Recommendation: Add a third sentence to 830.26: <u>Conduits or raceways entering enclosures of the ventilated type, shall be sealed or plugged with an approved fire stopping material at the point of entrance to the enclosure to prevent fire, smoke, or other products of combustion from passing through the raceway into other areas of the building or structure.</u>

Substantiation: A fire in the area where the enclosure is located will produce smoke, poison gases, and other products of combustion which can easily be carried through the enclosure's vents and these unsealed raceways to other areas in the building. Essentially defeating any firewalls. I have not seen this particular problem addressed in building codes or fire resistance directories since these raceways are not "sleeves" which ARE required to be fire stopped, but rather they are complete raceway systems which generally require only sealing up around the OUTSIDE of the pipe where it penetrates a firewall. In this particular installation smoke could easily pass right through the INSIDE of the raceway because of the ventilation openings in the enclosure.

I have witnessed the results of this "chimney-effect" problem when the smoke from a fire in a basement electric room spread throughout the upper floors of a high rise building because the raceways leaving the switch gear acted like chimneys and transported heavy smoke from the basement directly to panelboards and switchboards on the upper floors of the building thus bypassing and defeating any fire walls that the raceways penetrated and completely filling the UPPER floors with smoke. Luckily nobody was injured. If the ends of the raceways were simply filled with some fire-stopping type caulk or similar material this situation would probably never have happened.

Once a fire starts to produce toxic fumes we almost have to think of that area as a Hazardous (classified) location similar to those in Article 500. We must try to prevent those hazardous gases passing from one area in a building to another.

Just as other sealing requirements throughout the code prevent moisture, condensation, dusts, gases or vapors from traveling through raceways, this requirement for some simple fire proof putty could prevent toxic fumes from spreading throughout the building. The seals required by this proposal are equally as important as any other seals required by the NEC such as 230.8, 300.5(G), 300.7(A), 300.50(E), 312.5(C) exception to (D), 324.40(A), 332.40(A), 368, 238, 372.7, 501.15, 502.15, 504.70, 505.16, 506.16, 680.24(B) and any other seals that may be required.

I am submitting companion proposals to sections 300.21, 770.26, 800.26, 820.26 and 830.26.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject

Panel Statement: The proposed recommendation is impractical. The submitter has not supplied sufficient data for substantiation of a problem.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

IVANS, R.: The submitter is correct that vented enclosures connected via unsealed raceways and conduit can bypass fire breaks between floors. It would not be impractical to seal such raceways or conduit.

16-307 Log #1203 NEC-P16 **Final Action: Reject**
(830.44(C))

Submitter: Dan Leaf, Seneca, SC

Recommendation: Revise text as follows:

Lead-in ~~or~~ <u>and</u> aerial drop network-powered broadband communication cable from a pole or other support including the point(s) of attachment to a building or structure shall <u>comply with 830.44 (I)</u> (1) ~~be kept away from electric light, power, Class I, or nonpower-limited fire alarm circuit conductors so as to avoid the possibility of accidental contact.~~ <u>except that lead-in and aerial drop network broadband communication cables shall have a separation of not less than 300 mm (12 in) from light, power, Class I, and nonpower-limited fire alarm open circuit conductors. The separation shall apply to all points along the conductors and shall be not less than 1.02m (40 in) at poles and other attachment points</u>.

Delete exception.

Substantiation: Section 830.44 provides specifics rather than kept away from. "Proximity" is not specific and the 12 in. clearance is the actual determining clearance which should apply to open light, power, Class 1 and nonpower-limited conductors whether or not they are "service" conductors.

Panel Meeting Action: Reject

Panel Statement: 830.44(C) addresses lead-in (drop) clearance and states in general terms that the drop should be kept away from specific other circuits. Specific separation for drops (12 in.) is given in the Exception; it is clear that, unless unattainable, separation should be greater than 12 in. Once the cable attaches to the building, specific clearances are provided in 830.44(I), (1) through (3). Additional clarification is unnecessary.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-308 Log #1999 NEC-P16 **Final Action: Reject**
(830.44(C) and (D)(3))

Submitter: Dan Leaf, Seneca, SC

Recommendation: In (C) change "avoid" to "minimize".

In (D)(3) insert "recreational vehicle parks, mobile home parks" after "traffic".

Substantiation: (C) is a generalized requirement which does not absolutely ensure the avoidance of accidental contact. In (D) These locations should be included; 551.79 appears to apply only to power and lighting conductors.

Panel Meeting Action: Reject

Panel Statement: The word "avoid" must be taken in the context of the sentence: network-powered broadband communications cables shall be kept far enough away so that accidental contact is not possible. 830.44(D)(3), in stating alleys, roads, and parking areas subject to truck traffic is sufficient to cover recreational vehicle and mobile home parks.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-309 Log #2000 NEC-P16 **Final Action: Reject**
(830.44(C) and (D)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: In (C) change "avoid" to "minimize".
In (D)(3) insert "recreational vehicle parks, mobile home parks" after "traffic".
Substantiation: These locations should be included; 551.79 appears to apply only to power and lighting conductors.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 16-308.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-309a Log #CP1601 NEC-P16 **Final Action: Accept**
(830.44(C) Exception)

Submitter: Code-Making Panel 16,
Recommendation: Revise existing 830.44(C) Exception text:
Exception: Where proximity to electric light, power, Class 1, or non–power-limited fire alarm circuit ~~service~~ conductors cannot be avoided, the installation shall ~~be such as to~~ provide clearances of not less than 300 mm (12 in.) from electric light, power, Class 1, or non–power-limited fire alarm circuit conductors ~~service drops~~.
The remainder of the text remains unchanged.
Substantiation: The panel identified the need for clarification in the exception. The panel recognizes that the term "fire alarm circuit service conductors" is not a defined term.
The panel notes that Proposal 16-126 relocated the existing 830.44(B) Exception to new 830.44(A)(4) Exception.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-310 Log #3425 NEC-P16 **Final Action: Reject**
(830.44(C) Exception)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
830.44(C)
Exception: Where proximity to electric light, power, Class 1, or non-power-limited fire alarm circuit service-entrance conductors cannot be avoided, the installation shall be such as to provide clearance not less than 300 mm (12 in.) from light, power, Class 1, or non-power-limited fire alarm circuit service-entrance conductors. (The remainder of the text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See panel action and statement on Proposal 16-243.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-311 Log #1750 NEC-P16 **Final Action: Accept in Principle**
(830.44(H))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Change "acceptable" to "identified".
Substantiation: Edit. "Identified" is defined in Article 100, is specific, and used through the Code. "Acceptable" is not necessarily the same.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-312.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-312 Log #1202 NEC-P16 **Final Action: Accept in Principle**
(830.44(H) and Exception)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal relating to "identified for the purpose" in compliance with the NEC Style Manual.
This action will be considered by the panel as a public comment.
Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
Aerial network broadband communications ~~extending~~ installed between structures or buildings and also their supports and attachments shall be identified ~~acceptable~~ for the purpose. ~~And have sufficient strength to withstand the loads to which they may be subjected.~~
Delete exception.
Substantiation: Spans between structures whether or not buildings should be included. "Identified" covers all aspects including cable strength, supports, attachments, messenger cable, etc. "acceptable" and "sufficient" are terms to be avoided per the Style Manual. The rule requires "sufficient" strength; the exception refers to insufficient strength but does not permit insufficient strength. Proposed text makes the exception unnecessary.
Panel Meeting Action: Accept in Principle
Revise existing 830.44(H) as follows:
(H) Between Buildings. Network-powered broadband communications cables extending between buildings or structures and also the supports or attachment fixtures shall be ~~acceptable~~ identified for the purpose and shall have sufficient strength to withstand the loads to which they may be subjected.
The remainder of the recommendation is rejected. The exception remains unchanged.
Panel Statement: The panel accepts the addition of the words "structure" and "identified".
Adding the word "aerial" is redundant as the entire Section 830.44 deals with aerial cables. Replacing "extending" with "installed" and "the" with "their" provides no improvement in clarity. The exception alerts the reader to an alternative to self-supporting cable and is therefore pertinent. With respect to adding "or structures', see panel action on proposal 16-313.
The NEC Style Manual, Section 3.2.1, identifies "acceptable" as a vague and unenforceable term.
While the use of the phrase "identified for the purpose" seems redundant based on the Art. 100 definition, use of "identified" alone fails to convey the full meaning.
The panel notes that Proposal 16-126 moved 830.44(H) to 830.44(F).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-313 Log #1246 NEC-P16 **Final Action: Accept**
(830.44(I)(4))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Add: "or structures" after "buildings".
Substantiation: Edit. Structures other than "buildings" should be included, such as poles. Through 830.44 D) covers clearance above grade for overhead spans to poles, the cables may be run down the poles.
Panel Meeting Action: Accept
Panel Statement: Proposal 16-126 moved 830.44(I) to 830.44(G).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-314 Log #2132 NEC-P16 **Final Action: Accept**
(830.47)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
830.47 Underground ~~Circuits~~ Network-Powered Broadband Communications Cables Entering Buildings.
Underground network-powered broadband communications cables entering buildings shall comply with 830.47(A) through (D).
Substantiation: This is an editorial proposal. It will improve clarity. The cables enter the buildings to feed the circuits. The circuits themselves are not entering the building.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-315 Log #3420 NEC-P16 **Final Action: Accept**
(830.47(B) Exception No. 1)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
830.47(B)
Exception No.1: Where electric service-entrance conductors or co-axial cables are installed in raceways or have metal cable armor.
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of “service drops” and “service laterals”. Those, too, are utility installed extensions of the services. What comes after the “point of delivery” or “the point of connection” are “service-entrance conductors,” either underground or overhead.
It is recognized, however, that the definitions of “service entrance conductors” (either overhead and/or underground) need to have the concept of “service point” added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of “Service Drop” and “Service Lateral” are “by current definitions and code requirements, not limited to the ‘utility company side of the service point’.” These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as “Service Drop” and “Service Lateral”) will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
IVANS, R.: The proposed change does not add any clarity to the interpretation or readability of the NEC regarding the use of the term “Service.” The submitter has not substantiated what value has been added by inserting the word “entrance”.

16-316 Log #1245 NEC-P16 **Final Action: Reject**
(830.47(B) Exceptions No. 1s and No. 2)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Delete Exception No. 1.
Revise Exception No. 2: Where electric light or ~~power branch circuit or feeder~~ conductors non-power-limited fire alarm circuit conductors ~~or~~ and Class 1 circuit conductors are installed in a separate raceway(s) or separate approved metal ~~sheathed metal clad~~ covered cables or Type UF or Type USE cables, or the network-powered broadband communication cables have metal cable armor or are installed in a separate raceway(s).
Substantiation: Exception No. 2 should apply to light and power circuits whether or not branch circuit or feeder conductors, such as service conductors. The raceway should be specified as separate for the system involved. Present wording does not specifically prohibit communication cables installed in the same raceway with other systems. Metal sheathed and metal clad implies Type MI and MC cables and Type MV cable permitted to be direct-buried (328.10(4)) which should not be exempted from the 12 in. separation requirement.
Panel Meeting Action: Reject
Panel Statement: The Panel understands that the submitter intended the proposal to apply to 830.47(B), Exceptions Nos. 1 and 2. The submitter provided no substantiation for deleting Exception No. 1. Exception No. 2 does apply to both electric light and power circuits as indicated by the punctuation of Exception No. 2. The submitter’s proposed revision provides no clarification.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-317 Log #401 NEC-P16 **Final Action: Accept**
(830.90(A), FPN 2(2))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change “per” to “each”.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. “Per” is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-318 Log #2133 NEC-P16 **Final Action: Accept**
(830.90(C))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the following:
(C) Hazardous (Classified) Locations. The primary protector shall not be located in any hazardous (classified) locations as defined in 500.5 and 505.5 or in the vicinity of easily ignitable material.
Exception: As permitted in 501.50, 502.150 and 503.150.
Substantiation: This is a clarification proposal. It is editorial and technical.
CMP 16 was instructed by the Technical Correlating Committee during the 2008 NEC ROP process to consider not only the different hazardous location division applications (500.5) but also the different hazardous location zone applications (505.5). This directive was issued for 2008 Proposal 16-121 which dealt with 800.3(A). This reference of 505.5 should be added here as well to correlate with all related sections that references these defined hazardous locations and hazardous location zones.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Ohde.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-319 Log #4563 NEC-P16 **Final Action: Reject**
(830.100 (New))

Submitter: Marcelo M. Hirschler, GBH International / Rep. American Fire Safety Council
Recommendation: Add the following new text:
830.100 Grounding. Article 250 covers the general requirements for grounding and bonding of network-powered broadband communications systems and their associated electrical installations, and the specific requirements in (1) through (5), unless otherwise indicated in 830.101(A) through (D).
(1) Systems, circuits, and equipment required, permitted, or not permitted to be grounded
(2) Circuit conductor to be grounded on grounded systems
(3) Location of grounding connections
(4) Types and sizes of grounding and bonding conductors and electrodes
(5) Methods of grounding and bonding
~~830.100~~ 830.101 Cable, Network Interface Unit, and Primary Protector Grounding.
Network interface units containing protectors, NIUs with metallic enclosures, primary protectors, and the metallic members of the network-powered broadband communications cable that are intended to be grounded shall be grounded as specified in 830.101(A) through (D) ~~830.100(A) through (D)~~.
(A) Grounding Conductor. *(no change to text except for renumbering section 830.100 to section 830.101)*
(B) Electrode. *(no change to text except for renumbering section 830.100 to section 830.101)*
(C) Electrode Connection. *(no change to text)*
(D) Bonding of Electrodes. *(no change to text)*
Substantiation: This proposal recommends wording to ensure that network-powered broadband communications systems appropriately comply with the grounding and bonding requirements of article 250, while recommending that Article 83 include specific requirements associated with network-powered broadband communications systems. This change is needed because Chapter 8 is independent of Chapters 1 through 4 and thus Article 250 on grounding. Please note that “medium power wiring” is included in Article 83 and not just low power wiring and that brings some additional needs.
Panel Meeting Action: Reject
Panel Statement: The NEC Style Manual, Section 4.1.1, prohibits reference to complete articles. A blanket statement referencing Article 250 is redundant as communications grounding requirements are fully covered in Article 830, IV. Grounding Methods, with specific reference to the applicable sections of Article 250 contained throughout Sections 830.100(B) and (C).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-320 Log #3107 NEC-P16 **Final Action: Accept in Principle**
(830.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Mike Holt, Leesburg, FL
Recommendation: Revise text as follows:
(1) Listing ~~Insulation~~. The grounding conductor ~~shall be insulated and~~ shall be listed.
Substantiation: There is no electrical reason that this conductor should be required to be insulated. This proposal provides consistency with nearly every other grounding/bonding related section of the code.
Panel Meeting Action: Accept in Principle
Revise 830.100(A)(1) to read as follows:
(1) Insulation. The grounding conductor shall be listed and shall be permitted to be insulated, covered, or bare.
Panel Statement: The grounding conductor does not need to be insulated but for esthetic reasons, such as exposed grounding conductors routed within a premises, insulation or covering may be appropriate. Adding “covered” accommodates Proposal 16-321. Permitting all three, “insulated, covered, or bare” will clarify that all three are now permitted since for many years only an insulated conductor was permitted.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-321 Log #4396 NEC-P16 **Final Action: Accept in Principle in Part**
(830.100(A)(1))

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal.
This action will be considered by the panel as a public comment.
Submitter: Jake Killinger, Underwriters Laboratories Inc.
Recommendation: Revise text as follows:
830.100 Cable, Network Interface Unit, and Primary Protector Grounding.
Network interface units (NIUs) containing protectors, NIUs with metallic enclosures, primary protectors, and the metallic members of the network-powered broadband communications cable that are intended to be grounded shall be grounded as specified in 830.100(A) through (D).
(A) Grounding Conductor.
(1) ~~Insulation~~Insulated or Covered Conductors. The grounding conductor shall be permitted to be insulated, or covered and shall be listed as Protector Grounding Conductors.
(remaining text remains unchanged)
Substantiation: This is a sister proposal to 800.100.
The existing text would require fully insulated and Listed conductors for cable and primary protector grounding whereas in most other cases, bare conductors are usually adequate for most grounding purposes. Prior to the 1990 NEC, protective grounding conductors were required to have 30 mil rubber insulation and be covered by a fibrous covering. It also permitted conductors Listed for this use having less than 30 mil rubber insulation or having other kinds of insulation. In 1990 the NEC removed the thickness statements so that it read the grounding conductor shall be insulated and shall be listed as suitable for the purpose. In 2008, the suitable for the purpose clause was removed.
Discussions with past members of this CMP revealed that the reason for specifying insulated conductors was only to combat theft of uncovered copper wire. That being the case, thinner insulated conductor was permitted so long as it gave the same illusion of a conductor carrying power.
Listed Protector Grounding Conductors having less than the full insulation of Listed and insulated conductors exist today. These are based on the past allowances for thinner insulations. The 2008NEC text would literally not permit the use of these thinner walled insulated conductors and would make their certification obsolete.
If the reason for using the term ‘insulated’ was merely to provide a theft deterrent, then fully insulated wire is unnecessary. By definition in Article 100, only a “covered” conductor would be more than adequate. Therefore propose changing the text to permit both “insulated as well as “covered” conductors.
Also propose adding “Protector Grounding Conductor” to help identify the type of Listed products suitable in this application. These “Protector Grounding Conductors” are surface marked with this terminology to make it clear that they are listed only for this purpose and are not intended for general use with other Articles in the Code. They are presently certified under UL’s KDER category, but may be relocated to the KDSH (Grounding and Bonding Equipment – Communication) category to make their restricted use more obvious.
Panel Meeting Action: Accept in Principle in Part
Panel Statement: The panel accepts in principle the part to add “covered”. See panel action and statement on Proposal 16-320, which now permits the use of listed insulated, covered, or bare conductors. The title is left as “insulation” since the paragraph now deals with levels of insulation.
The panel rejects the parts adding the phrases “permitted to be” and “as a protector grounding conductor”. The panel does not want to restrict the listed wire to only listed “protector grounding conductors”.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-322 Log #2002 NEC-P16 **Final Action: Accept in Part**
(830.100(A)(3))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text: The grounding conductor shall not be smaller than 14 AWG and shall have ~~a current carrying capacity approximately equal to that of~~ an ampacity not less than the grounded metallic members (remainder unchanged).
Substantiation: Edit. “Approximately equal” is vague and subjective; see table 3.2.1 of the Style Manual.
Panel Meeting Action: Accept in Part
Revise existing 830.100(A)(3) text as follows:
The grounding conductor shall not be smaller than 14 AWG and shall have a current-carrying capacity ~~approximately equal to~~ not less than that of the grounded metallic member(s) and protected conductor(s) of the network-powered broadband communications cable. The grounding conductor shall not be required to exceed 6 AWG.
Panel Statement: Communications grounding conductors are subject to transient conditions resulting from power fault and lightning events. “Ampacity” applies to a continuous (i.e., steady-state) condition and is inappropriate for communications grounding conductors (see Article 100).
The panel accepts the part to revise “approximately equal to” to “not less than”. The panel rejects the part to revise “a current-carrying capacity” to “an ampacity”.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-323 Log #3731 NEC-P16 **Final Action: Accept in Principle in Part**
(830.100(A)(4) Exception)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 830.100(A)(4), Exception as follows:
Exception: In one- and two-family dwellings where it is not practicable to achieve an overall maximum primary protector grounding conductor length of 6.0 m (20 ft), one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used as a separate communications electrode. ~~a separate communications ground rod meeting the minimum dimensional criteria of 830.100(B)(2)(2) shall be driven, and t~~ The primary protector shall be connected to the communications ~~ground rod~~ electrode(s) in accordance with 830.100(C), and the communications ~~ground rod~~ electrode(s) shall be connected to the power grounding electrode system in accordance with 830.100(D).
Substantiation: The current reference in this exception to 830.100(B)(2)(2) addressing a ground rod is incorrect as 830.100(B)(2)(2) addresses the attachment location of a grounding electrode conductor to an interior metal water pipe. In addition, it must be assumed that in the case of this exception a grounding electrode is not available within 20 feet of the communications system installation and that an electrode(s) is required to be installed and utilized. A ground rod is only one such electrode that can be installed therefore this exception should reference all electrodes that are practicable in such necessary installations.
In addition, the requirements of this section should state that where a grounding electrode is required to be installed, the electrode installed should be a ground ring, rod, pipe, plate, or other underground metal structure that is recognized by Article 250 and more specifically 250.52(A)(4), (A)(5), (A)(6), (A)(7), and (A)(8). This revision would bring the electrode requirements included in this exception into line with the requirements of Article 250 for both consistency and for technical application.
Panel Meeting Action: Accept in Principle in Part
Revise existing exception as follows:
Exception: In one- and two-family dwellings where it is not practicable to achieve an overall maximum grounding conductor length of 6.0 m (20 ft), a separate communications ground rod meeting the minimum dimensional criteria of 830.100(B)~~(2)~~(3)(2) shall be driven, and the grounding conductor shall be connected to the communications ground rod in accordance with 830.100(C). The communications ground rod shall be bonded to the power grounding electrode system in accordance with 830.100(D).
Reject the remainder of the proposal.
Panel Statement: The panel accepts in principle the part that states the reference to 830.100(B)(2)(2) is incorrect; the correct reference is 830.100 (B)(3)(2).
The panel rejects the remainder of the proposal. Referencing the grounding electrodes in 250.52(A)(4) through (A)(8) is unnecessary as:
1. 830.100(B)(1) through (3) presents a logical sequence for selecting the appropriate telecom grounding electrode, in order of preference. The first choice is the Intersystem Bonding Termination (introduced in the 2008 NEC), where available. The second choice is one of the electrodes of 830.100(B)(2). If none of the above are available, then an electrode as specified in 830.100(B)(3) is selected, some of which are contained in 250.52(A).
2. The electrodes identified in 250.52(A)(4) through (A)(8) are intended for power system applications. Network-powered broadband communications system currents are small, typically less than 100 mA. Where Network-powered broadband communications system circuits are subjected to power contact, currents are limited by the equivalent small gauge of the communications conductors, precluding the need for expansive and expensive grounding electrodes.
3. The submitter has provided no technical substantiation for revising the telecom grounding criteria and eliminating the 5-ft telecom ground rod that has been used successfully and safely by the telecom industry for decades.
4. Increasing the diameter and length of the telecom ground rod has minimal impact on grounding resistance (see Panel substantiation for Proposal 16-151).
5. The most important safety aspect is the bonding together of the power and telecom systems. When bonded together as specified in 830.100(D), intersystem voltages are equalized and the telecom grounding electrode, if separate, becomes part of the grounding electrode system at the premises.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-324 Log #197 NEC-P16 **Final Action: Accept**
(830.100(B))

TCC Action: The Technical Correlating Committee directs the panel to reconsider the action on this proposal as the existing numbering complies with the NEC Style Manual and is consistent with other lists in the code.
This action will be considered by the panel as a public comment.
Submitter: Stanley Kaufman, CableSafe Inc.
Recommendation: Renumber 830.100(B) as shown.
(B) Electrode. The grounding conductor shall be connected in accordance with 830.100(B)(1), (B)(2), or (B)(3).
(1) In Buildings or Structures with an Intersystem Bonding Termination. If the building or structure served has an intersystem bonding termination, the grounding conductor shall be connected to the intersystem bonding termination.
(2) In Buildings or Structures with Grounding Means. If the building or structure served has no intersystem bonding termination, the grounding conductor shall be connected to the nearest accessible location on the following:
(~~1~~a) The building or structure grounding electrode system as covered in 250.50
(~~2~~b) The grounded interior metal water piping system, within 1.5 m (5 ft) from its point of entrance to the building, as covered in 250.52
(~~3~~c) The power service accessible means external to enclosures as covered in 250.94
(~~4~~d) The metallic power service raceway
(~~5~~e) The service equipment enclosure
(~~6~~f) The grounding electrode conductor or the grounding electrode metal enclosure, or
(~~7~~g) The grounding conductor or the grounding electrode of a building or structure disconnecting means that is grounded to an electrode as covered in 250.32
A bonding device intended to provide a termination point for the grounding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is non-removable.
For purposes of this section, the mobile home service equipment or the mobile home disconnecting means, as described in 830.93, shall be considered accessible.
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 830.100(B)(2), the grounding conductor shall be connected to either of the following:
(~~1~~a) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4).
(~~2~~b) If the building or structure served has no intersystem bonding termination or has no grounding means, as described in 830.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(7) and (A)(8), or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or lightning-rod conductors shall not be employed as electrodes for protectors, NIUs with integral protection, grounded metallic members, NIUs with metallic enclosures, and other equipment.
Substantiation: The current numbering is not in compliance with the style manual. See section 2.1.5.3 of the NEC Style Manual.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-325 Log #3312 NEC-P16 **Final Action: Reject**
(830.100(B))

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise (B)(2)(3): The electric power service accessible means external to enclosures as covered in 250.84(B)(2)(4): The metallic nonflexible power service raceway.
Substantiation: Edit. "Power" may infer that a service only for lighting is not acceptable. Flexible service raceways do not seem suitable for connection of ground clamps.
Panel Meeting Action: Reject
Panel Statement: See panel action on Proposal 16-257.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
BRUNSSEN, J.: The Panel Meeting Action should be 'Accept in Principle in Part', based upon the Panel Meeting Action on similar proposals to other articles by this submitter (see the Panel Meeting Action on Proposals 16-35, -149, -216a and -258). Add "nonflexible" to 830.100(B)(2)(4) as follows: "(4) The nonflexible metallic power service raceway." The remainder of the proposal should continue to be rejected.

16-325a Log #CP1609 NEC-P16 **Final Action: Accept**
(830.100(B)(1))

Submitter: Code-Making Panel 16,
Recommendation: Revise 830.100(B)(1) as follows:
"If the building or structure served has an intersystem bonding termination as required by 250.94, the grounding conductor shall...".
Substantiation: This change provides correlation with the revision to 800.100(B)(1) accepted by the Panel. See Panel action on Proposal 16-147.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-326 Log #1139 NEC-P16 **Final Action: Accept**
(830.100(B)(1), FPN (New))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Add the FPN following 830.100(B) (1):
FPN: See Article 100 for the definition of *Intersystem Bonding Termination.*
Substantiation: *Intersystem Bonding Termination* is a new and unfamiliar term introduced in the 2008 NEC. The FPN reference to Article 100 will help ensure that NEC users not only become familiar with the new terminology, but encourage application of this preferred intersystem bonding arrangement as well.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-327 Log #3730 NEC-P16 **Final Action: Reject**
(830.100(B)(3))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Revise 830.100(B)(3) as follows:
(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 830.100(B)(2), one or more of the grounding electrodes specified in 250.52(A)(4) through (A)(8) shall be installed and used with the requirements of 250.56 being applicable to rod, pipe, and plate electrode installations. ~~the grounding conductor shall be connected to either of the following:~~
~~(1) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4).~~
~~(2) If the building or structure served has no intersystem bonding termination or has no grounding means, as described in 830.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(7) and (A)(8), or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (½ in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or lightning-rod conductors shall not be employed as electrodes for protectors, NIUs with integral protection, grounded metallic members, NIUs with metallic enclosures, and other equipment.~~
Substantiation: The requirement in existing 830.100(B)(3)(1) to connect the grounding electrode conductor to either a metal underground water pipe, the metal frame of a building or structure, a concrete-encased electrode, or a ground ring seems to require these electrodes to be installed as the subject of this section is **"Buildings or Structures Without …. Grounding Means."** This is not consistent with 250.50 that only requires the use of such electrodes where they are "present at each building or structure served." In addition, the first sentence of 830.100(B)(3)(2) is not a complete sentence, is simply a list of references, and thus has no meaning. In addition, it allows either a rod or pipe electrode to be used that is only 1.5 m (5 ft) in length and 12.7 mm (½ in.) in diameter and driven where practicable into permanently damp earth. Into permanent damp earth is a good requirement but is doubtfully attained with a ½ in. rod or ½ in. pipe 5 ft in length.
The requirements of this section should state that where a building or structure is without grounding means, it is to have such reasonable grounding means installed such as a ground ring, rod, pipe, plate, or other underground metal structure that is recognized by Article 250 and more specifically 250.52(A)(4), (A)(5), (A)(6), (A)(7), and (A)(8). Also, 250.56 already requires that rod, pipe, and plate electrodes that do not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52(A)(4) through (A)(8), and that where multiple rod, pipe, or plate electrodes are installed to meet the requirements of this section, they shall not be less than 1.8 m (6 ft) apart. This revision would bring the grounding of network-powered broadband communications systems circuits into line with the requirements of Article 250 for both consistency and for technical application.
In addition 250.60 already states, "Air terminal conductors and driven pipes, rods, or plate electrodes used for grounding air terminals shall not be used in lieu of the grounding electrodes required by 250.50 for grounding wiring systems and equipment." With the revisions being sought, these revisions would also prohibit other possible electrodes not recognized by 250.52.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided no technical substantiation for eliminating the 5-ft telecom ground rod, currently permitted by 830.100(B)(3)(2), that has been used successfully and safely by the telecom industry for decades. The tutorial, The ABCs of Grounding and Bonding, states: "Very little resistance change will result from using larger sizes of electrodes." The most important safety aspect is the bonding together of the power and telecom systems. When bonded together as specified in 830.100(D), intersystem voltages are equalized and the network-powered broadband communications system grounding electrode, if separate, becomes part of the grounding electrode system at the premises.
The electrodes identified in 250.52(A)(4) through (A)(8), as proposed by the submitter, are intended for power system applications. Network-powered broadband communications system currents are small, typically less than 100 mA. Where power contact to network-powered broadband communications systems is of concern (i.e., power fault) currents are limited by the equivalent small gauge of the Network-Powered Broadband Communications System conductors, precluding the need for expansive and expensive grounding electrodes.
Finally, the title of 830.100(B)(3), "In Buildings or Structures Without …… Grounding Means" must be considered in context with the preceding Section 830.100(B)(2) where specific grounding means at the building or structure are identified.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-328 Log #1140 NEC-P16 **Final Action: Accept**
(830.106(A)(1))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
"… the network-powered broadband communications cable, network interface unit, and primary protector ground shall be installed connected to a grounding conductor in accordance with ~~830.100(B)(2)~~ 830.100(B)(3)."
Substantiation: The reference is incorrect. In the 2005 NEC 830.106(A)(1) referred to 830.100(B)(2). That information is now contained in 830.100(B)(3) in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-329 Log #1141 NEC-P16 **Final Action: Accept**
(830.106(A)(2))

Submitter: James E. Brunssen, Telecordia Technologies Inc. / Rep. Alliance for Telecommunications Industries Solutions (ATIS)
Recommendation: Revise the text as follows:
"… the network-powered broadband communications cable, network interface unit, and primary protector ground shall be installed connected to a grounding conductor in accordance with ~~830.100(B)(2)~~ 830.100(B)(3)."
Substantiation: The reference is incorrect. In the 2005 NEC 830.106(A)(1) referred to 830.100(B)(2). That information is now contained in 830.100(B)(3) in the 2008 NEC.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-330 Log #2121 NEC-P16 **Final Action: Accept**
(830.110)

TCC Action: The Technical Correlating Committee directs that the panel clarify the panel action on this proposal related to "Chapter 3 Raceways".
This action will be considered by the panel as a public comment.
Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise 830.110 as follows:
830.110 Raceways for Low- and Medium- Power Network- Powered Broadband Communications Cables.
(A) Chapter 3 Raceways. ~~Where~~ Low-and medium- power network-powered broadband communications cables shall be permitted to be ~~are~~ installed ~~in a~~ any raceway~~, the raceway shall be either of a type~~ included ~~permitted~~ in Chapter 3. The raceways shall be ~~and~~ installed in accordance with the requirements of Chapter 3.
(B) Raceway Fill for Network- Powered Broadband Communications Cables. Raceway fill for network-powered broadband communications cables shall comply with either (B)(1) or (B)(2)
(1) Low-Power Network-Powered Broadband Communications Cables. Raceway ~~Conduit~~ fill ~~restrictions~~ requirements of Chapter 3 and Chapter 9 shall not apply to low-power network-powered broadband communications cables.

(2) Medium-Power Network-Powered Broadband Communications Cables. Where medium-power network- powered broadband communications cables are installed in a raceway, the raceway fill requirements of Chapter 3 and Chapter 9 shall apply.

~~*Exception: Conduit fill restrictions shall not apply* low-power network-powered broadband communications cables.~~

Substantiation: This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 830.113.

Besides moving the requirements a correction was made to 830.154(C)(5), which is 830.113(F)(4). Grounding block was changed to NIU because Article 830 installations terminate at an NIU (Network Interface Unit) rather than a grounding block.

A companion proposal for section 830.154 greatly simplifies the statement of the applications of communications cables and raceways by using a table.

This proposal and its companion proposal for section 830.154 need to be considered together as a package.

Panel Meeting Action: Accept

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-331 Log #2122 NEC-P16 **Final Action: Accept in Principle**
(830.113 (New) and 830.151)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Delete section 830.151.

830.113 Installation of Network-Powered Broadband Communications Cables.. Installation of network-powered broadband communications cables shall comply with 830.113 (A) through (F).

(A) Listing. Network-powered broadband communications cables installed in buildings shall be listed.

(B) Air Ducts and Plenums. The following cables shall be permitted to be installed in air ducts and plenums as described in 300.22(B).

(1) Type BLP

(2) Types BLP, BMR, BLR, BM, BL and BLX installed in raceways that are installed in compliance with 300.22(B)

(C) Other Spaces Used For Environmental Air. The following cables shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C).

(1) Type BLP

(3) Types BLP, BMR, BLR, BM, BL and BLX installed in raceways that are installed in compliance with 300.22(C)

(D) Risers- Cables in Vertical Runs. The following cables shall be permitted in vertical runs penetrating more than one floor and in vertical runs in a shaft:

(1) Types BLP, BMR and BLR

(2) Types BMR and BM encased in a metal raceway or in a fireproof shaft having firestops at each floor

FPN: See 830.26 for firestop requirements for floor penetrations.

(E) Risers-Cables in Metal Raceways, Fireproof Shafts and One- and Two-Family Dwellings. The following cables shall be permitted in metal raceway, in a fireproof shaft with firestops at each floor and in one- and two-family dwellings:

(1) Types BLP, BMR, BLR, BM, BL and BLX

FPN: See 830.26 for firestop requirements for floor penetrations.

(F) Other Building Locations. The following cables and raceways shall be permitted to be installed in building locations other than the locations covered in 830.113(B) through (E).

(1) Types BLP, BMR, BLR, BM and BL

(2) Types BLP, BMR, BLR, BM, BL and BLX installed in raceway

(3) Types BLX and BL less than 10 mm (0.375 in.) in diameter in one- and two-family dwellings

(4) Types BMU and BLU cables entering the building from outside and run in rigid metal conduit or intermediate metal conduit where the conduits is connected by a grounding conductor to an electrode in accordance with 830.100(B).

(3) Types BLX and BL cables less than 10 mm (0,375 in.) in diameter in one- and two-family dwellings

(4) A maximum length of 15 m (50 ft) within the building of Type BLX cable entering the building from outside and terminated at a NIU or a primary protection location

FPN to (4): This provision limits the length of Type BLX cable to 15 m (50 ft), while 830.90(B) requires that the primary protector, or NIU with integral protection, be located as close as practicable to the point at which the cable enters the building. Therefore, in installations requiring a primary protector, or NIU with integral protection, Type BLX cable may not be permitted to extend 15 m (50 ft) into the building if it is practicable to place the primary protector closer than 15 m (50 ft) to the entrance point.

Substantiation:

This proposal is editorial and technical.

The cable and raceway applications sections of articles 770, 800, 820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal moves those installation rules to section 830.113.

Besides moving the requirements a correction was made to 830.154(C)(5), which is 830.113(F)(4). Grounding block was changed to NIU because Article 830 installations terminate at an NIU (Network Interface Unit) rather than a grounding block.

A companion proposal for section 830.154 greatly simplifies the statement of the applications of communications cables and raceways by using a table. This proposal and its companion proposal for section 830.154 need to be considered together as a package.

Panel Meeting Action: Accept in Principle

Revise 830.113 text and replace in entirety as follows:

830.113 Installation of Network-Powered Broadband Communications Cables. Installation of network-powered broadband communications cables shall comply with 830.113 (A) through (F).

(A) Listing. Network-powered broadband communications cables installed in buildings shall be listed.

(B) Fabricated Ducts and Plenums. The following cables shall be permitted to be installed in air ducts and plenums as described in 300.22(B) if they are directly associated with the air distribution system:

(1) Up to 1.22 m (4 ft) of Type BLP

(2) Types BLP, BMR, BLR, BM, BL, and BLX installed in raceways that are installed in compliance with 300.22(B)

FPN: See 4.3.4 and 4.3.11.3.3 of NFPA 90A-2009, Standard for the Installation of Air-Conditioning and Ventilation Systems, for information on wire and cables in air ducts and apparatus casings plenums. See 3.3.22 for the definition of an apparatus casing plenum.

(C) Other Spaces Used For Environmental Air (Plenums). The following cables shall be permitted to be installed in other spaces used for environmental air as described in 300.22(C):

(1) Type BLP

(2) Type BLP supported by metallic cable trays or cable tray systems

(3) Types BLP, BMR, BLR, BM, BL, and BLX installed in raceways that are installed in compliance with 300.22(C)

FPN: See 4.3.11.2, 4.3.11.4, and 4.3.11.5 of NFPA 90A-2009, Standard for the Installation of Air-Conditioning and Ventilation Systems, for information on wire, cables, and raceways in ceiling cavity, raised floor, and air-handling unit room plenums. See 3.3.22 for plenum definitions.

(D) Risers-Cables in Vertical Runs. Types BLP, BMR, and BLR cables shall be permitted in vertical runs penetrating one or more floors and in vertical runs in a shaft.

FPN: See 830.26 for firestop requirements for floor penetrations.

(E) Risers-Cables in Metal Raceways or Fireproof Shafts. Types BLP, BMR, BLR, BM, BL, and BLX cables shall be permitted in metal raceway or in a fireproof shaft with firestops at each floor.

FPN: See 830.26 for firestop requirements for floor penetrations.

(F) Risers-Cables in One- and Two-Family Dwellings. Types BLP, BMR, BLR, BM, BL, and BLX cables shall be permitted in one- and two-family dwellings.

FPN: See 830.26 for firestop requirements for floor penetrations.

(G) Other Building Locations. The following cables and raceways shall be permitted to be installed in building locations other than the locations covered in 830.113(B) through (F):

(1) Types BLP, BMR, BLR, BM, and BL

(2) Type BLX installed in a raceway

(3) Types BLP, BMR, BLR, BM, and BL

(4) Types BLX and BL less than 10 mm (0.375 in.) in diameter in one- and two-family dwellings

(5) Types BMU and BLU cables entering the building from outside and run in rigid metal conduit or intermediate metal conduit where the conduits is connected by a grounding conductor to an electrode in accordance with 830.100(B).

FPN: This provision limits the length of Type BLX cable to 15 m (50 ft), while 830.90(B) requires that the primary protector, or NIU with integral protection, be located as close as practicable to the point at which the cable enters the building. Therefore, in installations requiring a primary protector, or NIU with integral protection, Type BLX cable may not be permitted to extend 15 m (50 ft) into the building if it is practicable to place the primary protector closer than 15 m (50 ft) to the entrance point.

(6) A maximum length of 15 m (50 ft) within the building of Type BLX cable entering the building from outside and terminated at a NIU or a primary protection location.

Panel Statement: See panel statement on Proposals 16-160 and 16-172. The text is a combination of the text from Proposal 16-331, which has been modified to improve clarity, with text to incorporate panel actions to accept in principle Proposals 16-340 (metallic cable tray) and 16-338 and 16-341 (requiring riser cable for penetration of one floor) and by modifications to correlate with NFPA 90A-2009.

The revised text relocates the wire, cable, and raceway installation rules from 830.154 and also includes installation rules from 830.110.

The panel recognizes that this proposal is a companion proposal to Proposal 16-339 and has considered them together.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

Comment on Affirmative:

DORNA, G.: The proposal recommended for the deletion of section 830.151. The panel action needs to be clarified to show that the recommendation to delete section 830.151 was accepted.

Also, see my comment on proposal 16-48.

IVANS, R.: We agree with the revision proposal prepared by the CMP 16 Special Editorial Task Group. The proposal recommended for the deletion of section 830.151. The panel action needs to be clarified to show that the recommendation to delete section 830.151 was accepted.

Also, see my comment on proposal 16-48.

16-332 Log #2461 NEC-P16 **Final Action: Reject**
(830.133)

Submitter: Joseph P. Savage, FIFTH Council North America
Recommendation: Add the following line to 830.133

(6) Premises-powered broadband communications circuits, in compliance with Article 8XX.

Substantiation: A submission has been made for a new Article to Chapter 8. If this Article is accepted, then Article 830.133 should include the above added reference.
Panel Meeting Action: Reject
Panel Statement: The recommendation is not needed since it is already covered in Article 830.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-332a Log #CP1611 NEC-P16 **Final Action: Accept**
(830.133(A)(1))

Submitter: Code-Making Panel 16,
Recommendation: Revise 830.133(A)(1) Title to read as follows:

(1) In Raceways, Cable Trays, Boxes, and Enclosures.

Substantiation: The panel revised the title to include "Boxes" in order to provide consistency.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-333 Log #2123 NEC-P16 **Final Action: Accept**
(830.133(A)(1)(b) and (c))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:

(b) *Low-Power Network-Powered Broadband Communications Circuit Cables.* Low-power network-powered broadband communications cables shall be permitted in the same raceway, cable tray, or enclosure with jacketed cables of any of the following circuits:

(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Parts I and III of Article 725

(2) Power-limited fire alarm systems in compliance with Parts I and III of Article 760

(3) Communications circuits in compliance with Parts I and IV of Article 800

(4) Nonconductive and conductive optical fiber cables in compliance with Parts I and IV of Article 770

(5) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820

(c) *Medium-Power Network-Powered Broadband Communications Circuit Cables.* Medium-power network-powered broadband communications cables shall not be permitted in the same raceway, cable tray, or enclosure with conductors of any of the following circuits:

(1) Class 2 and Class 3 remote-control, signaling, and power-limited circuits in compliance with Parts I and III of Article 725

(2) Power-limited fire alarm systems in compliance with Parts I and III of Article 760

(3) Communications circuits in compliance with Parts I and IV of Article 800

(4) Conductive optical fiber cables in compliance with Parts I and IV of Article 770

(5) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820.

Substantiation: This proposal is editorial and technical. It refines the references to the articles in order to comply with the style manual.

The NEC Style Manual states:

4.1.1 References to a Part Within an Article. References shall not be made to an entire article, such as "grounded in accordance with Article 250" unless additional conditions are specified. References to parts within articles shall be permitted.

This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-334 Log #4694 NEC-P16 **Final Action: Reject**
(830.133(A)(2) Exception No. 3 (New))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Add a third exception as follows:

Exception No. 3: Where all of the electric light, power, Class 1, and non-power limited fire alarm circuit conductors are permanently separated from all of the network-powered broadband communications cables through the use of sheathing that provides for system separation that does not rely on conductor or cable insulation alone, the combination of conductors comprising different systems shall be permitted to be combined into a listed hybrid cable assembly.

Substantiation: There is not and has never been any express permission to include network-powered conductors within a common cable assembly with power conductors. Para (2) here comes the closest, because it recognizes a "continuous and firmly fixed nonconductor." This is crucial to the production of hybrid cables, where additional separation beyond the conductor insulation is applied to the power-limited conductors in accordance with the spirit of these principles. For example, 334.116(C) expressly recognizes this type of construction for Type NMS cable, and UL has been listing such constructions for many years. This topic must be addressed in the limited-power wiring articles, and this proposal is designed to raise the issue.
Panel Meeting Action: Reject
Panel Statement: The submitter has not cited an application for hybrid network-powered broadband/electric power cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-335 Log #2124 NEC-P16 **Final Action: Accept**
(830.133(B))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise the title of 830.133(B) as follows:
(B) Support of ~~Conductors~~ Network-Powered Broadband Communications Cables. Raceways shall be used for their intended purpose. Network-powered broadband communications cables shall not be strapped, taped, or attached by any means to the exterior of any conduit or raceway as a means of support.
Substantiation: This proposal is editorial. The addition of the wording "Network-Powered Broadband Communications Cables" is more appropriate than conductors as this section deals with network-powered broadband communications cables and not conductors.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-336 Log #2125 NEC-P16 **Final Action: Accept**
(830.133(C))

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Delete 830.133(C)
~~**Installation and Use.** Section 110.3(b) shall apply~~

Relocate the same to 830.3(F).

830.3 (F) Installation and Use. 110.3 (B) shall apply.
Substantiation: This change is both editorial and technical. This proposal relocates the requirements in 830.133(C) to a more appropriate section 830.3 (F) – Other Articles. The requirements of 110.3 (B) really apply to the entire Article 830 therefore the requirements of 110.3(B) should be inserted in 830.3.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-337 Log #2288 NEC-P16 **Final Action: Reject**
(830.135)

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Add a new Section to read as follows:
830.135 Network-Powered Broadband Communication Device and Equipment Mounting. Network-Powered Broadband Communication devices or equipment shall be mounted in listed boxes, brackets or assemblies designed for the purpose, and such boxes or assemblies shall be securely fastened in place. Boxes or brackets can be completly enclosed or backless.
(A) Network-Powered Broadband Communication Devices and Equipment Mounted to Boxes or Brackets. Communication devices or equipment shall be mounted to a listed boxes or bracket and installed per 314.20.
(B) Network-Powered Broadband Communication Devices and Equipment Mounted on Covers. Communication device and equipment mounted to and supported by a cover shall be held rigidly against the cover which is mounted to the box or bracket.
Substantiation: This proposal adds a new section to Article 830 addressing the mounting of devices or equipment to listed boxes and brackets. Currently, depending on the quality of workmanship, Network-Powered Broadband Communication devices or equipment have not been mounted to boxes or brackets that can support them. After several years device and/or covers that are mounted directly to the dry wall will become hazard because they have become loose and exposed. Network-Powered Broadband Communication cable can become energized by coming in incidental contact with electrical conductors.
830.135 was only a suggestion for the location of this new section. (A) addresses devices mounted directly to boxes or devices where as (B) address devices mounted to covers.
Panel Meeting Action: Reject
Panel Statement: Not all network-powered broadband communications equipment and devices need to be mounted in boxes, brackets or assemblies.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 14 Negative: 2
Explanation of Negative:
IVANS, R.: Loose and exposed cable or connectors can pose a risk of electric shock. Network Powered Broadband Circuits can pose a risk of electric shock and should not become accessible. Ringing voltages can exceed 100V and should not become easily accessible. Loose cabling and connectors can come into contact with electric light and power conductors. There are boxes and brackets listed for this purpose using UL Subject 2269, “Outline of Investigation for Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes.”
OHDE, H.: See our Negative Comment on Proposal 16-171.

16-338 Log #2213 NEC-P16 **Final Action: Accept in Principle**
(830.151(B))

Submitter: Robert W. Jensen, dbi / Rep. BICSI
Recommendation: Revise text as follows:
Cables installed in vertical runs and penetrating one or more floors ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type BMR. Floor penetrations requiring Type BMR shall contain only cables suitable for riser or plenum use.
Exception No. 1: Type BM cables encased in metal raceway or located in a fireproof shaft that has firestops at each floor.
Exception No. 2: Type BM cables in one- and two-family dwellings.
Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-331.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: The current riser requirements are so complicated that they could be considered to be a “vague and unenforceable”.
Section 830.151(B) requires that “Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type BMR. Floor penetrations requiring Type BMR shall contain only cables suitable for riser or plenum use”. Consequently at least two floor penetrations are required, one for plenum and riser cables and another for general-purpose cables.
The panel action on this proposal greatly simplifies the installation rules for cables in risers in other than one and two-family dwellings. The installation rules for one and two-family dwellings are already simplified since any listed cable is permitted.

16-339 Log #2126 NEC-P16 **Final Action: Accept in Principle**
(830.154)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Revise text to read as follows:
~~**830.154 Applications of Low-Power Network-Powered Broadband Communications System Cables.**~~
~~Low-power network-powered broadband communications systems shall comply with any of the requirements of 830.154(A) through (C).~~
~~**(A) Plenums.** Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type BLP. Type BLX cable installed in compliance with 300.22 shall be permitted.~~
~~**(B) Riser.** Cables installed in risers shall comply with any of the requirements in 830.154(B)(1), (B)(2), or (B)(3).~~
~~**(1) Cables in Vertical Runs.** Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type BLP, BLR, or BMR. Floor penetrations requiring Type BMR or BLR shall contain only cables suitable for riser or plenum use.~~
~~**(2) Metal Raceways or Fireproof Shafts.** Type BLX cables shall be permitted to be encased in a metal raceway or located in a fireproof shaft having firestops at each floor.~~
~~**(3) One- and Two-Family Dwellings.** Type BLX or BL cables less than 10 mm (0.375 in.) in diameter shall be permitted in one- and two-family dwellings.~~
~~(C**) Other Wiring** Within Buildings. Cables installed in locations other than those covered in 830.154(A) and (B) shall comply with the requirements of 830.154(C)(1) through (C)(5).~~
~~**(1) General.** Type BLP, BL, or BM shall be permitted.~~
~~**(2) In Raceways.** Type BLX shall be permitted to be installed in a raceway.~~
~~**(3) Type BLU Cable.** Type BLU cable entering the building from outside shall be permitted to be run in rigid metal conduit or intermediate metal conduit. Such conduits shall be connected by a grounding conductor to an electrode in accordance with 830.100(B).~~
~~**(4) One- and Two-Family Dwellings.** Type BLX or BL cables less than 10 mm (0.375 in.) in diameter shall be permitted to be installed in one- and two-family dwellings.~~
~~**(5) Type BLX Cable.** Type BLX cable entering the building from outside and terminated at a grounding block or a primary protection location shall be permitted to be installed, provided that the length of cable within the building does not exceed 15 m (50 ft).~~
~~FPN: This provision limits the length of Type BLX cable to 15 m (50 ft), while 830.90(B) requires that the primary protector, or NIU with integral protection, be located as close as practicable to the point at which the cable enters the building. Therefore, in installations requiring a primary protector, or NIU with integral protection, Type BLX cable may not be permitted to extend 15 m (50 ft) into the building if it is practicable to place the primary protector closer than 15 m (50 ft) to the entrance point.~~
~~(D) Cable Substitutions. The substitutions for network-powered broadband cables listed in Table 830.154 shall be permitted. All cables in Table 830.154, other than network-powered broadband cables, shall be coaxial cables.~~
830.154 Applications of Network-Powered Broadband Communications System Cables. Permitted and non-permitted applications of listed network-powered broadband communications system cables shall be as indicated in Table 830.154(A). The substitutions for network-powered broadband system cables listed in Table 830.154(B) shall be permitted.

See Table 830.154(A) on page 1151

(Renumber Table 830.154 to Table 820.154(B) and insert it here.) (Not submitted).

Substantiation: This proposal is editorial and technical.
The cable and raceway applications sections of articles 770, 800,820 and 830 (xxx.154) contain more than applications; they also contain installation rules. These installation rules are in the wrong place; the right place is the installation sections. This proposal for section 820.154 greatly simplifies the statement of the applications of optical fiber cables and raceways by using a table where the permitted applications are indicated by a “Y” and the applications that are not permitted are indicted by an “N”. A companion proposal moves the installation rules to section 830.113 Installation of Network-Powered Broadband Cables.
This proposal makes no changes to the existing permitted and not permitted applications of network-powered broadband cables.
This proposal and its companion proposal for section 830.113 need to be considered together as a package.
This proposal is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group for the 2011 NEC. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.

Table 830.154(A), Applications of Network Powered Broadband Cables

Cable Type	Applications								
	In air ducts and plenums as described in 300.22(B)	In other spaces used for environmental air as described in 300.22(C)	In risers	In building locations other than air ducts, plenums, other spaces used for environmental air and, risers	In one- and two-family dwellings	In nonconcealed spaces	In cable trays	In rigid metal conduit and intermediate metal conduit	In any raceway in Chapter 3
BLP	Y	Y	Y	Y	Y	Y	Y	Y	Y
BMR, BLR	N	N	Y	Y	Y	Y	Y	Y	Y
BM, BL	N	N	Y	Y	Y	Y	Y	Y	Y
BLX	N	N	Y	Y	Y	Y	N	Y	Y
BLU	N	N	N	N	N	N	N	Y	N

Note. Applications indicated by "Y" shall be permitted. Applications indicated by an "N" shall not be permitted.

(Renumber Table 830.154 to Table 820.154(B) and insert it here.)

16-339 Rec

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept in Principle

See Table 730.154(A) on page 1153

Panel Statement: See panel statement on Proposals 16-160, 16-172, and 16-331.
The non-permitted applications were determined by considering the listing requirements for the cable. Other non-permitted applications were determined from existing code requirements as determined by the panel.
The panel recognizes that this proposal is a companion proposal to Proposal 16-331 and has considered them together.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: See my comments on proposals 16-48 and 16-56.
Since the new 830.154 includes medium-power and low-power applications, emphasizing compliance with 830.40 should be helpful.
In addition the panel action needs to be expanded to delete the current 830.151 because its contents have been incorporated into the panel actions on proposals 16-331 and 16-339.
The revised 830.154 should appear as shown below:
830.154 Applications of Network-Powered Broadband Communications System Cables. Permitted and non-permitted applications of listed network-powered broadband communications system cables shall be as indicated in Table 830.154(A). The permitted applications are subject to the installation rules of 830.40, 830.110 and 830.113. The substitutions for network-powered broadband system cables listed in Table 830.154(B) shall be permitted.

See Table 830.154(A) on page 1154

(Renumber Table 830.154 to Table 830.154(B) and insert it here.)
IVANS, R.: See my comments on proposals 16-48 and 16-56.
Since the new 830.154 includes medium-power and low-power applications, emphasizing compliance with 830.40 should be helpful.
In addition the panel action needs to be expanded to delete the current 830.151 because its contents have been incorporated into the panel actions on proposals 16-331 and 16-339.
The revised 830.154 should appear as shown below:
830.154 Applications of Network-Powered Broadband Communications System Cables. Permitted and non-permitted applications of listed network-powered broadband communications system cables shall be as indicated in Table 830.154(A). The permitted applications are subject to the installation rules of 830.40, 830.110 and 830.113. The substitutions for network-powered broadband system cables listed in <u>Table 830.154(B)</u> shall be permitted.

We have an additional recommendation for a reformatted table structure for Table 830.154(A) (technical content unchanged).

See Table 830.154(A) on page 1155

(Renumber Table 830.154 to Table 830.154(B) and insert it here.)

16-340 Log #131 NEC-P16 **Final Action: Accept in Principle**
(830.154(B))

Submitter: Gerald Lee Dorna, Belden
Recommendation: Add the following text at the end of 830.154(B):
<u>Metallic cable trays and metallic cable tray systems shall be permitted to be installed in other spaces used for environmental air. Type BLP cables shall be permitted to be installed in these cable trays and cable tray systems. Types BMR, BLR, BM, BL and BLX, cables shall not be permitted to be installed in these cable trays and cable tray systems.</u>
Substantiation: Article 392, Cable Trays, has requirements for cable trays in air handling spaces in section 392.4.
392.4 Uses Not Permitted.
Cable tray systems shall not be used in hoistways or where subject to severe physical damage. Cable tray systems shall not be used in ducts, plenums, and other air-handling spaces, except as permitted in 300.22, to support wiring methods recognized for use in such spaces.
Section 300.22 has provisions for cable trays in 300.22(C), Other Space Used For Environmental Air.
(C) Other Space Used for Environmental Air. This section applies to space used for environmental air-handling purposes other than ducts and plenums as specified in 300.22(A) and (B). It does not include habitable rooms or areas of buildings, the prime purpose of which is not air handling.
FPN: The space over a hung ceiling used for environmental air-handling purposes is an example of the type of other space to which this section applies.
Exception: This section shall not apply to the joist or stud spaces of dwelling units where the wiring passes through such spaces perpendicular to the long dimension of such spaces.
(1) Wiring Methods. The wiring methods for such other space shall be limited to totally enclosed, nonventilated, insulated busway having no provisions for plug-in connections, Type MI cable, Type MC cable without an overall nonmetallic covering, Type AC cable, or other factory-assembled multiconductor control or power cable that is specifically listed for the use, or listed prefabricated cable assemblies of metallic manufactured wiring systems without nonmetallic sheath. Other types of cables and conductors shall be installed in electrical metallic tubing, flexible metallic tubing, intermediate metal conduit, rigid metal conduit without an overall nonmetallic covering, flexible metal conduit, or, where accessible, surface metal raceway or metal wireway with metal covers or solid bottom metal cable tray with solid metal covers.
Section 300.22(C)(1) permits only solid bottom metal cable tray with solid metal covers. Optical fiber, communications, CATV, signaling and fire-alarm plenum cables, and plenum raceways are often installed in metal cable trays and metal cable tray systems in plenums (other spaces used for environmental air). These installations are "neat and workmanlike" and safe. They should be permitted.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-331.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-341 Log #2214 NEC-P16 **Final Action: Accept in Principle**
(830.154(B)(1))

Submitter: Robert W. Jensen, dbi / Rep. BICSI
Recommendation: Revise text as follows:
Cables installed in vertical runs and penetrating <u>one or more floors</u> ~~more than one floor~~, or cables installed in vertical runs in a shaft, shall be Type BLP, BLR, or BMR. Floor penetrations requiring Type BMR or BLR shall contain only cables suitable for riser or plenum use.
Substantiation: Is it really our intention that cables passing between floors through a floor penetration be less than riser rated?
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Accept in Principle
Panel Statement: See panel action and statement on Proposal 16-331.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16
Comment on Affirmative:
DORNA, G.: The current riser requirements are so complicated that they could be considered to be a "vague and unenforceable".
Section 830.151(B) requires that "Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type BLP, BLR or BMR. Floor penetrations requiring Type BMR or BMR shall contain only cables suitable for riser or plenum use". Consequently at least two floor penetrations are required, one for plenum and riser cables and another for general-purpose cables.
The panel action on this proposal greatly simplifies the installation rules for cables in risers in other than one and two-family dwellings. The installation rules for one and two-family dwellings are already simplified since any listed cable is permitted.

16-342 Log #2127 NEC-P16 **Final Action: Accept**
(830.157)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group
Recommendation: Delete 830.157
~~830.157 Protection Against Physical Damage.~~
~~Section 300.4 shall apply~~
Relocate the same to 830.3(E).
<u>**830.3 (E) Protection Against Physical Damage.** 300.4 shall apply.</u>
Substantiation: This change is both editorial and technical. This proposal relocates the requirements in 830.157 to a more appropriate section 830.3 (E) – Other Articles. The requirements of 300.4 really apply to the entire Article 830 therefore the requirements of 300.4 should be inserted in 830.3.
This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:
1) place requirements in the appropriate sections;
2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;
3) make the Articles as self-sufficient as is reasonably possible; and,
4) improve the language in the difficult to understand Sections.
The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.
Panel Meeting Action: Accept
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

Revise 830.154 text and replace in entirety as follows:

830.154 Applications of Network-Powered Broadband Communications System Cables. Permitted and non-permitted applications of listed network-powered broadband communications system cables shall be as indicated in Table 830.154(A). The permitted applications are subject to the installation rules of 830.113. The substitutions for network-powered broadband system cables listed in Table 830.154(B) shall be permitted.

Table 830.154(A), Applications of Network Powered Broadband Cables

Cable Types	Applications									
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In risers in vertical runs	In risers in metal raceways or fire-proof shafts	In risers in one- and two-family dwellings	In building locations other than fabricated ducts and plenums, other spaces used for environmental air (plenums) and risers	In one- and two-family dwellings	In cable trays	In rigid metal conduit and intermediate metal conduit	In any raceway in Chapter 3
BLP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
BMR, BLR	N	N	Y	Y	Y	Y	Y	Y	Y	Y
BM, BL	N	N	N	Y	Y	Y	Y	Y	Y	Y
BLX	N	N	N	Y	Y	Y	Y	N	Y	Y
BLU	N	N	N	N	N	N	N	N	Y	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 830.113.

(Renumber Table 830.154 to Table 830.154(B) and insert it here.)

16-339 Meeting Action

Table 830.154(A), Applications of Listed Network Powered Broadband Cables

Cable Types	**Applications**										
	In Air-Handling Spaces		**In Risers**				**Within Buildings in Other Than Air-Handling Spaces and Risers**				
	In fabricated ducts and plenums as described in 300.22(B)	In other spaces used for environmental air (plenums) as described in 300.22(C)	In vertical runs	In metal raceways	In fireproof shafts	In one- and two-family dwellings	General	In one- and two-family dwellings	In cable trays	In rigid metal conduit and intermediate metal conduit	In any raceway in Chapter 3
BLP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
BMR, BLR	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
BM, BL	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
BLX	N	N	N	Y	Y	Y	Y	Y	N	Y	Y
BMU, BLU	N	N	N	N	N	N	N	N	N	Y	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 830.113.

16-339 Dorna BE

Table 830.154(A), Applications of Network Powered Broadband Cables

Applications		Cable Types BLP	BMR, BLR	BM, BL	BLX	BMU, BLU
In Air-Handling Spaces	Fabricated ducts and plenums as described in 300.22(B)	Y	N	N	N	N
	Other spaces used for environmental air (plenums) as described in 300.22(C)	Y	N	N	N	N
In Risers	Vertical runs	Y	Y	N	N	N
	Metal raceways	Y	Y	Y	Y	N
	Fireproof shafts	Y	Y	Y	Y	N
	One-and two-family dwellings	Y	Y	Y	Y	N
Within Buildings in Other Than Air-Handling Spaces and Risers	General	Y	Y	Y	Y	N
	One-and two-family dwellings	Y	Y	Y	Y	N
	Cable trays	Y	Y	Y	N	N
	Rigid metal conduit and intermediate metal conduit	Y	Y	Y	Y	Y
	Chapter 3 raceway	Y	Y	Y	Y	N

Note: An 'N' in the table indicates that the cable type shall not be permitted to be installed in the application. A 'Y' indicates that the cable shall be permitted to be installed in the application, subject to the limitations described in 830.113.

16-339 Ivans BE

16-343 Log #49 NEC-P16 **Final Action: Reject**
(830.179)

NOTE: This proposal appeared as Comment 16-317 on Proposal 16-415 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-415 was:
Change the titles as shown:
830.179 Network-Powered Broadband Communications Equipment and Cables.
Network-powered broadband communications equipment and cables shall be listed as suitable for the purpose.
Exception No. 1: This listing requirement shall not apply to community antenna television and radio distribution system coaxial cables that were installed prior to January 1, 2000, in accordance with Article 820 and are used for low-power network-powered broadband communications circuits.
Exception No. 2: Substitute cables for network-powered broadband communications cables shall be permitted as shown in Table 830.133.
(A) Listing and Marking. Listing and marking of network-powered broadband communications cables shall comply with 830.179(A)(1) or (A)(2).
(1) Types BMU, ~~Type~~ BM, and ~~Type~~ BMR Cables. Network-powered broadband communications medium power underground cable, Type BMU; network-powered broadband communications medium power cable, Type BM; and network-powered broadband communications medium power riser cable, Type BMR, shall be factory-assembled cables consisting of a jacketed coaxial cable, a jacketed combination of coaxial cable and multiple individual conductors, or a jacketed combination of an optical fiber cable and multiple individual conductors. The insulation for the individual conductors shall be rated for 300 volts minimum. Cables intended for outdoor use shall be listed as suitable for the application. Cables shall be marked in accordance with 310.11. Type BMU cables shall be jacketed and listed as being suitable for outdoor underground use. Type BM cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire. Type BMR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.
FPN No. 1: One method of defining *resistant to spread of fire* is that the cables do not spread fire to the top of the tray in the vertical tray flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*. Another method of defining *resistant to the spread of fire* is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA vertical flame test for cables in cable trays, as described in CSA C22.2 No. 0.3-M-1985, *Test Methods for Electrical Wires and Cables.*
FPN No. 2: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*
(2) Types BLU, ~~Type~~ BLX, ~~Type~~ BL, BLR and ~~Type~~ BLP Cables. Network-powered broadband communications low-power underground cable, Type BLU; limited use network-powered broadband communications low-power cable, Type BLX; network-powered broadband communications low-power cable, Type BL; network-powered broadband communications low-power riser cable, Type BLR; and network-powered broadband communications low-power plenum cable, Type BLP, shall be factory-assembled cables consisting of a jacketed coaxial cable, a jacketed combination of coaxial cable and multiple individual conductors, or a jacketed combination of an optical fiber cable and multiple individual conductors. The insulation for the individual conductors shall be rated for 300 volts minimum. Cables intended for outdoor use shall be listed as suitable for the application. Cables shall be marked in accordance with 310.11. Type BLU cables shall be jacketed and listed as being suitable for outdoor underground use. Type BLX limited-use cables shall be listed as being suitable for use outside, for use in dwellings, and for use in raceways and shall also be listed as being resistant to flame spread. Type BL cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire. Type BLR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. Type BLP cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.
FPN No. 1: One method of determining that cable is resistant to flame spread is by testing the cable to VW-1 (vertical-wire) flame test in ANSI/UL 1581-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*.
FPN No. 2: One method of defining *resistant to spread of fire* is that the cables do not spread fire to the top of the tray in the vertical tray flame test in ANSI/UL 1584-1991, *Reference Standard for Electrical Wires, Cables and Flexible Cords*.
FPN No. 3: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-1997, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*
FPN No. 4: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-1999, *Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air Handling Spaces*.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and revise the Fine Print Notes to read as follows:
830.179(A)(1)
FPN No. 1: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*
Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables.*
FPN No. 2: One method of determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts*.
830.179(A)(2)
FPN No. 1: One method of determining that the cable is resistant to flame spread is the VW-1 (vertical-wire) flame test in ANSI/UL 1581-2001, *Reference Standard for Electrical Wires, Cables and Flexible Cords.*

FPN No. 2: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*

FPN No. 3: One method of determining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ANSI/UL 1666-2002, *Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.*

FPN No. 4: One method of determining that the cable has fire-resistant and low-smoke-producing characteristics is NFPA 262-2002, *Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces*.

Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The FPNs in the Proposal define the damage, specify performance requirements, and include mandatory language by requiring that the cable be tested to a particular standard or pass the requirements of a particular test. The revised wording provides explanatory information without any requirements.

830.179(A)(1) FPN No. 1 – In accordance with the Panel action to Accept Proposal 16-416, the number, title, and the date of the latest edition of the UL 1685 standard were corrected to reflect the current applicable standard; the title of the reference within the CSA standard was corrected and the date of the CSA standard was updated. This Comment also incorporates my Comments on Proposals 16-416 and 16-417.

In 830.179(A)(2): FPN No. 1 – the date was updated. FPN No. 2 – the UL standard was corrected from UL1584 to UL 1581 and then updated to UL 1685 to incorporate the current effective standard as explained in Accepted Proposal 16-416.

Panel Meeting Action: Reject

Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 16

16-344 Log #2128 NEC-P16 **Final Action: Accept in Principle**
(830.179)

Submitter: Ron L. Janikowski, City of Wausau, Wisconsin / Rep. CMP16 Special Editorial Task Group

Recommendation: Revise text to read as follows:

830.179 Network-Powered Broadband Communications Equipment and Cables.

Network-powered broadband communications equipment and cables shall be listed and marked ~~as suitable for the purpose~~ in accordance with 830.179(A) or (B

Exception No. 1: This listing requirement shall not apply to community antenna television and radio distribution system coaxial cables that were installed prior to January 1, 2000, in accordance with Article 820 and are used for low-power network-powered broadband communications circuits.

Exception No. 2: Substitute cables for network-powered broadband communications cables shall be permitted as shown in Table 830.154.

~~(A) Listing and Marking. Listing and marking of network-powered broadband communications cables shall comply with 830.179(A)(1) or (A)(2).~~

~~(1) Types BMU, BM, and BMR Cables. Network-powered broadband communications medium-power underground cable, Type BMU; network-powered broadband communications medium-power cable, Type BM; and network-powered broadband communications medium-power riser cable, Type BMR,~~

(A) **Network-Powered Broadband Communications Medium-Power Cables. Network-powered broadband communications medium-power cables** shall be factory-assembled cables consisting of a jacketed coaxial cable, a jacketed combination of coaxial cable and multiple individual conductors, or a jacketed combination of an optical fiber cable and multiple individual conductors. The insulation for the individual conductors shall be rated for 300 volts minimum. Cables intended for outdoor use shall be listed as suitable for the application. Cables shall be marked in accordance with 310.11.

~~Type BMU cables shall be jacketed and listed as being suitable for outdoor underground use.~~

~~Type BM cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.~~

~~Type BMR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.~~

(1) **Type BMR.** Type BMR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN ~~No. 2~~: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.

(2) **Type BM.** Type BM cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.

FPN ~~No. 1~~: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

~~FPN No. 2: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~

(3)Type BMU. Type BMU cables shall be jacketed and listed as being suitable for outdoor underground use.

~~(2) Types BLU, BLX, BL, BLR, and BLP Cables. Network-powered broadband communications low-power underground cable, Type BLU; limited-use network-powered broadband communications low-power cable, Type BLX; network-powered broadband communications low-power cable, Type BL; network-powered broadband communications low-power riser cable, Type BLR; and network-powered broadband communications low-power plenum cable, Type BLP,~~

(B) **Network-Powered Broadband Communication Low-Power Cables**. Network-powered broadband communications low-power cables shall be factory-assembled cables consisting of a jacketed coaxial cable, a jacketed combination of coaxial cable and multindividual conductors, or a jacketed combination of an optical fiber cable and multiple individual conductors. The insulation for the individual conductors shall be rated for 300 volts minimum. Cables intended for outdoor use shall be listed as suitable for the application. Cables shall be marked in accordance with 310.11.

~~Type BLU cables shall be jacketed and listed as being suitable for outdoor underground use. Type BLX limited-use cables shall be listed as being suitable for use outside, for use in dwellings, and for use in raceways and shall also be listed as being resistant to flame spread. Type BL cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire. Type BLR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. Type BLP cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.~~

(1) Type BLP. Type BLP cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.

FPN ~~No. 4~~: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

(2) Type BLR. Type BLR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.

FPN No. 3: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-1997, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.

(3) Type BL. Type BL cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire

FPN ~~No. 2~~: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

(4)Type BLX. Type BLX limited-use cables shall be listed as being suitable for use outside, for use in dwellings, and for use in raceways and shall also be listed as being resistant to flame spread.

FPN ~~No. 1~~: One method of determining that cable is resistant to flame spread is by testing the cable to VW-1 (vertical-wire) flame test in ANSI/UL 1581-2001, Reference Standard for Electrical Wires, Cables and Flexible Cords.

(5) Type BLU. Type BLU cables shall be jacketed and listed as being suitable for outdoor underground use.

FPN No. 2: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

~~FPN No. 3: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-1997, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~

~~FPN No. 4: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.~~

Substantiation:

Change language to be compatible to 770.179, 800.179, and 820.179. Editorial only with no change to requirements. This proposal restructured existing requirements into a more readable format which is more closely parallel to the other.179 sections. Cable types were re-ordered to go from highest to lowest fire protection. FPNs were moved to the associated cable type. This change is consistent with placement of the FPNs in 770.179, 800.179, and 820.179.

This is one of a group of Proposals prepared by the CMP-16 Special Editorial Task Group. The goals of the task group were to:

1) place requirements in the appropriate sections;

2) improve the parallelism between related Articles such that similar requirements are stated the same way in each Article;

3) make the Articles as self-sufficient as is reasonably possible; and,

4) improve the language in the difficult to understand Sections.

The Task Group members are Jim Brunssen, Sandy Egesdal, Ralph Esemplare, Steve Johnson Stan Kahn, Stan Kaufman and Harry Odhe.

Panel Meeting Action: Accept in Principle

Revise recommendation text as follows:

830.179 Network-Powered Broadband Communications Equipment and Cables.

Network-powered broadband communications equipment and cables shall be listed <u>and marked</u> ~~as suitable for the purpose~~ <u>in accordance with 830.179(A) or (B)</u>

Exception No. 1: This listing requirement shall not apply to community antenna television and radio distribution system coaxial cables that were installed prior to January 1, 2000, in accordance with Article 820 and are used for low-power network-powered broadband communications circuits.

Exception No. 2: Substitute cables for network-powered broadband communications cables shall be permitted as shown in Table 830.154.

~~(A) Listing and Marking. Listing and marking of network-powered broadband communications cables shall comply with 830.179(A)(1) or (A)(2).~~

~~(1) Types BMU, BM, and BMR Cables. Network-powered broadband communications medium-power underground cable, Type BMU; network-powered broadband communications medium-power cable, Type BM; and network-powered broadband communications medium-power riser cable, Type BMR,~~

(A) <u>Network-Powered Broadband Communications Medium-Power Cables.</u> <u>Network-powered broadband communications medium-power cables</u> shall be factory-assembled cables consisting of a jacketed coaxial cable, a jacketed combination of coaxial cable and multiple individual conductors, or a jacketed combination of an optical fiber cable and multiple individual conductors. The insulation for the individual conductors shall be rated for 300 volts minimum. Cables intended for outdoor use shall be listed as suitable for the application. Cables shall be marked in accordance with 310.11.

~~Type BMU cables shall be jacketed and listed as being suitable for outdoor underground use.~~

~~Type BM cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.~~

~~Type BMR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.~~

(1) <u>Type BMR.</u> <u>Type BMR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.</u>

<u>FPN</u> ~~No. 2~~: <u>One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2007, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.</u>

(2) <u>Type BM.</u> <u>Type BM cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire.</u>

FPN ~~No. 1~~: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL flame exposure, vertical tray flame test" in UL 1685-2007, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "vertical flame test — cables in cable trays," as described in CSA C22.2 No. 0.3-2001, Test Methods for Electrical Wires and Cables.

~~FPN No. 2: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~

<u>(3)Type BMU.</u> <u>Type BMU cables shall be jacketed and listed as being suitable for outdoor underground use.</u>

~~(2) Types BLU, BLX, BL, BLR, and BLP Cables.~~

~~Network-powered broadband communications low-power underground cable, Type BLU;~~

~~limited-use network-powered broadband communications low-power cable, Type BLX;~~

~~network-powered broadband communications low-power cable, Type BL;~~

~~network-powered broadband communications low-power riser cable, Type BLR;~~

~~and network-powered broadband communications low-power plenum cable, Type BLP,~~

(B) <u>Network-Powered Broadband Communication Low-Power Cables</u>. <u>Network-powered broadband communications low-power cables</u> shall be factory-assembled cables consisting of a jacketed coaxial cable, a jacketed combination of coaxial cable and multindividual conductors, or a jacketed combination of an optical fiber cable and multiple individual conductors. The insulation for the individual conductors shall be rated for 300 volts minimum. Cables intended for outdoor use shall be listed as suitable for the application. Cables shall be marked in accordance with 310.11.

~~Type BLU cables shall be jacketed and listed as being suitable for outdoor underground use. Type BLX limited-use cables shall be listed as being suitable for use outside, for use in dwellings, and for use in raceways and shall also be listed as being resistant to flame spread. Type BL cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire. Type BLR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. Type BLP cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.~~

(1) Type BLP. <u>Type BLP cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics.</u>

FPN ~~No. 4~~<u>: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.</u>

(2) Type BLR. <u>Type BLR cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.</u>

<u>FPN No. 3: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-2007, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.</u>

(3) Type BL. <u>Type BL cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire</u>

<u>FPN</u> ~~No. 2~~<u>: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL flame exposure, vertical tray flame test" in UL 1685-2007, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable. Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "vertical flame test — cables in cable trays," as described in CSA C22.2 No. 0.3-2001, Test Methods for Electrical Wires and Cables.</u>

(4)Type BLX. <u>Type BLX limited-use cables shall be listed as being suitable for use outside, for use in dwellings, and for use in raceways and shall also be listed as being resistant to flame spread.</u>

FPN ~~No. 1~~: One method of determining that cable is resistant to flame spread is by testing the cable to VW-1 (vertical-wire) flame test in ANSI/UL 1581-2001, Reference Standard for Electrical Wires, Cables and Flexible Cords.

(5) Type BLU. <u>Type BLU cables shall be jacketed and listed as being suitable for outdoor underground use.</u>

~~FPN No. 2: One method of defining resistant to the spread of fire is that the cables do not spread fire to the top of the tray in the "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.~~

~~Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.~~

~~FPN No. 3: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass the requirements of ANSI/UL 1666-1997, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.~~
~~FPN No. 4: One method of defining a cable that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.~~
Panel Statement: The panel changed the references to old issues of the UL standard to the latest versions.

The panel notes the text of FPN No. 2 information was moved up to the appropriate cable type. Therefore the panel deleted FPN No. 2 as it is no longer necessary.

Typo on submittal transcribe Complete a sentence In 830.179(B).
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-345 Log #50 NEC-P16 **Final Action: Reject**
(830.179(A) FPN No. 1)

NOTE: This proposal appeared as Comment 16-318 on Proposal 16-416 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-416 was:
Revise text to read as follows:

FPN No. 1: One method of defining *resistant to the spread of fire* is that the cables do not spread fire to the top of the tray in the "<u>UL Flame Exposure</u>, Vertical Tray Flame Test" in ~~ANSI/UL 1581-2001, Standard for Electrical Wires, Cables, and Flexible Cords.~~ <u>UL 1685-2000 Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.</u> Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-~~1985~~ <u>2001</u>, Test Methods for Electrical Wires and Cables.
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should have been to Accept in Principle and reword FPN No. 1 to read:

FPN: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*

Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables.*
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The Proposal as submitted defines the damage and specifies performance requirements.

The sentence "The smoke measurements in the test method are not applicable." is mandatory language.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-346 Log #1683 NEC-P16 **Final Action: Reject**
(830.179(A)(1) FPN 1 and 2)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 830.179(A)(1) FPNs as follows:

FPN No. 1: One method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ <u>testing in accordance with</u> "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ <u>testing in accordance with</u> CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

FPN No. 2: One method of ~~defining~~ <u>determining</u> fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the cables pass the requirements of~~ <u>testing the cable in accordance with</u> ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts.
Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-347 Log #51 NEC-P16 **Final Action: Reject**
(830.179(A)(2), FPN No. 2)

NOTE: This proposal appeared as Comment 16-319 on Proposal 16-417 in the 2007 Annual Meeting National Electrical Code Committee Report on Proposals. This comment was held for further study during the processing of the 2008 NATIONAL ELECTRICAL CODE. The recommendation in Proposal 16-417 was:
Revise text to read as follows:

FPN No. 2: One method of defining "resistant to the spread of fire" is that the cables do not spread fire to the top of the tray in the "<u>UL Flame Exposure</u>, Vertical Tray Flame Test" in ~~ANSI/UL 1581-2001, Standard for Electrical Wires, Cables, and Flexible Cords.~~ <u>UL 1685-2000 Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable. Another method of defining resistant to the spread of fire is for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the CSA "Vertical Flame Test - Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.</u> The CSA test is ae to coincie with FPN No.1 in 830.179(A)(1).
Submitter: James Daly, Upper Saddle River, NJ
Recommendation: The Panel Action should be to continue to Accept in Principle, however, FPN No. 2 should be reworded to read:

FPN No. 2: One method of determining that the cable is resistant to the spread of fire is the UL Flame Exposure, Vertical Tray Flame Test in UL1685-2000 *Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.*

Another method of determining that the cable is resistant to the spread of fire is the "Vertical Flame Test - Cables in Cable Trays," in CSA C22.2 No. 0.3-M-2001, *Test Methods for Electrical Wires and Cables.*
Substantiation: 3.1.3 of the NEC Style Manual stipulates that "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."

The Proposal as submitted defines the damage and specifies performance requirements.

The sentence "The smoke measurements in the test method are not applicable." is mandatory language.
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

16-348 Log #1684 NEC-P16 **Final Action: Reject**
(830.179(A)(2) FPN 2 through 4)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise 830.179(A)(2) FPNs as follows:

FPN No. 2: One method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~that the cables do not spread fire to the top of the tray in the~~ <u>testing in accordance with</u> "UL Flame Exposure, Vertical Tray Flame Test" in UL 1685-2000, Standard for Safety for Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables. The smoke measurements in the test method are not applicable.

Another method of ~~defining resistant~~ <u>determining resistance</u> to the spread of fire is ~~for the damage (char length) not to exceed 1.5 m (4 ft 11 in.) when performing the~~ <u>testing in accordance with</u> CSA "Vertical Flame Test — Cables in Cable Trays," as described in CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables.

FPN No. 3: One method of ~~defining~~ <u>determining</u> fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is ~~that the cables pass the requirements of~~ <u>testing the cable in accordance with</u> ANSI/UL 1666-2002, Standard Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts

FPN No. 4: One method of ~~defining~~ <u>determining fire resistance and low smoke-producing characteristics of</u> a cable <u>is testing</u> ~~that is low smoke-producing cable and fire-resistant cable is that the cable exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested~~ in accordance with NFPA 262-<u>2007</u>, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

Substantiation: 3.1.3 of the NEC Style Manual states "Fine print notes contain explanatory information. They shall not contain requirements and shall not be written in mandatory language."
Panel Meeting Action: Reject
Panel Statement: The fine print note(s) does contain explanatory information. It does not contain requirements and is not written in mandatory language.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

ARTICLE 840 —PREMISES-POWERED BROADBAND COMMUNICATIONS SYSTEMS

16-349 Log #2463 NEC-P16 **Final Action: Accept in Principle**
(840 (New))

TCC Action: The Technical Correlating Committee advises that Article Scope statements are the responsibility of the Technical Correlating Committee and the Technical Correlating Committee Accepts the panel action.
The Technical Correlating Committee further directs that the panel review the proposed changes for compliance with the NEC Style Manual with respect to titles for first level subsections.
This action will be considered by the panel as a public comment.
Submitter: Joseph P. Savage, FIFTH Council North America
Recommendation: Add the following new Article 840 as follows:
Article 8XX - Non-Network Powered Fiber-based Broadband Communications Systems
I. General
8XX.1 Scope. This article covers non-network powered broadband communications systems that provide any combination of voice, video, data, and interactive services through a network interface unit.

FPN No. 1: A typical basic system configuration includes an optical fiber cable serving an Optical Network Terminal (ONT)which would provide traditional telephone service, video service, and high speed internet service. These systems derive their power from the ac available at the premise by the use of an ONT Power Supply UNIT (OPSU) and a battery backup unit (BBU) for some specified time should ac be lost.

FPN No. 2: See 90.2(B)(4) for installations of broadband communications systems that are not covered.

8XX.2 Definitions. See Article 100. For purpose of this article, the following additional definitions apply.
Abandoned Coaxial Cable. Installed coaxial cable that is not terminated at equipment other than a coaxial connector and not identified for future use with a tag.

Abandoned Communications Cable. Installed communications cable that is not terminated at both ends at a connector or other equipment and not identified for future use with a tag.

Abandoned Optical Fiber Cable. Installed optical fiber cable that is not terminated at equipment other than a connector and not identified for future use with a tag.

FPN: See Article 100 for a definition of Equipment

Block. A square or portion of a city, town, or village enclosed by streets, including the alleys so enclosed but not any street.

Coaxial Cable. A cylindrical assembly composed of a conductor centered inside a metallic tube or shield, separated by a dielectric material, and usually covered by an insulating jacket.

Communications Circuit. The circuit that extends voice, audio, video, data, interactive services, telegraph (except radio), outside wiring for fire alarm and burglar alarm from the communications utility to the customer's communications equipment up to and including terminal equipment such as a telephone, fax machine, or answering machine.

Conductive Optical Fiber Cable. These optical fiber cables contain non–current-carrying conductive members such as metallic strength members, metallic vapor barriers, and metallic armor or sheath.
Exposed (to Accidental Contact). A circuit in such a position that, in case of failure of supports or insulation, contact with another circuit may result.

Fiber-to-the-Premises (FTTP). Optical fiber cable taken to the premises and terminated either aerial, buried, or in a raceway and may or may not contain a non-current carrying metallic member.

Optical Fiber Cable. A factory assembly of one or more optical fibers having an overall covering.

Optical Fiber Raceway. A raceway for enclosing and routing optical fiber cables.

FPN: See Article 100 for a definition of Raceway.

Optical Network Terminal (ONT). A device that converts an optical signal into component voice, audio, video, data, wireless signals or interactive service signals.

Nonconductive Optical Fiber Cable. These optical fiber cables contain no metallic members and no other electrically conductive materials.

Point of Demarcation: The defined point of separation between the service provider facilities/equipment and a subscriber's facilities/equipment conforming to subpart F of Part 68 of the FCC rules.

Point of Entrance. The point within a building at which the cable emerges from an external wall, from a concrete floor slab, or from a rigid metal conduit (Type RMC) or an intermediate metal conduit (Type IMC) connected by a grounding conductor to an electrode in accordance with 8XX.100(B).

Premises. The property of a user located on the user side of the utility-use network point of demarcation.

Wire. A factory assembly of one or more insulated conductors without an overall covering.
8XX.3 Other Articles

(A) Hazardous (Classified) Locations. Non-network powered broadband communications circuits and equipment installed in a location that is classified in accordance with 500.5 shall comply with the applicable requirements of Chapter 5.

(B) Ducts, Plenums, and Other Air-Handling Spaces. Section 300.22 shall apply where installed in ducts, plenums, or other spaces used for environmental air.

(C) Equipment in Other Space Used for Environmental Air. Section 300.22(C) shall apply.

(D) Output Circuits. As appropriate for the services provided, the output circuits derived from the network interface unit shall comply with the requirements of the following:

(1) Installations of communications circuits — Article 800
(2) Installations of community antenna television and radio distribution circuit— Article 820
(3) Installations of optical fiber cables — Article 770
(4) Installations of Class 2 and Class 3 circuits — Article 725
(5) Installations of power-limited fire alarm circuits — Article 760

8XX.24 Mechanical Execution of Work. Non-network powered broadband communications circuits and equipment shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware including straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also conform to 300.4(D) and 300.11.

FPN: Accepted industry practices are described in ANSI/NECA/BICSI 568-2006, *Standard for Installing Commercial Building Telecommunications Cabling*; ANSI/TIA/EIA-568-B.1 2004 – Part I General Requirements Commercial Building Telecommunications Cabling Standard; ANSI/TIA – 569-B-2004 – Commercial Building Standard for Telecommunications Pathways and Spaces; ANSI/TIA-570-B, Residential Telecommunications Infrastructure, and other ANSI-approved installation standards.

8XX.25 Abandoned Cables. The accessible portion of abandoned non-network powered broadband cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved. Also, the accessible portion of abandoned communications cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment. Finally, the accessible portion of abandoned coaxial cables shall be removed. Where cables are identified for future use with a tag, the tag shall be of sufficient durability to withstand the environment involved.

8XX.26 Spread of Fire or Products of Combustion. Installation of non-network powered broadband cables in hollow spaces, vertical shafts, and ventilation or air-handling ducts shall be made so that the possible spread of fire or products of combustion will not be substantially increased. Openings around penetrations of non-network powered broadband cables through fire-resistant-rated walls, partitions, floors, or ceilings shall be firestopped using approved methods to maintain the fire resistance rating.

FPN: Directories of electrical construction materials published by qualified testing laboratories contain many listing installation restrictions necessary to maintain the fire-resistive rating of assemblies where penetrations or openings are made. Buildings codes also contain restrictions on membrane penetrations on opposite sides of a fire resistance-rated wall assembly. An example is the 600 mm (24 in.) minimum horizontal separation that usually applies between boxes installed on opposite sides of the wall. Assistance in complying with 800.26 can be found in building codes, fire resistance directories, and product listings.

II. Cables Outside and Entering Building.

8XX.44 Overhead Optical Fiber Cables.

Overhead optical fiber cables containing a non-current carrying metallic member entering buildings shall comply with 8XX.44(A) and (B).

(A) On Poles and In-Span. Where outside plant optical fiber cables and electric light or power conductors are supported by the same pole or are run parallel to each other in-span, the conditions described in(1) through 8XX.44 (A)(4) shall be met.

(1) Relative Location. Where practicable, the outside plant optical fiber cables shall be located below the electric light or power conductors.

(2) Attachment to Cross-Arms. Attachment of outside plant optical fiber cables to a cross-arm that carries electric light or power conductors shall not be permitted.

(3) Climbing Space. The climbing space through outside plant optical fiber cables shall comply with the requirements of 225.14(D)

(4) Clearance. Supply service drops of 0–750 volts running above and parallel to communications service drops shall have a minimum separation of 300 mm (12 in.) at any point in the span, including the point of and at their attachment to the building, provided the nongrounded conductors are insulated and that a clearance of not less than 1.0 m (40 in.) is maintained between the two services at the pole.

(B) Above Roofs. Outside plant optical fiber cables shall have a vertical clearance of not less than 2.5 m (8 ft) from all points of roofs above which they pass.

Exception No. 1: Auxiliary buildings, such as garages and the like.

Exception No. 2: A reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (a) not more than 1.2 m (4 ft) of communications service-drop conductors pass above the roof overhang and (b) they are terminated at a through- or above-the-roof raceway or approved support.

Exception No. 3: Where the roof has a slope of not less than 100 mm in 300 mm (4 in. in 12 in.), a reduction in clearance to not less than 900 mm (3 ft) shall be permitted.

FPN: For additional information regarding overhead wires and cables, see ANSI C2-2007, *National Electric Safety Code*, Part 2, Safety Rules for Overhead Lines.

8XX.47 Underground Circuits Entering Buildings.

Underground optical fiber cables with a non-current carrying metallic member entering buildings with electric light or power conductors in a raceway, handhole enclosure, or manhole containing electric light, power, Class 1, or non–power-limited fire alarm circuit conductors shall be in a section separated from such conductors by means of brick, concrete, or tile partitions or by means of a suitable barrier.

(B) Direct-Buried Cables and Raceways. Direct-buried non-network-powered broadband communications cables with a non-current carrying metallic member shall be separated by at least 300 mm (12 in.) from conductors of any light, power, non–power-limited fire alarm circuit conductors or Class 1 circuit.

Exception No. 1: Where electric service conductors installed in raceways or have metal cable armor.

Exception No. 2: Where electric light or power branch-circuit or feeder conductors, non–power-limited fire alarm circuit conductors, or Class 1 circuit conductors are installed in a raceway or in metal-sheathed, metal-clad, or Type UF or Type USE cables.

(C) Mechanical Protection. Direct-buried cable, conduit, or other raceways shall be installed to meet the minimum cover requirements of 6 inches.

8XX.48 Unlisted Cables and Raceways Entering Buildings.

(A) Conductive and Nonconductive Cables. Unlisted conductive and non-conductive outside plant optical fiber cables shall be permitted to be installed in locations as described in 8XX.154(C), where the length of the cable within the building, measured from its point of entrance, does not exceed 15 m (50 ft) and the cable enters the building from the outside and is terminated in an enclosure.

FPN: Splice cases or terminal boxes, both metallic and plastic types, typically are used as enclosures for splicing or terminating optical fiber cables.

(B) Nonconductive Cables. Unlisted nonconductive optical fiber outside plant cable optical fiber cables shall be permitted to enter the building from the outside and run in raceway systems installed in compliance with any of the following articles in Chapter 3: Article 342, Intermediate Metal Conduit: Type IMC; Article 344, Rigid Metal Conduit: Type RMC; Article 352, Rigid Polyvinyl Chloride Conduit: Type PVC; and Article 358, Electrical Metallic Tubing: Type EMT.

III Protection

8XX.93 Grounding of the Outer Conductive Shield of Coaxial Cables. Where the ONT is installed outside of the building, the coaxial cables terminated on the ONT entering buildings or attached to buildings shall be grounded in accordance with 8XX.100 using the ground lugs provided by the ONT. The grounding shall be as close as practicable to the point of attachment or termination. Where the outer conductive shield of a coaxial cable is grounded, no other protective devices shall be required. For purposes of this section grounding located at mobile home service equipment located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, or at a mobile home disconnecting grounded in accordance with 250.32 and located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section. Abandon coaxial service drops shall be grounded per 820.100.

IV Grounding Methods

8XX.100 ONT and Optical Fiber Cable Grounding. The ONT and the non-current carrying member of the optical fiber cable shall be grounded as specified in 8XX.100(A) through (D).

A Grounding Conductor

(1) Insulation. The grounding conductor shall be insulated and shall be listed and in accordance with the ONTs listing.

(2) Material. The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) Size. The grounding conductor shall not be smaller than 14 AWG. The grounding conductor shall have a current-carrying capacity at least equal to that of the outer conductor of the coaxial cable and the non-current carrying member of the optical fiber cable. The grounding conductor shall not be required to exceed 6 AWG.

(4) Length. The grounding conductor shall be as short as practicable. In one- and two-family dwellings, the grounding conductor shall be as short as practicable, not to exceed 6.0 m (20 ft) in length.

FPN: Similar grounding conductor length limitations applied at apartment buildings and commercial buildings will help to reduce voltages that may be developed between the building's power and communications systems during lightning events.

Exception: In one- and two-family dwellings where achieving an overall maximum grounding conductor length of 6.0 m (20 ft) is not practicable, a separate grounding electrode as specified in250.52(A)(5), (A)(6), or (A)(7) shall be used, the grounding conductor shall be connected to the separate grounding electrode in accordance with 250.70, and the separate grounding electrode shall be connected to the power grounding electrode system in accordance with 8XX.100(D).

(5) Run in Straight Line. The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(6) Physical Protection. The grounding conductor shall be protected where exposed to physical damage. Where the grounding conductor is run in a metal raceway, both ends of the raceway shall be bonded to the grounding conductor or the same terminal or electrode to which the grounding conductor is connected.

(B) Electrode. The grounding conductor shall be connected in accordance with 8XX.100(B)(1), (B)(2), or (B)(3).

(1) In Building or Structure with an Intersystem Bonding Termination. If the building or structure served has an intersystem bonding termination, the grounding conductor shall be connected to the intersystem bonding termination.

(2) In Buildings or Structures with Grounding Means. If the building or structure served has no intersystem bonding termination, the grounding conductor shall be connected to the nearest accessible location on the following:

(1) The building or structure grounding electrode system as covered in 250.50
(2) The grounded interior metal water piping system, within 1.52 m (5 ft) from its point of entrance to the building, as covered in 250.52
(3) The power service accessible means external to enclosures as covered in 250.94
(4) The metallic power service raceway
(5) The service equipment enclosure
(6) The grounding electrode conductor or the grounding electrode conductor metal enclosure, or
(7) The grounding conductor or the grounding electrode of a building or structure disconnecting means enclosure that is connected to an electrode as covered in 250.32

A bonding device intended to provide a termination point for the grounding conductor intersystem bonding shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on non-removable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is non-removable.

For purposes of this section, the mobile home service equipment or the mobile home disconnecting means, as described in 820.93, shall be considered accessible.

(3) In Buildings or Structures Without Intersystem Bonding Termination or Grounding Means. If the building or structure served has no intersystem bonding termination or grounding means, as described in 8XX.100(B)(2), the grounding conductor shall be connected to either of the following:

(1) To any one of the individual electrodes described in 250.52(A)(1), (A)(2), (A)(3), (A)(4); or,
(2) If the building or structure served has no intersystem bonding termination or has no grounding means, as described in 800.100(B)(2) or (B)(3)(1), to any one of the individual electrodes described in 250.52(A)(7), and (A)(8) or to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (½ in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning conductors as covered in 800.53 and at least 1.8 m (6 ft) from electrodes of other systems. Steam or hot water pipes or air terminal conductors (lightning-rod conductors) shall not be employed as electrodes for protectors.

(C) Electrode Connection. Connections to grounding electrodes shall comply with 250.70.

(D) Bonding of Electrodes. A bonding jumper not smaller than 6 AWG copper or equivalent shall be connected between the optical fiber cable non-current carrying metallic member, ONT grounding electrode, and the power grounding electrode system at the building or structure served where separate electrodes are used.

Exception: At mobile homes as covered in 8XX.106.

FPN No. 1: See 250.60 for use of air terminals (lightning rods).

FPN No. 2: Bonding together of all separate electrodes limits potential differences between them and between their associated wiring systems.

8XX.101 ONT Mounted Completely Inside a Building

(A) Communications Circuits Leaving the Building. When the ONT is mounted completely inside the building and connected to the network via an outside plant optical fiber cable that does not contain a non-current carrying metallic member within the building, where any of the communications circuits or the coaxial cable terminated on the ONT do exit the facility at some point protection shall be provided per Article 800 and Article 820 to the communications circuits and/or the coaxial cable. If the outside plant optical fiber cable contains a non current carrying member it shall be grounded at the point of entrance as described in 770.93.

(B) Communications Circuits Not Leaving the Building. When the ONT is mounted completely inside the building and connected to the network via an outside plant optical fiber cable that does not contain a non-current carrying metallic member within the building, the ONT shall be grounded using the equipment grounding conductor (EGC) as specified in 645.15 where the communications circuits as well as the coaxial cable terminated on the ONT are totally within the building and do not exit the facility. This does not preclude the use of any of the grounding methods as outlined in Section 8XX.100 (B). If the outside plant optical fiber cable contains a non current carrying member it shall be grounded at the point of entrance as described in 770.93.

FPN No. 1: The ONT may be served by a flexible cord from the local ac outlet and the EGC would be sized per 250.122(E) and using Table 400.5(A) to ensure that the EGC has been sized correctly.

FPN No. 2. Another example is where the ONT is powered by a power supply which is not internal to the ONT. Therefore, the ONT Power Supply Unit (OPSU) is mounted on the wall near the ONT. The OPSU is served by a two, or three pronged plug and then the ONT is served by two wires which provide the dc power to the ONT. Following the previously described thought process for grounding the ONT, the EGC is derived for grounding the ONT by using a listed device used for extending the equipment ground from the AC outlet to the ONT grounding lug. Table 250.122 is applied to this scenario and sizing the EGC from the listing device to the ONT.

8XX.106 Grounding and Bonding at Mobile Homes.

(A) Grounding. Grounding shall comply with 8XX.106(A)(1) and (A)(2).

(1) Where there is no mobile home service equipment located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, the coaxial cable shield ground, or surge arrester ground, shall be connected to a grounding conductor in accordance with 8XX.100(B)(2). If a network interface device (NID) is required this NID shall be installed per 800.90 and 800.106.

(2) Where there is no mobile home disconnecting means grounded in accordance with 250.32 and located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, the coaxial cable shield ground, or surge arrester ground, shall be connected to a grounding conductor in accordance with 8XX.100(B)(2) following the guidelines of 820.93.

(B) Bonding. The ONT grounding terminal or grounding electrode shall be connected to the metal frame or available grounding terminal of the mobile home with a copper grounding conductor not smaller than 12 AWG under any of the following conditions:

(1) Where there is no mobile home service equipment or disconnecting means as in 8XX.106(A).
(2) Where the mobile home is supplied by cord and plug.

V. Installation Methods Within Buildings

8XX.110 Raceways

(A) Optical Fiber Cables. Where optical fiber cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or listed plenum optical fiber raceway, listed riser optical fiber raceway, or listed general-purpose optical fiber raceway selected in accordance with the provisions of 770.154, and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply. Where optical fiber cables are installed in a raceway without current-carrying conductors, the raceway fill tables of Chapter 3 and Chapter 9 shall not apply. Where nonconductive optical fiber cables are installed with electric conductors in a raceway, the raceway fill tables of Chapter 3 and Chapter 9 shall apply.

(B) Communications Wires and Cables. Where communications wires and cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or listed plenum communications raceway, listed riser communications raceway, or listed general-purpose communications raceway installed in accordance with 800.154 and installed in accordance with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply. The raceway fill tables of Chapter 3 and Chapter 9 shall not apply.

(C) Coaxial Cables. Where coaxial cables are installed in a raceway, the raceway shall be either of a type permitted in Chapter 3 and installed in accordance with Chapter 3 or listed plenum CATV raceway, listed riser CATV raceway, or listed general-purpose CATV raceway installed in accordance with 820.154, and with 362.24 through 362.56, where the requirements applicable to electrical nonmetallic tubing apply.

Exception: Conduit fill restrictions shall not apply.

8XX.113 Installation Past the ONT

Installation of communications wires and cables installed in a building from the ONT shall be listed for the purpose and the installation shall comply with 800.133 and 800.154.

Installation of coaxial cables installed in a building from the ONT shall be listed for the purpose and the installation shall comply with 820.133 and 820.154.

8XX.154 Applications of Listed Optical Fiber Cables and Raceways.

Nonconductive and conductive optical fiber cables shall comply with any of the requirements given in 8XX.154(A) through (D) and 770.154(F) or where cable substitutions are made as shown in 8XX.154(E).

(A) Plenums. Cables installed in ducts, plenums, and other spaces used for environmental air shall be Type OFNP or OFCP. Abandoned cables shall not be permitted to remain. Types OFNR, OFCR, OFNG, OFN, OFCG, and OFC cables installed in compliance with 300.22 shall be permitted. Listed plenum optical fiber raceways shall be permitted to be installed in ducts and plenums as described in 300.22(B) and in other spaces used for environmental air as described in 300.22(C). Only Type OFNP and OFCP cables shall be permitted to be installed in these raceways.

(B) Riser. Cables installed in risers shall be as described in any of (B)(1), (B)(2), or (B)(3).

(1) Cables in Vertical Runs. Cables installed in vertical runs and penetrating more than one floor, or cables installed in vertical runs in a shaft, shall be Type OFNR or OFCR. Floor penetrations requiring Type OFNR or OFCR shall contain only cables suitable for riser or plenum use. Listed riser optical fiber raceways and listed plenum optical fiber raceways shall also be permitted to be installed in vertical riser runs in a shaft from floor to floor. Only Type OFNP, OFCP, OFNR, and OFCR cables shall be permitted to be installed in these raceways.

(2) Metal Raceways or Fireproof Shafts. Type OFNG, OFN, OFCG, and OFC cables shall be permitted to be encased in a metal raceway or located in a fireproof shaft having firestops at each floor.

(3) One- and Two-Family Dwellings. Type OFNG, OFN, OFCG, and OFC cables shall be permitted in one- and two-family dwellings.

FPN: See 300.21 for firestop requirements for floor penetrations.

(C) Other Cabling Within Buildings. Cables installed in building locations other than the locations covered in 8XX.154(A) and (B) shall be Type OFNG, OFN, OFCG, or OFC. Such cables shall be permitted to be installed in listed general-purpose optical fiber raceways, listed riser optical fiber raceways, and listed plenum optical fiber raceways.

(D) Cable Trays. Optical fiber cables of the types listed in Table 770.179 shall be permitted to be installed in cable trays.

FPN: The intent is not to require that these optical fiber cables be listed specifically for use in cable trays.

(E) Cable Substitutions. The substitutions for optical fiber cables listed in Table 8XX.154(E) and illustrated in Figure 8XX.154(E) shall be permitted.

Table 8XX.154(E) Cable Substitutions

Cable Type	Permitted Substitutions
OFNP	None
OFCP	OFNP
OFNR	OFNP
OFCR	OFNP, OFCP, OFNR
OFNG, OFN	OFNP, OFNR
OFNG, OFN	OFNP, OFNR
OFGC, OFC	OFNP, OFCP, OFNR, OFCR, OFNG, OFN

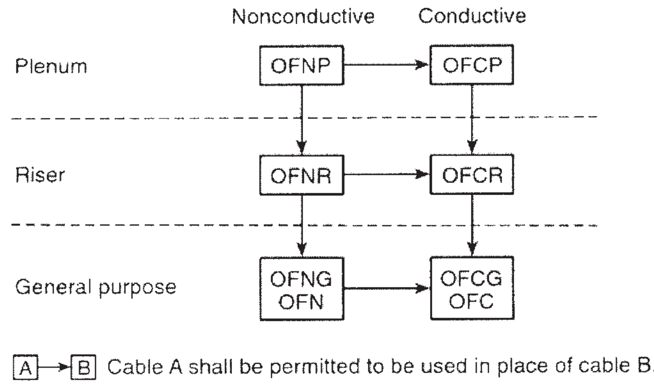

Figure 8XX.154(E) Cable Substitution Hierarchy

F) Hazardous (Classified) Locations. Cables installed in hazardous (classified) locations shall be any type indicated in Table 770.154(E). Cables shall be sealed in accordance with the requirements of 501.15, 502.15, 505.16, or 506.16, as applicable.

VI Listing Requirements

8XX.170 Equipment.

The ONT shall be listed as being suitable for the purpose.

FPN No. 1: One way to determine applicable requirements is to refer to UL60950-1-2003 *Standard for Safety of Information Technology Equipment*; or UL 498A *Current Taps and Adapters.*

FPN No. 2: there are no requirements on the ONT and its grounding methodologies except for those covered by the listing of the product.

Optical fiber cables shall be listed in accordance with 770.179(A) through (D) and shall be marked in accordance with Table 770.179.

The communications wires and cables being served from the ONT shall be listed in accordance with 800.179 and communications raceways associated with the non-network powered broadband communications systems shall be listed in accordance with 800.182

Coaxial cables being served from the ONT shall be listed in accordance with 820.179 and CATV raceways associated with the non-network powered broadband communications systems shall be listed in accordance with 820.182.

Substantiation: Broadband services are being offered that are non-network powered. At this point in time no specific Article of the National Electrical Code addresses all the applications involved in these types of services resulting in state regulatory agencies, authorities having jurisdiction, and even companies making judgments on installations with loose interpretation or in some limited cases no interpretations of the National Electric Code. Installations have been found that create fire hazards and the potential for shock. This proposed Article to Chapter 8 is an attempt to address these known issues. Refer to attached sketches for an explanation of how services are being provided in certain scenarios.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Accept in Principle

Revise text and create a new article as follows:

Article 840 Premises-Powered Broadband Communications Systems

I. General

840.1 Scope. This article covers premises-powered optical fiber-based broadband communications systems that provide any combination of voice, video, data, and interactive services through an optical network terminal (ONT).

FPN No. 1: A typical basic system configuration consists of an optical fiber cable to the premises (FTTP) supplying a broadband signal to an ONT that converts the broadband optical signal into component electrical signals such as traditional telephone, video, high-speed internet, and interactive services. Powering of the ONT is typically accomplished through an ONT power supply Unit (OPSU) and battery backup unit (BBU) that derives their power input from the available ac at the premises. The optical fiber cable is unpowered and may be nonconductive or conductive.

FPN No. 2: See 90.2(B)(4) for installations of broadband communications systems that are not covered.

840.2 Definitions. The definitions in Article 100 and 770.2, 800.2, and 820.2 shall apply. For purpose of this article, the following additional definitions apply.

Fiber-to-the-Premises (FTTP). Conductive or non-conductive optical cable provided either aerial, buried, or through a raceway and terminated at an optical network terminal (ONT) and establishing a communications network.

Optical Network Terminal (ONT). A device that converts an optical signal into component voice, audio, video, data, wireless signals, and/or interactive service electrical signals and is considered to be a network interface unit terminating equipment.

Premises Community Antenna Television (CATV) Circuit. The circuit that extends community antenna television (CATV) systems for audio, video, data, and interactive services from the service provider's ONT to the appropriate customer equipment.

Premises Communications Circuit. The circuit that extends voice, audio, video, data, interactive services, telegraph (except radio), outside wiring for fire alarm and burglar alarm from the service provider's ONT to the customer's communications equipment up to and including terminal equipment such as a telephone, fax machine, or answering machine.

840.3 Other Articles.

(A) Chapters 1 through 7. The requirements of Chapters 1 though 7 shall not apply to Article 840 except where the requirements are specifically referenced in Article 840. See 90.3

(B) Hazardous (Classified) Locations. Premises-powered broadband communications circuits and equipment installed in a location that is classified in accordance with 500.5 and 505.5 shall comply with the applicable requirements of Chapter 5.

(C) Equipment in Other Space Used for Environmental Air. Section 300.22(C) shall apply.

(D) Output Circuits. As appropriate for the services provided, the output circuits derived from the network interface unit shall comply with the requirements of the following:

(1) Installations of premises communications circuits — Article 800

(2) Installations of premises community antenna television and radio distribution circuits — Article 820

(3) Installations of optical fiber cables — Article 770

(4) Installations of Class 2 and Class 3 circuits — Article 725

(5) Installations of power-limited fire alarm circuits — Article 760

840.21 Access to Electrical Equipment Behind Panels Designed to Allow Access. Access to electrical equipment shall not be denied by an accumulation of premises-powered broadband cables that prevents removal of panels, including suspended ceiling panels.

840.24 Mechanical Execution of Work. Sections 770.24, 800.24, and 820.24 shall apply.

840.25 Abandoned Cables. Sections 770.25, 800.25, and 820.25 shall apply.

840.26 Spread of Fire or Products of Combustion. Sections 770.26, 800.26, and 820.26 shall apply.

II. Cables Outside and Entering Building.

840.44 Overhead Optical Fiber Cables.

Overhead optical fiber cables containing a non-current carrying metallic member entering buildings shall comply with 840.44(A) and (B).

(A) On Poles and In-Span. Where outside plant optical fiber cables and electric light or power conductors are supported by the same pole or are run parallel to each other in-span, the conditions described in 840.44(A)(1) through (A)(4) shall be met.

(1) Relative Location. Where practicable, the outside plant optical fiber cables shall be located below the electric light or power conductors.

(2) Attachment to Cross-Arms. Attachment of outside plant optical fiber cables to a cross-arm that carries electric light or power conductors shall not be permitted.

(3) Climbing Space. The climbing space through outside plant optical fiber cables shall comply with the requirements of 225.14(D).

(4) Clearance. Supply service drops of 0–750 volts running above and parallel to premises-powered broadband communications service drops shall have a minimum separation of 300 mm (12 in.) at any point in the span, including the point of and at their attachment to the building. Clearance of not less than 1.0 m (40 in.) shall be maintained between the two services at the pole.

(B) Above Roofs. Outside plant optical fiber cables shall have a vertical clearance of not less than 2.5 m (8 ft) from all points of roofs above which they pass.

Exception No. 1: Auxiliary buildings, such as garages and the like.

Exception No. 2: A reduction in clearance above only the overhanging portion of the roof to not less than 450 mm (18 in.) shall be permitted if (a) not more than 1.2 m (4 ft) of premises-powered broadband communications service-drop cable passes above the roof overhang and (b) it is terminated at a through- or above-the-roof raceway or approved support.

Exception No. 3: Where the roof has a slope of not less than 100 mm in 300 mm (4 in. in 12 in.), a reduction in clearance to not less than 900 mm (3 ft) shall be permitted.

FPN: For additional information regarding overhead wires and cables, see ANSI C2-2007, National Electric Safety Code, Part 2, Safety Rules for Overhead Lines.

840.47 Underground Optical Fiber Cables Entering Buildings. Underground optical fiber cables entering buildings shall comply with 840.47(A) through (C).

(A) Class 1 or Non-Power Limited Fire Alarm Circuits. Underground optical fiber cables with a non-current carrying metallic member entering buildings with electric light, power, Class 1, or non–power-limited fire alarm circuit conductors in a raceway, handhole enclosure, or manhole shall be in a section separated from such conductors by means of brick, concrete, or tile partitions or by means of a suitable barrier.

(B) Direct-Buried Cables and Raceways. Direct-buried premises-powered broadband communications optical fiber cables with a non-current carrying metallic member shall be separated by at least 300 mm (12 in.) from conductors of any light, power, non–power-limited fire alarm circuit conductors or Class 1 circuit.

Exception No. 1: Where electric service conductors installed in raceways or have metal cable armor.

Exception No. 2: Where electric light or power branch-circuit or feeder conductors, non–power-limited fire alarm circuit conductors, or Class 1 circuit conductors are installed in a raceway or in metal-sheathed, metal-clad, or Type UF or Type USE cables.

(C) Mechanical Protection. Direct-buried cable, conduit, or other raceways shall be installed to have a minimum cover of 150 mm (6 in.).

840.48 Unlisted Cables and Raceways Entering Buildings. Section 770.48 shall apply.

III Protection

840.90 Protective Devices. Section 800.90 shall apply.

840.93 Grounding or Interruption.

(A) Non-Current Carrying Metallic Members of Optical Fiber Cables. Non-current carrying metallic members of optical fiber cables entering the building or terminating on the outside of the building shall comply with 770.93(A) or (B).

(B) Communications Cables. The grounding or interruption of the metallic sheath of communications cable shall comply with 800.93.

(C) Coaxial Cables. Where the ONT is installed inside or outside of the building with coaxial cables terminating at the ONT, either entering, exiting or attached to the outside of the building, 820.93 shall apply.

IV Grounding Methods

840.100 ONT and Optical Fiber Cable Grounding. Grounding required for protection shall comply with 770.100, 800.100, or 820.100 as applicable.

840.101 Premises Circuits Not Leaving the Building. Where the ONT is served by a nonconductive optical fiber cable, or where any non-current-carrying metallic member is interrupted by an insulating joint or equivalent device, and circuits that terminate at the ONT and are completely contained within the building (i.e., do not exit the building), 840.101 (A) or (B) or (C) shall apply as applicable.

(A) The shield of coaxial cable shall be grounded by one of the following:

(1) Any of the methods described in 820.100 or 820.106.

(2) A fixed connection when using an equipment grounding conductor as described in 250.118. Use of the equipment grounding conductor to ground the ONT shall not require additional grounding of the coaxial cable shield.

(B) Communications circuits shall not be required to be grounded.

(C) The ONT shall not be required to be grounded unless required by its listing. Where grounding is required, connecting to an equipment grounding conductor through a listed grounding device that will retain the ground connection if the ONT is unplugged shall be permitted. If the coaxial cable shield is grounded as permitted in 840.101(A), the use of a cord and plug for the connection to the ONT shall be permitted.

FPN No. 1. Where required to be grounded, a listed device that extends the equipment grounding conductor from the receptacle to the ONT equipment grounding terminal is permitted. Sizing of the extended equipment grounding conductor is covered in Table 250.122.

840.103 Equipment Grounding. The grounding of the ONT shall be as required by the equipment listing.

840.106 Grounding and Bonding at Mobile Homes.

(A) Grounding. Grounding shall comply with (1) and (2).

(1) Where there is no mobile home service equipment located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, the ONT, if required to be grounded, shall be connected to a grounding conductor in accordance with 840.100. Premises communications circuits and premises community antenna television (CATV) circuits shall be grounded in accordance with 840.93.

(2) Where there is no mobile home disconnecting means grounded in accordance with 250.32 and located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, ONT, if required to be grounded, shall be connected to a grounding conductor in accordance with 840.100(B)(3). Premises communications circuits and premises community antenna television (CATV) circuits shall be grounded in accordance with 840.93.

(B) Bonding. The ONT grounding terminal or grounding electrode shall be connected to the metal frame or available grounding terminal of the mobile home with a copper grounding conductor not smaller than 12 AWG under any of the following conditions:

(1) Where there is no mobile home service equipment or disconnecting means as in 840.106(A).

(2) Where the mobile home is supplied by cord and plug.

V Installation Methods Within Buildings

840.110 Raceways for Premises-Powered Broadband Communications Optical Fiber Cables. Section 770.110 shall apply.

840.113 Installation Past the ONT. Installation of premises communications circuits and premises coaxial circuits shall comply with 840.113(A) and (B).

(A) Premises Communications Circuits. Premises communications wires and cables installed in a building from the ONT shall be listed in accordance with 800.179, and the installation shall comply with 800.113 and 800.133.

(B) Premises Community Antenna Television (CATV) Circuits. Premises community antenna television (CATV) coaxial cables installed in a building from the ONT shall be listed in accordance with 820.179, and the installation shall comply with 820.113 and 820.133.

840.133 Installation of Optical Fibers and Electrical Conductor Associated with Premises-Powered Communications Systems.

Section 770.133 shall apply.

840.154 Applications of Listed Optical Fiber Cables and Raceways.

Section 770.154 shall apply.

VI Listing Requirements

840.170 Equipment and Cables. Premises-powered broadband communications systems equipment and cables shall comply with 840.170(A) through (D).

(A) Optical Network Terminal. The ONT and applicable grounding means shall be listed for application with premises-powered broadband communications systems.

FPN No. 1: One way to determine applicable requirements is to refer to UL 60950-1-2003, Standard for Safety of Information Technology Equipment, UL 498A, Current Taps and Adapters, or UL 467, Grounding and Bonding Equipment.

FPN No. 2: There are no requirements on the ONT and its grounding methodologies except for those covered by the listing of the product.

(B) Optical Fiber Cables. Optical fiber cables shall be listed in accordance with 770.179(A) through (D) and shall be marked in accordance with Table 770.179.

(C) Premises Communications Circuits. Premises communications wires and cables connecting to the ONT shall be listed in accordance with 800.179. Communications raceways associated with the premises-powered broadband communications system shall be listed in accordance with 800.182.

(D) Premises Community Antenna Television (CATV) Circuits. Premises community antenna television (CATV) coaxial cables connecting to the ONT shall be listed in accordance with 820.179.

Panel Statement: The panel acknowledges new technologies being introduced into the market and made changes to the proposal to align with the style manual requirements and safety issues expressed by various panel members were addressed.

Number Eligible to Vote: 16

Ballot Results: Affirmative: 15 Negative: 1

Explanation of Negative:

PREZIOSO, L.: This Proposal seeks to add a new Article to deal with “Premise-Powered” systems. The Article is well written, in the format of the other Articles, and it contains repeated references to the other Articles. I see this as evidence that the subject matter is already covered, with some exceptions, by the current NEC Articles. Current sections should be amended to include any issues with the new technology.

Article 830 was added to the NEC to cover “Network-Powered Broadband Communications Systems”. The rationale for the Network-Powered Article was that previous systems were all premise powered. The justification was that new systems were not being powered on-site, and the existing NEC Articles were not written to address this situation. While there may be valid issues with this technology that need to be addressed in the NEC, the introduction of a new article is premature. When asked why this issue needed to be addressed with a new Article, the Panel discussion centered on the belief that there is confusion amongst AHJs regarding the installation of this new technology. It is standard practice to require a safety justification for proposals seeking to amend the Code. There was no information presented identifying and validating the safety concerns that would be resolved by enacting a new article. This panel used the lack of safety justification alone as a reason to reject other proposals submitted in this code cycle.

Once a safety justification has been presented and accepted, the proper course of action would be to amend the current code, not add a new article. Technology changes continuously, but the activities covered by the NEC (power, grounding, bonding, pathways, etc.) remain fairly constant regardless of the technology. The NEC would be unmanageable if the solution is to add a new Article to the NEC for each new technology.”

Comment on Affirmative:

BRUNSSEN, J.: Currently there appears to be a great deal of confusion in the field regarding the grounding of premises-powered broadband communications systems provided over non-conductive OF cable, and why grounding requirements for these systems should differ from those of the more conventional “metallic” telephone and CATV systems. A separate article, rather than inserting requirements within a number of existing articles, will enhance NEC usability by placing all requirements for premises-powered broadband communications systems in a single location. This arrangement will serve both to highlight and to inform installers and AHJs as to the differences in grounding requirements from those of Articles 800, 820 and 830 applicable to locally-powered optical fiber systems.

IVANS, R.: The panel wording of section 840.101 is not clear and does not convey the intent that the coaxial grounding connection should never be able to be disconnected by the disconnection of a plug. Section 840.101 should be reworded as follows:

840.101 Premises Circuits Not Leaving the Building.

Where the ONT is served by a nonconductive optical fiber cable, or where any non-current-carrying metallic member is interrupted by an insulating joint or equivalent device, and circuits that terminate at the ONT and are completely contained within the building (i.e., do not exit the building), 840.101 (A) or and (B) or and (C) shall apply as applicable.

(A) The shield of coaxial cable shall be grounded by one of the following:

(1) Any of the methods described in 820.100 or 820.106.

(2) A fixed connection when using to an equipment grounding conductor as described in 250.118. Use of the equipment grounding conductor to ground the ONT shall not require additional grounding of the coaxial cable shield.

(3) Connection to the ONT grounding terminal provided that the terminal is connected to an equipment grounding conductor through a listed grounding device that will retain the ground connection if the ONT is unplugged.

(B) Communications circuits shall not be required to be grounded.

(C) The ONT shall not be required to be grounded unless required by its listing. Where grounding is required, connecting to an equipment grounding conductor through a listed grounding device that will retain the ground connection if the ONT is unplugged shall be permitted. If the coaxial cable shield is separately grounded as permitted required in 840.101 (A)(1) or 840.101(A)(2), the use of a cord and plug for the connection to the ONT grounding connection shall be permitted.

FPN No. 1. Where required to be grounded, a listed device that extends the equipment grounding conductor from the receptacle to the ONT equipment grounding terminal is permitted. Sizing of the extended equipment grounding conductor is covered in Table 250.122.

MCCOY, W.: The 50 feet exemption to installed unlisted optical fiber cable past the point of entrance outlined in Article 770.48 has proven not to be a liability as a source of fire in communications installation when installed in vaults or rooms containing communications type equipment that meet NEBS requirements and/or has a fire suppression system. However, a number of installations for premises powered equipment involve unlisted conductive and/or non-conductive optical fiber cable being run from the outside and installed up to 50 feet in environments, such as garages, where flammable items are stored and in some cases come in contact with the unlisted cable. Therefore, Section 840.48 should be changed to read as follows:

<u>**Conductive and Nonconductive Cables.** Unlisted conductive and nonconductive outside plant optical fiber cables shall be installed up to 15 m (50 ft) from the point of entrance to its termination in compliance with any of the following articles in Chapter 3: Article 342, Intermediate Metal Conduit: Type IMC; Article 344, Rigid Metal Conduit: Type RMC; Article 352, Rigid Polyvinyl Chloride Conduit: Type PVC; and Article 358, Electrical Metallic Tubing: Type EMT.</u>

OHDE, H.: We support the new Article as new technology has been introduced to the market. We believe that the Article need some more work done to it to make to provide better clarity. Hopefully the NEC TCC will accept the new Article so more work can be done to improve and enhance this article.

ARTICLE 862

16-350 Log #2289 NEC-P16 **Final Action: Reject**
(862 (New))

Submitter: David H. Kendall, Thomas & Betts Corp.
Recommendation: Add a new Article to read as follows:
ARTICLE 862 Optical Fiber/Communication Raceways:
Type OFCR
I. General
862.1 Scope.
This article covers the use, installation, and construction specifications for optical fiber/communication raceways (OFCR) and associated fittings.
862.2 Definition.
Optical Fiber/Communication Raceways (OFCR). A nonmetallic, pliable, corrugated raceway of circular cross section with integral or associated couplings, connectors, and fittings for the installation of signaling, optical-fiber, communication and community antenna television and radio distribution system (CATV) cables. OFCR is composed of a material that is resistant to moisture and chemical atmospheres and is flame retardant and are identified as:
(A) Plenum Optical Fiber/Communications Raceways (OFCR). Plenum rated OFCR is utilized in ducts, plenums, and other spaces used for environmental air and has the adequate fire-resistant and low smoke-producing characteristics.
FPN: One method of defining a low smoke producing raceway and a fire-resistant raceway is that the raceway exhibits a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 1.52 m (5 ft) or less when tested in accordance with the plenum test in UL 2024, Standard for Optical Fiber Cable Raceway.
(B) Riser Optical Fiber/Communications Raceways (OFCR). Riser rated OFCR has the adequate fire-resistant characteristics capable of preventing the carrying of fire from floor to floor.
FPN: One method of defining a riser raceway that is fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the raceways pass the requirements of the test for Flame Propagation (riser) in UL 2024, Standard for Optical Fiber Cable Raceway.
(C) General-Purpose Optical Fiber/Communications Raceways (OFCR). General-purpose rated OFCR is resistant to the spread of fire.
FPN: One method of defining a general purpose raceway that is resistance to the spread of fire is that the raceways pass the requirements of the Vertical-Tray Flame Test (General Use) in UL 2024, Standard for Optical Fiber Cable Raceway.
A pliable raceway is a raceway that can be bent by hand with a reasonable force but without other assistance.
862.6 Listing Requirements. OFCR and associated fittings shall be listed.
II. Installation
862.10 Uses Permitted. The use of OFCR shall be permitted in accordance with 862.10 (A) through (G):
(A) Concealed. OFCR shall be permitted to be installed within the walls, floors, or ceilings of a building of any height. OFCR is permitted to be installed as innerduct in any other type of listed conduits or tubings permitted in Chapter 3.
(B) Exposed. OFCR shall be permitted in exposed locations, where not prohibited by 862.12.
(C) Dry and Damp Locations. OFCR shall be permitted in dry and damp location where not prohibited by 862.12.
(D) Ducts and Plenums. Plenum Rated OFCR shall be permitted to be installed in ducts and plenums as described in 300.22(B) when used with Plenum Rated cables defined in Articles 770, 800 or 820.
(E) Above Suspended Ceilings. Plenum Rated OFCR shall be permitted to be installed above suspended ceilings as defined by 300.22(C) when used with Plenum Rated cables defined in Articles 725, 770, 800 or 820. Riser Rated and General Purpose Rated OFCR shall be permitted to be installed above suspended ceilings when this space is not used for environmental air-handling purposes and when used with cables defined in Articles 725, 770, 800 and 820.
(F) Riser Application. Riser Rated and Plenum Rated OFCR shall be permitted to be installed in a riser application when used with cables defined in Articles 725, 770, 800 and 820.
(G) General Purpose. General Purpose Rated, Riser Rated and Plenum Rated OFCR shall be permitted to be installed in general purpose application when used with cables defined in Articles 725, 770, 800 and 820.
862.12 Uses Not Permitted. The use of OFCR shall not be permitted for use in accordance with 862.12 (A) through (E):
(A) Electrical Conductors. OFCR shall not be used with electrical conductors or cables. Only those cables defined in Articles 725, 770, 800 and 820 are permitted to be used with OFCR.
(B) Cables. With cables other then those defined in Articles 725, 770, 800 or 820.
(C) Physical Damage. OFCR shall not be used where subject to physical damage.
(D) Direct Rays of the Sun. OFCR shall not be used where exposed to the direct rays of the sun, unless identified as sunlight resistant.
(E) Wet Locations. OFCR shall not be used in areas defined as a Wet Location.
862.22 Number of Cables. Where optical fiber, communication and coaxial cables, per Articles 770, 800 and 820, are installed in OFCR without current-carrying conductors, the raceway fill tables of Chapter 3 and Chapter 9 shall not apply. Where nonconductive optical fiber cables are installed with electric conductors in a raceway, the raceway fill tables of Chapter 3 and Chapter 9 shall apply.
FPN: See 725.3(A) for Signaling cables fill requirements.
862.24 Bends — How Made. Bends shall be so made that the OFCR will not be damaged and the internal diameter of the raceway will not be effectively reduced. Bends shall be permitted to be made manually without auxiliary equipment, and the radius of the curve to the centerline of such bends shall not be less than shown in Table 2, Chapter 9 using the column "Other Bends."
862.26 Bends — Number in One Run. There shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points, for example, conduit bodies and boxes.
862.28 Trimming. All cut ends shall be trimmed inside and outside to remove rough edges.
862.30 Securing and Supporting. OFCR shall be installed as a complete system in accordance with 300.18 and shall be securely fastened in place and supported in accordance with 862.30(A) and (B).
(A) Securely Fastened. OFCR shall be securely fastened at intervals not exceeding 900 mm (3 ft). In addition, OFCR shall be securely fastened in place within 900 mm (3 ft) of each outlet box, device box, junction box, cabinet, or fitting where it terminates.
(B) Supports. Horizontal runs of OFCR supported by openings in framing members at intervals not exceeding 900 mm (3 ft) and securely fastened within 900 mm (3 ft) of termination points shall be permitted.
Exception No. 1: For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of OFCR shall be permitted to be fished.
862.46 Bushings. Where the OFCR enters a box, fitting, or other enclosure, a bushing or adapter shall be provided to protect the cable from abrasion unless the box, fitting, or enclosure design provides equivalent protection.
862.48 Joints. All joints between lengths of OFCR and between raceways and couplings, fittings, and boxes shall be by an approved method.
III. Construction Specifications
862.100 Construction. OFCR, as a prewired manufactured assembly, shall be provided in continuous lengths capable of being shipped in a coil, reel, or carton without damage.
862.120 Marking. OFCR shall be clearly and durably marked at least every 3 m (10 ft) as required in the first sentence of 110.21. Plenum Rated OFCR shall be marked "PLENUM", Riser Rated OFCR shall be marked "RISER" and General Purpose Rated OFCR shall be marked "GENERAL PURPOSE".
Substantiation: This is a NEW Article for the 2011 National Electrical Code for Optical Fiber/Communication Raceways (Type OFCR). Companion proposals have been submitted for Articles 725, 770, 800 and 820 to reference this new article.
Optical fiber/communication raceways (Type OFCR) are currently listed raceways for use in plenums, risers or general purpose applications for the management of signaling, optical fiber, communication and CATV cables. This new Article and the companion proposals will clarify the selection, and installation optical fiber/communication raceways including the construction specifications. It is not the intent of the submitter to revise or change any of the currently permitted uses by this proposal, but only to enhance the usability of the Code.
Only the TCC can assign an Article number and define the scope. It seems appropriate that this Article is placed at the end of Chapter 8. The Article Number "862" is used in the proposals since it gives a correlation with Article 362 for Electrical Nonmetallic Tubing. Sections of Article 362 have been referenced in Articles 770, 800 and 820. Panel 16 should discuss whether the new Article 862 will continue to be the responsibility of Panel 16 who first introduced these raceways into the NEC or if the responsibility should fall under Panel 8 who has the raceway expertise for the NEC.
This proposal will require a correlation with Panels 3 and 16 since Article 725 references these raceways for use with signaling cables. In addition, Panel 16 will have to make a recommendation to the TCC for the new article number and whether the proposed scope should be used.
Since there was not an easy acronym to be used to define Optical Fiber/Communication/Signaling/CATV Cable Raceway the submitter used "OFCR". "OFCR" basically stands for "Optical Fiber/Communication Raceway".
This new optical fiber/communication raceways article utilizes the same format developed by Panel 8 for the raceways articles found in Chapter 3.
Panel Meeting Action: Reject
Panel Statement: Acceptance of the article in this proposal will eliminate a competitive product, Maxcell fiber innerduct. Use of the acronym "OFCR" will cause confusion because it is identical to riser fiber optical cables.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 15 Negative: 1
Explanation of Negative:
IVANS, R.: The panel action should have been an AIP as the panel comments could have been easily handled with editorial changes. A separate article for optical fiber and communications raceways and cable routing assemblies is a good idea and would consolidate the requirements and avoid constant repetition. It would also eliminate the difficulty of always having to coordinate requirements for these identical assemblies and devices between the various existing articles.

Chapter 9 Tables

6-177 Log #3251a NEC-P06 **Final Action: Reject**
(Chapter 9, Table Notes)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
(3) Equipment grounding and bonding conductors where installed, shall be included when calculating ~~conduit or tubing~~ conductor fill.
(5) For conductors not included in Chapter 9 such as multiconductor cables, flexible cords and cables, and optical fiber cables, the actual dimensions shall be used.
A copy of this proposal has also been sent to CMP-8 for action related to Tables 1-4.
Substantiation: Note 3 should apply to conductor fill for raceways other than conduit and tubing. Note 5 should include flexible cords and cables.
Panel Meeting Action: Reject
Panel Statement: No technical substantiation was provided for the proposed changes. There is no evidence that there is a problem or confusion with the current code text.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

8-278 Log #3251 NEC-P08 **Final Action: Reject**
(Chapter 9, Table Notes)

Submitter: Dan Leaf, Seneca, SC
Recommendation: Revise text as follows:
(3) Equipment grounding and bonding conductors where installed, shall be included when calculating ~~conduit or tubing~~ conductor fill.
(5) For conductors not included in Chapter 9 such as multiconductor cables, flexible cords and cables, and optical fiber cables, the actual dimensions shall be used.
A copy of this proposal has also been sent to CMP-6 for action related to Tables 5-9.
Substantiation: Note 3 should apply to conductor fill for raceways other than conduit and tubing. Note 5 should include flexible cords and cables.
Panel Meeting Action: Reject
Panel Statement: Requirements for flexible cord and cable are included in Chapter 9 Notes to Tables, Note 9. Optical fiber cables are the privy of CMP-16
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-279 Log #4792 NEC-P08 **Final Action: Reject**
(Chapter 9, Table 2)

Submitter: Omeshwar D. Mathur, SW Construction, PWD / Rep. Philadelphia Water Dept.
Recommendation: Proposed revised wording:
MINIMUM Radius of Conduit and Tubing Bends
Substantiation: Existing wording of this Table 2 heading states "Radius of Conduit and Tubing Bends" while MINIMUM RADIUS OF CONDUIT AND TUBING BENDS is better description of the contents of the table as larger radius of conduits and tubing bends is safer and acceptable.
Panel Meeting Action: Reject
Panel Statement: Conduit and tubing bends are described in each conduit or tubing section 3XX.24
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-280 Log #302 NEC-P08 **Final Action: Reject**
(Chapter 9 Table 4, & Annex C)

Submitter: Stephen Pirolli, Florida Electrical Apprenticeship & Training, Inc.
Recommendation: Add new text to Chapter 9, Table 4 to read as follows.
Also, add new text to Annex C to read as follows:
The Dimensions and Percent Area of Conduit and Tubing for Article 355 Reinforced Thermosetting Resin Conduit: Type RTRC.
Substantiation: 355.22 refers you to Table 1, Chapter 9. In Table 4, Chapter 9, there is no table to figure out conduit fill for Type RTRC Article 355. Conduit fill table is missing. RTRC is also missing from Annex C.
Panel Meeting Action: Reject
Panel Statement: Submitter did not provide any proposed tables.
The proposal does not recommend specific code text as is required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

6-178 Log #2554 NEC-P06 **Final Action: Reject**
(Chapter 9, Table 5)

Submitter: John Stuckwisch, Barth Electric / Rep. IEJATC Local 481 IBEW
Recommendation: #10 THW must have its area increased in Table 5 or Annex C. #10 THW must have its conductor fills increased.
A companion proposal has been submitted to Code-Making Panel 8 for Annex C.
Substantiation: So that the Table and the Annex agree with one another.
Note: Supporting material is available for review at NFPA Headquarters.
Panel Meeting Action: Reject
Panel Statement: The submitter has only provided documentation of problems in previous editions of the Code (1999, 2002). In the current edition of the code, the dimensions in Chapter 9 Table 5 for 10 THW are correct.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-179 Log #3912 NEC-P06 **Final Action: Reject**
(Chapter 9, Table 5)

Submitter: Edward Walton, Draka Cableteq, USA
Recommendation: Annex C tables for conduit fill for types RHH*, RHW*, RHW-2* without outer covering are incorrect and should be revised. The correct diameters for these cables are shown in the table below:
A copy of this proposal has also been sent to CMP-8 for action related to Annex C.

See Chapter 9 Table 5 on page 1167

Substantiation: See proposal for NFPA 70, Chapter 9, Table 5 "Dimensions of Insulated Conductors and Fixture Wires". In this table, conductor types RHH*, RHW*, RHW-2* (*without outer jacket) have been placed in the same type class as TW, THW, THHW, THW-2 and this is never the case. This error leads to an understatement of the diameters of "R" type conductors in sizes 6 AWG and larger which could lead to under sizing conduit for these conductors.
I assume that Annex C tables are generated by a computer program that could be revised with the correct diameters. Willing to help with corrective effort.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided reference material to justify the proposed changes to Chapter 9 Table 5. In addition, current tables show largest (with a jacket and designated without *), and smallest diameters without jacket (designated with *). The numbers in the proposal are for a composite construction and are legitimate but thicker than those that exist without a jacket.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-180 Log #3911 NEC-P06 **Final Action: Reject**
(Chapter 9, Table 5)

Submitter: Edward Walton, Draka Cableteq, USA
Recommendation: See the following Table with revisions/errors for types RHH*, RHW*, RHW-2* without outer covering.

See Chapter 9, Table 5 on page 1168

Substantiation: NFPA 70, Chapter 9, Table 5 "Dimensions of Insulated Conductors and Fixture Wires". In this table, conductor types RHH*, RHW, RHW-2* (*without outer jacket) have been placed in the same class as TW, THW, THW-2 and this is never the case. This error leads to an understatement of the diameters of "R" type conductors in sizes 6 AWG and larger which could lead to under sizing conduit for these conductors.
The same error was carried over to Annex C for these types, see separate proposal.
Panel Meeting Action: Reject
Panel Statement: The submitter has not provided reference material to justify the proposed changes to Chapter 9 Table 5. In addition, current tables show largest (with a jacket and designated without *), and smallest diameters without jacket (designated with *). The numbers in the proposal are for a composite construction and are legitimate but thicker than those that exist without a jacket. Note that this is a duplicate proposal. See panel action on Proposal 1-179.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

CHAPTER 9

RHH*, RHW*, RHW-2* DIAMETERS FOR 2008 NFPA70

CORRECTED TABLE 5 DIMENSIONS OF INSULATED CONDUCTORS AND FIXTURE WIRES

TYPE	SIZE	COND DIA	COMPOSITE INSULATION "WITHOUT OUTER COVERING" INNER	OUTER	PROPER APPROXIMATE DIAMETER		**CURRENT LISTED DIAMETER**	**% ERROR**	PROPER APPROXIMATE AREA	
	AWG/kcmil	in.	in.	in.	in.	mm			in.	mm
'RHH*, RHW*, RHW-2*	14	0.073	0.030	0.015	0.163	4.140	0.163	0.0%	0.0209	13.46
	12	0.092	0.030	0.015	0.182	4.623	0.182	0.0%	0.0260	16.78
	10	0.116	0.030	0.015	0.206	5.233	0.206	0.0%	0.0333	21.50
	8	0.146	0.045	0.015	0.266	6.757	0.266	0.0%	0.0556	35.84
	6	0.184	0.045	0.030	0.334	8.484	**0.304**	**-9.0%**	0.0876	56.51
	4	0.232	0.045	0.030	0.382	9.703	**0.352**	**-7.9%**	0.1146	73.92
	3	0.260	0.045	0.030	0.410	10.414	**0.380**	**-7.3%**	0.1320	85.15
	2	0.292	0.045	0.030	0.442	11.227	**0.412**	**-6.8%**	0.1534	98.96
	1	0.332	0.055	0.045	0.532	13.513	**0.492**	**-7.5%**	0.2223	143.37
	1/0	0.372	0.055	0.045	0.572	14.529	**0.532**	**-7.0%**	0.2570	165.74
	2/0	0.418	0.055	0.045	0.618	15.698	**0.578**	**-6.5%**	0.3000	193.47
	3/0	0.470	0.055	0.045	0.670	17.019	**0.630**	**-6.0%**	0.3526	227.40
	4/0	0.528	0.055	0.045	0.728	18.492	**0.688**	**-5.5%**	0.4162	268.47
	250	0.575	0.065	0.065	0.835	21.210	**0.765**	**-8.4%**	0.5476	353.19
	300	0.630	0.065	0.065	0.890	22.607	**0.820**	**-7.9%**	0.6221	401.25
	350	0.681	0.065	0.065	0.941	23.902	**0.871**	**-7.4%**	0.6955	448.55
	400	0.728	0.065	0.065	0.988	25.096	**0.918**	**-7.1%**	0.7667	494.48
	500	0.813	0.065	0.065	1.073	27.255	**1.003**	**-6.5%**	0.9043	583.22
	600	0.893	0.080	0.065	1.183	30.049	**1.113**	**-5.9%**	1.0992	708.93
	700	0.964	0.080	0.065	1.254	31.853	**1.184**	**-5.6%**	1.2351	796.58
	750	0.998	0.080	0.065	1.288	32.716	**1.218**	**-5.4%**	1.3029	840.36
	800	1.030	0.080	0.065	1.320	33.529	**1.250**	**-5.3%**	1.3685	882.64
	900	1.094	0.080	0.065	1.384	35.155	**1.314**	**-5.1%**	1.5044	970.30
	1000	1.152	0.080	0.065	1.442	36.628	**1.372**	**-4.9%**	1.6331	1053.33
	1250	1.289	0.100	0.095	1.679	42.648	**1.539**	**-8.3%**	2.2141	1428.03
	1500	1.412	0.100	0.095	1.802	45.773	**1.662**	**-7.8%**	2.5504	1644.92
	1750	1.526	0.100	0.095	1.916	48.668	**1.776**	**-7.3%**	2.8832	1859.63
	2000	1.632	0.100	0.095	2.022	51.361	**1.882**	**-6.9%**	3.2111	2071.08

6-179 Rec

CHAPTER 9

RHH*, RHW*, RHW-2* DIAMETERS FOR 2008 NFPA70

CORRECTED TABLE 5 DIMENSIONS OF INSULATED CONDUCTORS AND FIXTURE WIRES

TYPE	SIZE	COND DIA	COMPOSITE INSULATION "WITHOUT OUTER COVERING" INNER	OUTER	PROPER APPROXIMATE DIAMETER		**CURRENT LISTED DIAMETER**	**% ERROR**	PROPER APPROXIMATE AREA	
	AWG/kcmil	in.	in.	in.	in.	mm			in.	mm
'RHH*, RHW*, RHW-2*	14	0.073	0.030	0.015	0.163	4.140	0.163	0.0%	0.0209	13.46
	12	0.092	0.030	0.015	0.182	4.623	0.182	0.0%	0.0260	16.78
	10	0.116	0.030	0.015	0.206	5.233	0.206	0.0%	0.0333	21.50
	8	0.146	0.045	0.015	0.266	6.757	0.266	0.0%	0.0556	35.84
	6	0.184	0.045	0.030	0.334	8.484	**0.304**	**-9.0%**	0.0876	56.51
	4	0.232	0.045	0.030	0.382	9.703	**0.352**	**-7.9%**	0.1146	73.92
	3	0.260	0.045	0.030	0.410	10.414	**0.380**	**-7.3%**	0.1320	85.15
	2	0.292	0.045	0.030	0.442	11.227	**0.412**	**-6.8%**	0.1534	98.96
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	2/0	0.418	0.055	0.045	0.618	15.698	**0.578**	**-6.5%**	0.3000	193.47
	3/0	0.470	0.055	0.045	0.670	17.019	**0.630**	**-6.0%**	0.3526	227.40
	4/0	0.528	0.055	0.045	0.728	18.492	**0.688**	**-5.5%**	0.4162	268.47
	250	0.575	0.065	0.065	0.835	21.210	**0.765**	**-8.4%**	0.5476	353.19
	300	0.630	0.065	0.065	0.890	22.607	**0.820**	**-7.9%**	0.6221	401.25
	350	0.681	0.065	0.065	0.941	23.902	**0.871**	**-7.4%**	0.6955	448.55
	400	0.728	0.065	0.065	0.988	25.096	**0.918**	**-7.1%**	0.7667	494.48
	500	0.813	0.065	0.065	1.073	27.255	**1.003**	**-6.5%**	0.9043	583.22
	600	0.893	0.080	0.065	1.183	30.049	**1.113**	**-5.9%**	1.0992	708.93
	700	0.964	0.080	0.065	1.254	31.853	**1.184**	**-5.6%**	1.2351	796.58
	750	0.998	0.080	0.065	1.288	32.716	**1.218**	**-5.4%**	1.3029	840.36
	800	1.030	0.080	0.065	1.320	33.529	**1.250**	**-5.3%**	1.3685	882.64
	900	1.094	0.080	0.065	1.384	35.155	**1.314**	**-5.1%**	1.5044	970.30
	1000	1.152	0.080	0.065	1.442	36.628	**1.372**	**-4.9%**	1.6331	1053.33
	1250	1.289	0.100	0.095	1.679	42.648	**1.539**	**-8.3%**	2.2141	1428.03
	1500	1.412	0.100	0.095	1.802	45.773	**1.662**	**-7.8%**	2.5504	1644.92
	1750	1.526	0.100	0.095	1.916	48.668	**1.776**	**-7.3%**	2.8832	1859.63
	2000	1.632	0.100	0.095	2.022	51.361	**1.882**	**-6.9%**	3.2111	2071.08

6-180 Rec

6-181 Log #1156 NEC-P06 **Final Action: Reject**
(Chapter 9, Table 5(A))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add a new column for Types RHH, RHW, or USE.

Size (AWG or kcmil)	Bare Conductor Diameter		Types RHH**, RHW**, or USE Approximate Diameter		Approximate Area	
	mm	in.	mm	in.	mm^2	$in.^2$
8	3.404	0.134	6.604	0.260	34.25	0.0531
6	4.293	0.169	7.493	0.295	44.10	0.0683
4	5.410	0.213	8.509	0.335	56.84	0.0881
2	6.807	0.268	9.906	0.390	77.03	0.1194
1	7.595	0.299	11.81	0.465	109.5	0.1698
1/0	8.534	0.336	12.70	0.500	126.6	0.1963
2/0	9.550	0.376	13.72	0.540	147.8	0.2290
3/0	10.74	0.423	14.99	0.590	176.3	0.2733
4/0	12.07	0.475	16.26	0.640	207.6	0.3217
250	13.21	0.520	18.16	0.715	259.0	0.4015
300	14.48	0.570	19.43	0.765	296.5	0.4596
350	15.65	0.616	20.57	0.810	332.3	0.5153
400	16.74	0.659	21.72	0.855	370.5	0.5741
500	18.69	0.736	23.62	0.930	438.2	0.6793
600	20.65	0.813	26.29	1.035	542.8	0.8413
700	22.28	0.877	27.94	1.100	613.1	0.9503
750	23.06	0.908	28.83	1.135	652.8	1.0118
900	25.37	0.999	31.50	1.240	779.3	1.2076
1000	26.92	1.060	32.64	1.285	836.6	1.2968

*Dimensions are from industry sources.
**Types RHH and RHW without outer coverings.

Substantiation: Types RHH, RHW, and USE are available with compact conductors.
Panel Meeting Action: Reject
Panel Statement: The submitter has provided new recommended values for the table but has not provided any references to justify the proposed change. There may be variations in manufacturer's data. The panel requests uniform, third-party data.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 10 Negative: 1
Explanation of Negative:
FRIEDMAN, S.: The panel vote on proposal 6-181 should be Accept in Part. The panel rejected this proposal because it did not know where the dimensions came from. However, the panel was advised (as indicated on the proposal) that these dimensions came from industry sources, as did the dimensions that are presently in table 5(A) of Chapter 9. NEMA agrees to remove USE from the title since that product does not exist in present table.

6-182 Log #1154 NEC-P06 **Final Action: Accept**
(Chapter 9, Table 8, FPN)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Change "NEMA WC8-1992" to "NEMA WC 70".
Substantiation: NEMA WC8 is obsolete and was replaced with NEMA WC70.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

8-281 Log #416 NEC-P08 **Final Action: Reject**
(Chapter 9, Table 8, FPN)

TCC Action: The Technical Correlating Committee refers this proposal to Code-Making Panel 6 for action.
This action will be considered by Code-Making Panel 6 as a public comment.
Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "per" to "in accordance with" in two places.
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: Not part of Panel 8 but the panel accepts.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

6-183 Log #280 NEC-P06 **Final Action: Accept**
(Chapter 9,Table 8, Note 2)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "equation".
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression which follows in the Note.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

1-274 Log #2385 NEC-P01 **Final Action: Reject**
(Chapter 9, Tables 13(A) and 13(B))

Submitter: Peter Pollak, The Aluminum Association, Inc.
Recommendation: Add text to read as follows:

Pressure Wire Connectors Whose Performance Depend Upon Prescribed Installation Torques Should Be Installed With the Recommended* Tightening Torques in Tables 13(A) and 13(B):

Table 13(A)
Recommended*Tightening Torques for Wire-Binding Screws, Connectors with Slotted Screws, and Connectors for External Drive Wrench
(See Table 13(B)

Type of connection	Wire size, AWG or kcmil	Tightening torques, Newton*metres
Wire-binding screws	14 to 10	1.4
Connectors with slotted screws	14, 12, and 10	2.3
	8	3.4
	6 and 4	4.0
	3 to 4/0 inclusive	4.5
Connectors for external drive wrench	1/0	19.8
	2/0	19.8
	3/0	28.3
	4/0	28.3
	250	39.5
	300	39.5
	350	39.5
	400	39.5
	500	45.2
	600	45.2
	700	45.2
	750	45.2
	800	50.8
	900	50.8
	1000	50.8
	1250	67.8
	1500	67.8
	1750	67.8
	2000	67.8

*For proper termination of conductors it is very important that field connections be properly tightened. In the absence of manufacturer's instructions on the equipment, the torque values given in Tables 13(A) and 13(B) are recommended.

Because it is normal for some relaxation to occur in service, checking torque values sometime after installation is not a reliable means of determining the values of torque applied at installation.

Table 13(B)
Recommended* Tightening Torques for Connectors with Hexagonal Socket Screws
(See Table 13(A)

Socket size (across flats), in	Tightening torque, Newton*metres
5/32	11.3
3/16	13.6
7/32	17.0
1/4	19.8
5/16	28.3
3/8	39.5
½	50.8
9/16	67.8

*For proper termination of conductors it is very important that field connections be properly tightened. In the absence of manufacturer's instructions on the equipment, the torque values given in Tables 13(A) and 13(B) are recommended.

Because it is normal for some relaxation to occur in service, checking torque values sometime after installation is not a reliable means of determining the values of torque applied at installation.

Substantiation: Electrical connections must be tight, but not too tight in order to provide reliable performance in service. This is why connector manufacturers provide torques values in their installation instructions. It is also why UL tests connector performance using prescribed installation torques. It is known that not every electrical installer uses torque wrenches. (Some do not even have torque wrenches.) The proposed addition of these torque tables to the Code would give tightening torques explicit recognition and provide needed values where manufacturers' recommended values are not available. Furthermore, the proposed addition harmonizes requirement already in the Canadian Electrical Code and UL 486 Standards. It adds no additional requirements, but helps electrical professionals to do a better job thus contributing to electrical safety.
Panel Meeting Action: Reject
Panel Statement: The addition of these tightening torque values to the NEC has not been technically substantiated. The panel notes the proposed tables are based on Tables D6 and D7 from Appendix D of the Canadian Electrical Code, Part 1. However, the proposed values do not correspond to the values of the Standard for Wire Connectors, ANSI/UL 486A-486B/CSA C22.2 No. 65-03 or the Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, ANSI/UL 486E.

Most terminals for listed equipment specify tightening torque values as part of the listing, requiring the specified torque to be used for installation of this equipment in accordance with 110.3(B). However, the panel notes that for some terminals, for example some control circuit conductor terminals of industrial control equipment, values for tightening torque are not required to be marked. The proposed tightening torques may be significantly higher than the accepted values for some unmarked terminals, and their use may introduce hazards through over-tightening or damage to equipment.

The proposed placement of recommended values in Chapter 9 is not permitted based on 90.3, and 2.3 of the NEC Style Manual. Tables of recommended values may be suitable for inclusion in a new informational annex. Information on the intended application of the tables, including text that is in the proposed notes, should be included as text in the informational annex to clearly explain the intent of the tables and to promote proper use. The requirements of 3.2.7.2 of the NEC Style Manual, for dual system of units, would apply to the values in the tables.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Abstain: 1
Explanation of Abstention:

ANTHONY, M.: APPA enters an abstention here in order to send a signal to the electrical industry that the educational facilities industry is positioned to encourage innovation in products and installation methods that reduce the cost of electrical infrastructure. A new burst of regulations seems likely given federal policy changes that will attempt to merge the objectives of educational facility infrastructure investment and energy conservation. The electrical industry will benefit from this information; at least placed in an informational annex. We hope to see consistent information presented to the panel in the ROC stage.

Annex A — Product Safety Standards

1-275 Log #2950 NEC-P01 **Final Action: Accept in Principle**
(Annex A)

TCC Action: The Technical Correlating Committee notes that this is a staff responsibility and will be addressed by NFPA editorial staff.
Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text to read as follows:

<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>

Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.
Panel Meeting Action: Accept in Principle
Panel Statement: The addition of a separate table of contents for the annexes is unnecessary.

The panel acknowledges that including the correct titles of the annexes in the table of contents, as is now done for each article and table, would improve usability and refers this issue to the Technical Correlating Committee as it affects more than one panel.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-276 Log #3590 NEC-P01 **Final Action: Accept in Principle**
(Annex A)

Submitter: Sonya M. Bird, Underwriters Laboratories Inc.
Recommendation:

Annex A Product Safety Standards

Product Standard Name	***Product Standard Number***
Antenna-Discharge Units	UL 452
Arc-Fault Circuit-Interrupters	UL 1699
Armored Cable	UL 4
Attachment Plugs and Receptacles	UL 498
Audio-, Video and ~~Musical Instrument Apparatus for Household, Commercial, and~~ Similar Electronic Apparatus ~~General Use~~	UL 60065
~~Audio Video Products and Accessories~~	~~UL 1492~~
Busways	UL 857
Cables — Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables	UL 493
Cables — Thermoplastic-Insulated Wires and Cables	UL 83
Cables — Thermoset-Insulated Wires and Cables	UL 44
Cable and Cable Fittings for Use in Hazardous (Classified) Locations	UL 2225
Cables for Non–Power-Limited Fire-Alarm Circuits	UL 1425
Cables for Power-Limited Fire-Alarm Circuits	UL 1424
Capacitors	UL 810
Cellular Metal Floor Raceways and Fittings	UL 209
Circuit Breakers for use in Communication Equipment	UL 489A
Circuit Integrity (CI) Cable — UL Outline of Investigation for Fire Tests for Electrical Circuit Protective Systems	Subject 1724
Circuit Integrity (CI) Cable — Tests of Fire Resistive Cables	UL 2196
~~Class 2 and Class 3 Transformers~~	~~UL 1585~~
Class 2 Power Units	UL 1310
Combustible Gas Detectors, Performance Requirements	ISA 12.13.01
~~Commercial Audio Equipment~~	~~UL 813~~
Communication Circuit Accessories	UL 1863
Communications Cables	UL 444
Community-Antenna Television Cables	UL 1655
Conduit, Tubing, and Cable Fittings	UL 514B
Conduit — Type EB and A Rigid PVC Conduit and HDPE Conduit	UL 651A
Continuous Length HDPE Conduit	UL 651B ~~HDPE~~
Control Centers for Changing Message Type Electric Signs	UL 1433
Cord Sets and Power-Supply Cords	UL 817
Cover Plates for Flush-Mounted Wiring Devices	UL 514D
Data-Processing Cable	UL 1690
~~Dead-Front Switchboards~~	~~UL 891~~
Electric Generators	UL 1004-4
~~Electric Motors~~	~~UL 1004~~
Electric Sign Components	UL 879
Electric Signs	UL 48
Electric Spas, Equipment Assemblies, and Associated Equipment	UL 1563

Electric Vehicle (EV) Charging System Equipment	UL 2202
Electric Water Heaters for Pools and Tubs	UL 1261
Electrical Apparatus for Explosive Gas Atmospheres — Part 11: Intrinsic Safety “i”	ISA 60079-11/UL 60079–11
Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Type of Protection “n”	ISA 60079-15/UL 60079-15
Electrical Apparatus for Explosive Gas Atmospheres – Part 18: Construction, Test and Marking of Type of Protection ~~Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection~~ - Encapsulation “m”	ISA S12.23.01/UL 60079-18
Electrical Apparatus for Explosive Gas Atmospheres – Part 0: ~~Use in Class I, Zones O & 1 Hazardous (Classified) Locations:~~ General Requirements	ISA 12.0.01/UL 60079-0
Electrical Apparatus for ~~Use in Class I, Zone 1 Hazardous (Classified) Locations~~ Explosive Gas Atmospheres – Part 7: ~~Type of Protection~~ Increased Safety “e”	ISA S12.16.01/UL 60079-7
Electrical Apparatus for Explosive Gas Atmospheres – Part 1: ~~for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection~~ - Flameproof Enclosures “d”	ISA S12.22.01/UL 60079-1
Electrical Apparatus for Explosive Gas Atmospheres – Part 5: ~~Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection -~~ Powder Filling “q”	ISA S12.25.01/UL 60079-5
Electrical Apparatus for Explosive Gas Atmospheres – Part 6: ~~Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection –~~ Oil--Immersion “o”	ISA S12.26.01/UL 60079-6
Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Encapsulation “mD”	ISA 61241-18 (12.10.07)
Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Enclosure “td”	ISA 61241-1 (12.10.03)
Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — General Requirements	ISA 61241-0 (12.10.02)
Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations — Protection by Intrinsic Safety “iD”	ISA 61241-11 (12.10.06)
Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations — Protection by Pressurization “pD”	ISA 61241-2 (12.10.04)
Electrical Heating Appliances	UL 499
Electrical Intermediate Metal Conduit — Steel	UL 1242
Electrical Metallic Tubing — Aluminum	UL 797A
Electrical Metallic Tubing — Steel	UL 797
Electrical Nonmetallic Tubing	UL 1653
Electrical Rigid Metal Conduit — Steel	UL 6
Electric-Battery-Powered Industrial Trucks	UL 583
Electrochemical Capacitors	UL 810A
Electromechanical Contactors and Motor Starters	UL 60947-4-1
Emergency Lighting and Power Equipment	UL 924
Enclosed and Dead-Front Switches	UL 98
Enclosures for Electrical Equipment	UL 50

Energy Management Equipment	UL 916
Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations	UL 1203
Fire Pump Controllers	UL 218
Fire Pump Motors	UL 1004-5
Fire Resistive Cables	UL 2196
Fixture Wire	UL 66
Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts	UL 1666
Flat-Plate Photovoltaic Modules and Panels	UL 1703
Flexible Cords and Cables	UL 62
Flexible Lighting Products	UL 2388
Flexible Metal Conduit	UL 1
Fluorescent-Lamp Ballasts	UL 935
Gas and Vapor Detectors and Sensors	UL 2075
Gas-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles	UL 307B
Gas-Fired Cooking Appliances for Recreational Vehicles	UL 1075
Gas-Tube-Sign Cable	UL 814
General-Use Snap Switches	UL 20
Ground-Fault Circuit-Interrupters	UL 943
Ground-Fault Sensing and Relaying Equipment	UL 1053
Grounding and Bonding Equipment	UL 467
Hardware for the Support of Conduit, Tubing and Cable	UL 2239
Heating and Cooling Equipment	UL 1995
High-Intensity-Discharge Lamp Ballasts	UL 1029
High Voltage Industrial Control Equipment	UL 347
Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-makers	UL 60335-2-24
Household Refrigerators and Freezers	UL 250
Impedance Protected Motors	UL 1004-2
Industrial Battery Chargers	UL 1564
Industrial Control Equipment	UL 508
Industrial Control Panels	UL 508A
Information Technology Equipment – Safety – Part 1: General Requirements	UL 60950-1
Information Technology Equipment – Safety – Part 21: Remote Power Feeding	UL 60950-21
Information Technology Equipment – Safety – Part 22: Equipment to be Installed Outdoors	UL 60950-22
Information Technology Equipment – Safety – Part 23: Large Data Storage Equipment	UL 60950-23
Instrumentation Tray Cable	UL 2250
~~Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations~~	~~UL 486D~~
Insulated Multi-Pole Splicing Wire Connectors	UL 2459
Inverters, Converters, Controllers and Interconnection System	UL 1741

Equipment for Use with Distributed Energy Resources	
Isolated Power Systems Equipment	UL 1047
Junction Boxes for Swimming Pool Luminaires	UL 1241
Light Emitting Diode (LED) Light Sources for Use in Lighting Products	UL 8750
Liquid Fuel-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles	UL 307A
Liquid-Tight Flexible Nonmetallic Conduit	UL 1660
Liquid-Tight Flexible Steel Conduit	UL 360
Lithium Batteries	UL 1642
Low-Voltage Fuses — Part 1: General Requirements	UL 248-1
Low-Voltage Fuses — Part 2: Class C Fuses	UL 248-2
Low-Voltage Fuses — Part 3: Class CA and CB Fuses	UL 248-3
Low-Voltage Fuses — Part 4: Class CC Fuses	UL 248-4
Low-Voltage Fuses — Part 5: Class G Fuses	UL 248-5
Low-Voltage Fuses — Part 6: Class H Non-Renewable Fuses	UL 248-6
Low-Voltage Fuses — Part 7: Class H Renewable Fuses	UL 248-7
Low-Voltage Fuses — Part 8: Class J Fuses	UL 248-8
Low-Voltage Fuses — Part 9: Class K Fuses	UL 248-9
Low-Voltage Fuses — Part 10: Class L Fuses	UL 249-10
Low-Voltage Fuses — Part 11: Plug Fuses	UL 248-11
Low-Voltage Fuses — Part 12: Class R Fuses	UL 248-12
Low-Voltage Fuses — Part 13: Semiconductor Fuses	UL 248–13
Low-Voltage Fuses — Part 14: Supplemental Fuses	UL 248–14
Low-Voltage Fuses — Part 15: Class T Fuses	UL 248-15
Low-Voltage Fuses — Part 16: Test Limiters	UL 248-16
Low-Voltage Landscape Lighting Systems	UL 1838
Low-Voltage Lighting Fixtures for Use in Recreational Vehicles	UL 234
Low-Voltage Luminaires	UL 2108
Low Voltage Transformers – Part 1: General Requirements	UL 5085-1
Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers	UL 5085-3
Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements	UL 1598B
Luminaires	UL 1598
Machine-Tool Wires and Cables	UL 1063
Manufactured Wiring Systems	UL 183
Medical Electrical Equipment — Part 1: General Requirements	UL 60601–1
Medium-Voltage Power Cables	UL 1072
Metal-Clad Cables	UL 1569
Metal-Clad Cables and Cable-Sealing Fittings for Use in Hazardous (Classified) Locations	UL 2225
Metallic Outlet Boxes	UL 514A
Mobile Home Pipe Heating Cable	UL 1462
Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures	UL 489
Motor Control Centers	UL 845
Motor-Operated Appliances	UL 73

Neon Transformers and Power Supplies	UL 2161
Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations	ISA-12.12.01
Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers	UL 514C
Nonmetallic Surface Raceways and Fittings	UL 5A
Nonmetallic Underground Conduit with Conductors	UL 1990
Office Furnishings	UL 1286
Optical Fiber Cable	UL 1651
Optical Fiber and Communication Cable Raceway	UL 2024
Panelboards	UL 67
Performance Requirements, Combustible Gas Detectors	ISA 12.13.01
Personal Protection Systems for Electric Vehicle Supply Circuits: General Requirements	UL 2231–1
Personal Protection Systems for Electric Vehicle Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems	UL 2231–2
Plugs, Receptacles and Couplers for Electrical Vehicles	UL 2251
Portable Electric Luminaires	UL 153
Portable Power Distribution Units	~~Ul~~ UL 1640
Potting Compounds for Swimming Pool, Fountain, and Spa Equipment	UL 676A
Power Conversion Equipment	UL 508C
Power Outlets	UL 231
Power Units Other Than Class 2	UL 1012
Power-Limited Circuit Cables	UL 13
Professional Video and Audio Equipment	UL 1419
Programmable Controllers – Part 2: Equipment Requirements and Tests	UL 61131-2
Protectors for Coaxial Communications Circuits	UL 497C
Protectors for Data Communication and Fire Alarm Circuits	UL 497B
Protectors for Paired Conductor Communications Circuits	UL 497
Proximity Switches	UL 60947-5-2
Reference Standard for Electrical Wires, Cables, and Flexible Cords	UL 1581
Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	UL 1684
Residential Pipe Heating Cable	UL 2049
Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids	ISA 12.27.01
Roof and Gutter De-Icing Cable Units	UL 1588
Room Air Conditioners	UL 484
Rotating Electrical Machines – General Requirements	UL 1004-1
~~Safety of Information Technology Equipment, Part 1: General Requirements~~	~~UL 60950-1~~
~~Safety of Information Technology Equipment, Part 21: Remote Power Feeding~~	~~UL 60950-21~~
Schedule 40 and 80 Rigid PVC Conduit and Fittings	UL 651
Sealed Wire Connector Systems	UL 486D
Seasonal and Holiday Decorative Products	UL 588
Secondary Protectors for Communications Circuits	UL 497A
Self-Ballasted Lamps and Lamp Adapters	UL 1993

Service-Entrance Cables	UL 854
Smoke Detectors for Fire Alarm Signaling Systems	UL 268
Specialty Transformers	UL 506
Splicing Wire Connectors	UL 486C
Stage and Studio Lighting	UL 1573
Standby Batteries	UL 1989
Stationary Engine Generator Assemblies	UL 2200
Strut-Type Channel Raceways and Fittings	UL 5B
Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings	UL 1684A
Surface Metal Raceways and Fittings	UL 5
Surface Raceways and Fittings for Use with Data, Signal and Control Circuits	UL 5C
Surge Arresters — Gapped Silicon-Carbide Surge Arresters for AC Power Circuits	IEEE C62.1
Surge Arresters — Metal-Oxide Surge Arresters for AC Power Circuits	IEEE C62.11
Swimming Pool Pumps, Filters, and Chlorinators	UL 1081
Switchboards	UL 891
Telephone Equipment	UL 1459
Thermally Protected Motors	UL 1004-3
Transfer Switch Equipment	UL 1008
Transient Voltage Surge Suppressors	UL 1449
Underfloor Raceways and Fittings	UL 884
Underwater Luminaires and Submersible Junction Boxes	UL 676
Uninterruptible Power Systems	UL 1778
Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines	UL 1017
Waste Disposers	UL 430
Wire Connectors	UL 486A-486B
Wireways, Auxiliary Gutters, and Associated Fittings	UL 870

Substantiation: Annex A, Product Safety Standards, is proposed to be updated in order for the annex to reflect the most recent product standard designations and names for those UL standards that are currently referenced. Additionally, changes to the Annex are needed in order to reflect the product listing requirements of the NEC, and to reflect those standards that are suitable for evaluating products and identifying them for a particular purpose within the NEC. Listing to these specific product safety standards is one mechanism for meeting the requirement that a product be identified for a particular purpose.

Specifically, this proposal is made to:

(1) Reinstate the reference to UL 183, Manufactured Wiring Systems. This standard was included in the 2005 NEC and was inadvertently removed from the 2008 NEC.

(2) Update the following standard titles and designations:

a. Audio, Video and Similar Electronic Apparatus, UL 60065 – Update title

b. Switchboards, UL 891 – Update title and reposition in table

c. Electrical Apparatus for Explosive Gas Atmospheres – Part 0, General Requirements, UL 60079-0 – Correct Title

d. Electrical Apparatus for Explosive Gas Atmospheres – Part 1, Flameproof Enclosures “d”, UL 60079-1 – Correct Title

e. Electrical Apparatus for Explosive Gas Atmospheres – Part 5, Powder Filling “q”, UL 60079-5 – Correct Title

f. Electrical Apparatus for Explosive Gas Atmospheres – Part 6, Oil-Immersion “o”, UL 60079-6 – Correct Title

g. Electrical Apparatus for Explosive Gas Atmospheres – Part 7, Increased Safety “e”, UL 60079-7 – Correct Title

h. Electrical Apparatus for Explosive Gas Atmospheres – Part 18, Construction, Test and Marking of Type of Protection Encapsulation “m”, UL 60079-18, Correct Title

i. Flexible Cords and Cables, UL 62 – Update Title

j. Sealed Wire Connector Systems, UL 486D – Update Title and reposition in the Annex based on the new title.

(3) Make the following editorial updates:

a. Remove the “HDPE” following the UL 651B reference

b. Correct the reference to UL 1640 such that the “UL” is capitalized

(4) Replace the reference to UL 1585, Class 2 and Class 3 Transformers, with references to the following unique standards, and position these references alphabetically:

a. UL 5085-1, Low Voltage Transformers – Part 1: General Requirements

b. UL 5085-3, Low Voltage Transformers – Part 3: Class 2 and Class 3 Transformers

(5) Replace the reference to UL 1004, Electric Motors, with references to the following unique standards and position these references alphabetically:

a. UL 1004-1, Rotating Electrical Machines – General Requirements

b. UL 1004-2, Impedance Protected Motors

c. UL 1004-3, Thermally Protected Motors

d. UL 1004-4, Electric Generators

e. UL 1004-5, Fire Pump Motors

(6) Replace the reference to UL 1598 with references to the following unique standards (currently, the reference includes the designation of (a) with the standard title of (b):

a. UL 1598, Luminaires

b. UL 1598B, Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements

(7) Add reference to UL 60947-5-2, Proximity Switches, and UL 61131-2, Programmable Controllers – Part 2: Equipment Requirements and Tests, as options to the existing UL 508 reference. These IEC-based UL standards incorporate the international requirements with relevant national differences.

(8) Add reference to UL 60950-22, Information Technology Equipment Safety – Part 22: Equipment to be Installed Outdoors, and UL 60950-23, Information Technology Equipment – Part 23: Large Data Storage Equipment, for specific requirements associated with the general requirements already referenced in UL 60950-1. Also, remove "Safety of" from the titles for the UL 60950-1 and the UL 60950-21 standards and reposition these standards alphabetically in the list.

(9) Add reference to UL 60335-2-24, Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers as an option to the existing UL 250 reference. UL 60335-2-24 is an IEC-based UL standard incorporating the international requirements with relevant national differences.

(10) Add reference to the following new UL standards in order to reflect product listing requirements of the NEC, and to reflect those standards that are suitable for evaluating products and identifying these for a particular purpose within the NEC (listing for these product safety standards is one mechanism for meeting the requirement that a product be identified for a particular purpose):

a. UL 489A, Circuit Breakers for use in Communication Equipment

b. UL 810A, Electrochemical Capacitors

c. UL 2459, Insulated Multi-Pole Splicing Wire Connectors

d. UL 8750, Light Emitting Diode (LED) Light Sources for Use in Lighting Products

(11) Delete the following reference standards, as these are scheduled to be withdrawn on 1/1/2010:

a. Audio-Video Products and Accessories, UL 1492

b. Commercial Audio Equipment, UL 813

Panel Meeting Action: Accept in Principle

The panel accepts the proposal with the addition of the following:

IEEE Standard 515, Standard for the Testing, Design, Installation and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications.

Panel Statement: The panel accepts the proposed text.

The added IEEE standard is referenced in 427.1 FPN.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

14-301 Log #4437 NEC-P14 **Final Action: Accept**

(Annex A)

TCC Action: The Technical Correlating Committee directs that this proposal be forwarded to Code-Making Panel 1 for action

This action will be considered by Code-Making panel 1 as a public comment.

Submitter: Eliana Beattie, ISA

Recommendation: Revise text to read as follows:

Change Combustible Gas Detectors, Performance Requirements ISA 12.13.01 to Combustible Gas Detectors, Performance Requirements for ANSI/ISA-60079-29-1

Change Electrical Apparatus for Explosive Gas Atmospheres – Part 11: Intrinsic Safety "i" ISA 60079-11/UL 60079-11 to Explosive Atmospheres – Part 11: Equipment protection by intrinsic safety "i" ANSI/ISA-60079-11 / ANSI/UL 60079-11

Change Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Type of Protection "n" ISA 60079-15/UL 60079-15 to Electrical Apparatus for Explosive Gas Atmospheres – Part 15: Type of Protection "n" ANSI/ISA-60079-15 / ANSI/UL 60079-15

Change Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection – Encapsulation "m" ISA S12.23.01/UL 60079-18 to Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations Type of Protection – Encapsulation "m" ANSI/ISA-60079-18 / ANSI/UL 60079-18

Change Electrical Apparatus for Use in Class I, Zones 0 & 1 Hazardous (Classified) Locations: General Requirements ISA 12.0.01/UL 60079-0 to Explosive Gas Atmospheres – Part 0: Equipment- General requirements ANSI/ISA-60079-0 / ANSI/UL 60079-0

Change Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection – Increased Safety "e" ISA S12.16.01/UL 60079-7 to Explosive Gas Atmospheres – Part 7: Increased safety "e" ANSI/ISA-60079-7 / ANSI/UL 60079-7

Change Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection – Flameproof "d" ISA S12.22.01/UL 60079-1 to Explosive Gas Atmospheres – Part 1: Type of protection – Flameproof "d" ANSI/ISA-60079-1 / ANSI/UL 60079-1

Change Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection – Powder Filling "q" ISA S12.25.01/UL 60079-5 to Explosive Gas Atmospheres – Part 5: Type of protection – Powder filling "q" ANSI/ISA-60079-5 / ANSI/UL 60079-5

Change Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection – Oil Immersion "O" ISA S12.26.01/UL 60079-6 Explosive Gas Atmospheres – Part 6: Type of protection – Oil immersion "o" ANSI/ISA-60079-6 / ANSI/UL 60079-6

Change Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation "mD" ISA 61241-18 (12.10.07) to Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Protection by Encapsulation "mD" ANSI/ISA-61241-18

Change Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Protection by Enclosure "td" ISA 61241-1 (12.10.03) to Electrical Apparatus for Use in Zone 20 and Zone 21 Hazardous (Classified) Locations – Protection by Enclosure "tD" ANSI/ISA-61241-1

Change Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – General Requirements ISA 61241-0 (12.10.02) to Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – General Requirements ANSI/ISA-61241-0

Change Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety "iD" ISA 61241-11 (12.10.06) to Electrical Apparatus for Use in Zone 20, Zone 21, and Zone 22 Hazardous (Classified) Locations – Protection by Intrinsic Safety "iD" ANSI/ISA-61241-11

Change Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization "pD" ISA 61241-2 (12.10.04) to Electrical Apparatus for Use in Zone 21 and Zone 22 Hazardous (Classified) Locations – Protection by Pressurization "pD" ANSI/ISA-61241-2

Change Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations ISA-12.12.01 to Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations ANSI/ISA-12.12.01

Change Performance Requirements, Combustible Gas Detectors ISA 12.13.01 to Performance Requirements of Detectors for Flammable Gases ANSI/ISA-60079-29-1

Change Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids ISA 12.27.01 to Requirements for Process Sealing Between Electrical Systems and Potentially Flammable or Combustible Process Fluids ANSI/ISA-12.27.01

Substantiation: Change format to match actual ISA standards title.

Panel Meeting Action: Accept

Panel Statement: See panel action and substantiation on Proposal 14-6a.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Annex B — Application Information for Ampacity Calculation

6-184 Log #2950a NEC-P06 **Final Action: Reject**

(Annex B)

Submitter: Mark T. Rochon, Peabody, MA

Recommendation: Add new text to read as follows:

<u>Annex: Informational Purposes Only.</u>

<u>Annex A Product Safety.</u>

<u>Annex B Application Information for Ampacity Calculation.</u>

<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>

<u>Annex D Examples.</u>

<u>Annex E Type of Construction.</u>

<u>Annex F About Critical Operations Power System.</u>

<u>Annex G Supervisory Control and Data Acquisition.</u>

<u>Annex H Administration and Enforcement.</u>

Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.

Panel Meeting Action: Reject

Panel Statement: The panel notes that this proposal would be helpful if included in the table of contents as well as the annex but cannot be acted on by this panel. The TCC could redirect this to the proper panel.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-185 Log #1152 NEC-P06 **Final Action: Accept**

(Table B.310.1 and Table B.310.3)

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)

Recommendation: Change "See Table 310.13" to "See Table 310.13(A)."

Substantiation: Table 310.13 has been revised to 310.13(A).

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-186 Log #641 NEC-P06 **Final Action: Accept in Principle**
(Table B.310.1)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the Correction Factors Table at the bottom of Table B.310.1 as shown:

CORRECTION FACTORS

Ambient Temperature (ºC)	For ambient temperatures other than 30ºC (86ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.						Ambient Temperature (ºF)
10 or less	1.29	1.20	1.15	1.29	1.20	1.15	50 or less
11-15	1.22	1.15	1.12	1.22	1.15	1.12	51-59
16-20	1.15	1.11	1.08	1.15	1.11	1.08	60-68
21-25	1.08	1.05	1.04	1.08	1.05	1.04	~~70~~ 69-77
26-30	1.00	1.00	1.00	1.00	1.00	1.00	~~79~~ 78-86
31-35	0.91	0.94	0.96	0.91	0.94	0.96	~~88~~ 87-95
36-40	0.82	0.88	0.91	0.82	0.88	0.91	~~97~~ 96-104
41-45	0.71	0.82	0.87	0.71	0.82	0.87	~~106~~ 105-113
46-50	0.58	0.75	0.82	0.58	0.75	0.82	~~115~~ 114-122
51-55	0.41	0.67	0.76	0.41	0.67	0.76	~~124~~ 123-131
56-60	—	0.58	0.71	—	0.58	0.71	~~133~~ 132-140
~~61-70~~	—	~~0.33~~	~~0.58~~	—	~~0.33~~	~~0.58~~	~~142-158~~
61-65	—	0.47	0.65	—	0.47	0.65	141-149
66-70	—	0.33	0.58	—	0.33	0.58	150-158
~~71-80~~	—	—	~~0.41~~	—	—	~~0.41~~	~~160-176~~
71-75	—	—	0.50	—	—	0.50	159-167
76-80	—	—	0.41	—	—	0.41	168-176
81-85	—	—	0.29	—	—	0.29	177-185

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).

Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.

The equation in 310.60(C)(4) was used to calculate the ampacity correction factors for various ambient air temperatures for the conductor temperature ratings in the table. The term Δ*TD* was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation appears in 3.4.1 of *IEEE STD 835, IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the three lower ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions and the 81-85C range was added to complete the table and address high ambient temperature applications. The temperature ranges for 61C-80C were changed from 10C to 5C since the differences in the correction factors are significant and it provides consistent temperature ranges throughout the Table. The correction factors for the ambient temperature ranges in the existing table remain the same.

The Ambient Temperature (ºF) column was revised to be continuous and consistent with Tables 310.16 through 310.19.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-187 Log #417 NEC-P06 **Final Action: Accept**
(Figure B310.3, FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Figure title, revise as shown:

"…(Three Conductors in Each ~~per~~ Electrical Duct), Nine Single-Conductor Cables in Each ~~per~~ Phase…".

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-188 Log #642 NEC-P06 **Final Action: Accept in Principle**
(Table B.310.3)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise the Correction Factors Table at the bottom of Table B.310.3 as shown on the next page:

CORRECTION FACTORS

Ambient Temp. (ºC)	For ambient temperatures other than 40ºC (104ºF), multiply the allowable ampacities shown above by the appropriate factor shown below.								Ambient Temp. (ºF)
10 or less	1.58	1.36	1.29	1.26	1.58	1.36	1.29	1.26	50 or less
11-15	1.50	1.31	1.25	1.22	1.50	1.31	1.25	1.22	51-59
16-20	1.41	1.25	1.20	1.18	1.41	1.25	1.20	1.18	60-68
21-25	1.32	1.20	1.15	1.14	1.32	1.20	1.15	1.14	~~70~~ 69-77
26-30	1.22	1.13	1.11	1.10	1.22	1.13	1.11	1.10	~~79~~ 78-86
31-35	1.12	1.07	1.05	1.05	1.12	1.07	1.05	1.05	~~88~~ 87-95
36-40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	~~97~~ 96-104
41-45	0.87	0.93	0.94	0.95	0.87	0.93	0.94	0.95	~~106~~ 105-113
46-50	0.71	0.85	0.88	0.89	0.71	0.85	0.88	0.89	~~115~~ 114-122
51-55	0.50	0.76	0.82	0.84	0.50	0.76	0.82	0.84	~~124~~ 123-131
56-60	—	0.65	0.75	0.77	—	0.65	0.75	0.77	~~133~~ 132-140
~~61-70~~	—	~~0.38~~	~~0.58~~	~~0.63~~	—	~~0.38~~	~~0.58~~	~~0.63~~	~~142-158~~
61-65	—	0.53	0.67	0.71	—	0.53	0.67	0.71	141-149
66-70	—	0.38	0.58	0.63	—	0.38	0.58	0.63	150-158
~~71-80~~	—	—	~~0.33~~	~~0.44~~	—	—	~~0.33~~	~~0.44~~	~~160-176~~
71-75	—	—	0.47	0.55	—	—	0.47	0.55	159-167
76-80	—	—	0.33	0.45	—	—	0.33	0.45	168-176
81-85	—	—	—	0.32	—	—	—	0.32	177-185

Substantiation: If the Proposal to add a new 310.15(B)(2) is accepted, this Proposal should be accepted in Principle and refer to the Panel Action on Proposal 310.15(B)(2) (New).

Acceptance of this revised table will harmonize the ampacity correction factors for various ambient temperatures between the NEC and the CEC.

The equation in 310.60(C)(4) was used to calculate the ampacity correction factors for various ambient air temperatures for the conductor temperature ratings in the table. The term Δ*TD* was deleted since it is not necessary to include it for cables rated below 46kV; the temperature rise due to dielectric heating is insignificant compared to the conductor losses. This equation appears in 3.4.1 of *IEEE STD 835*, *IEEE Standard Power Cable Ampacity Tables*.

Since the NEC is used internationally, the three lower ambient temperature ranges were added to provide the appropriate ampacity correction factors for colder regions and the 81-85C range was added to complete the table and address high ambient temperature applications.

The temperature ranges for 61C-80C were changed from 10C to 5C since the differences in the correction factors are significant and it provides consistent temperature ranges throughout the Table. The correction factors for the ambient temperature ranges in the existing table remain the same.

The Ambient Temperature (ºF) column ranges were revised to be continuous and consistent with Tables 310.18 through 310.20.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Principle
Panel Statement: See panel action on Proposal 6-53.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-189 Log #1643 NEC-P06 **Final Action: Accept**
(Table B.310.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Delete the asterisks beside "11" and "16" in the 90C copper column.
Substantiation: The asterisk footnote only applies to 14, 12, and 10 AWG.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-190 Log #418 NEC-P06 **Final Action: Accept**
(Figure B310.4, FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Figure title, revise as shown:
"…(One Conductor in Each ~~per~~ Electrical Duct), Four Single-Conductor Cables in Each ~~per~~ Phase…".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-191 Log #441 NEC-P06 **Final Action: Accept**
(Table B310.5)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the Table title:
Change "(One Conductor per Electrical Duct)" to "(One Conductor in Each Electrical Duct)".
Change "Electrical Duct Arrangement per Figure B.310.2" to "Electrical Duct Arrangement in Accordance with Figure B.310.2".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-192 Log #419 NEC-P06 **Final Action: Accept**
(Figure B310.5, FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the Figure title, revise as shown:
"…(One Conductor in Each ~~per~~ Electrical Duct), Five Single-Conductor Cables in Each ~~per~~ Phase…".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-193 Log #442 NEC-P06 **Final Action: Accept**
(Table B310.6)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the Table title:
Change "(One Cable per Electrical Duct)" to "(One Cable in Each Electrical Duct)".
Change "Electrical Duct Arrangement per Figure B.310.2" to "Electrical Duct Arrangement in Accordance with Figure B.310.2".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-194 Log #443 NEC-P06 **Final Action: Accept**
(Table B310.7)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the Table title:
Change "(Three Conductors per Electrical Duct)" to "(Three Conductors in Each Electrical Duct)".
Change "Electrical Duct Arrangement per Figure B.310.2" to "Electrical Duct Arrangement in Accordance with Figure B.310.2".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-195 Log #444 NEC-P06 **Final Action: Accept**
(Table B310.8)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the Table title:
Change "Arrangement per Figure B.310.2" to "Electrical Duct Arrangement in Accordance with Figure B.310.2".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
The addition of the words "Electrical Duct" will provide consistency with the other Tables in Annex B.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-196 Log #445 NEC-P06 **Final Action: Accept**
(Table B310.9)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the Table title:
Change "Arrangement per Figure B.310.2" to "Electrical Duct Arrangement in Accordance with Figure B.310.2".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistence throughout the Code. "Per" is not an appropriate term for a standard.
The addition of the words "Electrical Duct" will provide consistency with the other Tables in Annex B.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-197 Log #446 NEC-P06 **Final Action: Accept**
(Table B310.10)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In the Table title:
Change "Arrangement per Figure B.310.2" to "Electrical Duct Arrangement in Accordance with Figure B.310.2".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
The addition of the words "Electrical Duct" will provide consistency with the other Tables in Annex B.
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-198 Log #278 NEC-P06 **Final Action: Accept**
(Table B.310.11, FPN)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change "formula" to "equation" in the first sentence.
Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression which follows the FPN.
This is one of a series of proposals to have consistent terminology throughout the code.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-199 Log #643 NEC-P06 **Final Action: Accept in Part**
(Table B.310.11)

Submitter: James M. Daly, Rep. NEC/CEC Ampacity Harmonization Task Group
Recommendation: Revise first column heading in Table B.310.11 from "Number of Current-Carrying Conductors" to "Number of Conductors (See Note 1.)".
Add a Note below the Table before the FPN to read:
1 Number of Conductors is the total number of conductors in the raceway or cable adjusted in accordance with 310.15(B)(4) and (5).
Revise the FPN as follows:
"FPN: The ampacity limit for ~~the number of~~ <u>10 through 85</u> current-carrying conductors ~~in 10 through 85~~ is based on the following ~~formula~~ <u>equation</u>. For <u>more</u> ~~greater~~ than 85 conductors, special calculations are required that are beyond the scope of this table."
Revise the explanation of terms as follows:
A1 - replace the semi-colons after each Table number with commas in four places and revise the last phrase "~~and~~ <u>or</u> Table B.310.7 multiplied by the appropriate <u>adjustment</u> factor from Table B.310.11."
N = ~~total~~ number of conductors <u>that may be current-carrying</u> used to <u>select adjustment</u> ~~obtain multiplying~~ factor from Table B.310.11"
E = ~~desired~~ <u>maximum</u> number of ~~current-carrying~~ conductors <u>carrying current simultaneously</u> in the raceway or cable
In Example 1 and 2, revise the last phrase "that contains 24 conductors <u>that may, at different times, be current-carrying."</u>
Substantiation: A companion proposal is being submitted for Table 310.15(B)(2)(a).
During the 1993 NEC revision cycle, the column headings in Table 310.15(B)(2)(a) and Table B.310.11 were editorially changed to "Number of Current-Carrying Conductors". There was no Proposal, Comment, or Panel Action to make that change. See the substantiation and chronological history provided in the Proposal on Table 310.15(B)(2)(a).
The correction to the column heading also correlates with the column headings in Table 400.5 in the NEC and Table 5C in the 2006 Canadian Electrical Code, Part I.
When there is load diversity, the adjustment factor is calculated based on the percentage of the maximum number of conductors that are carrying current at any time to the total number of conductors that may carry current. The Note is proposed for clarity since there has been some confusion that the column referred to the total number of conductors in the raceway or cable.
The changes in the FPN correlate with the revised column heading. "Formula" refers more to a chemical composition whereas "equation" refers to a mathematical expression. The change from "greater" to "more" is grammatical.
The change in the explanation of the term *A1* is grammatical since a choice is offered between the five Tables.
The change in the explanation of the term *N* correlates with the change in the column heading, the addition of Note 1, and that the Table provides an adjustment factor rather than a multiplying factor.

The change in the explanation of the term *E* and the additional text in the two examples clarifies that this is the maximum number of conductors that would be current-carrying at any point in time.

This Proposal was generated by the NFPA/CSA NEC/CEC Ampacity Harmonization Task Group which consisted of the following members:

United States	Canada
Jim Daly, U.S. Co-Chair	Barry O'Connell, Canadian Co Chair
Thomas Blewitt	William Burr
Mark Earley	Steve Douglas
Christel Hunter	Duncan Dunshire
Alan Manche	David Mascarenhas
David Mercier	Robert Nelson
Jeff Sargent	Shawn Paulsen
John Stacey	Tim Pope
John Thompson	Doug Reith
	Brian Savaria
	Ark Tsisserev

Panel Meeting Action: Accept in Part

Accept all changes and revise text as follows:

N = ~~total~~ Number of conductors used to select adjustment ~~obtain multiplying~~ factor from Table B.310.11

E = ~~desired~~ Number of ~~current-carrying~~ conductors carrying current simultaneously in the raceway or cable.

Panel Statement: The panel does not accept the addition of the phrase "that may be current-carrying" because the added note 1, referencing Section 310.15(B)(4) and (5), will yield the proper number of conductors. The panel does not accept the addition of the word "maximum" because the equation deals with a count of conductors, not a maximum number.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-200 Log #1625 NEC-P06 **Final Action: Accept in Principle**
(Table B.310.11)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: In the definition of terms for *A*1, Change "Table 310.16, Table 310.18" to "Table 310.15(B)(1), Table 310.15(B)(3)".

Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.

Panel Meeting Action: Accept in Principle

Revise text to read as follows:

In the definition of terms for *A*1, Change "Table 310.16, Table 310.18" to "Table 310.15(B)(16), Table 310.15(B)(18)".

Panel Statement: This proposal was modified by the panel's acceptance of Proposal 6-52.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-201 Log #279 NEC-P06 **Final Action: Accept**
(B.310.15(B)(1))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "formula" to "equation".

Substantiation: The term formula normally refers to a chemical composition whereas an equation refers to a mathematical expression.

This is one of a series of proposals to have consistent terminology throughout the code.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-202 Log #1635 NEC-P06 **Final Action: Accept**
(B.310.15(B)(2), Table B.310.1 to Table B.310.10 and Figure B.310.1 to Figure B.310.5)

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: In B.310.15(B)(2):

Change "Table B.310.1 through Table B.310.10" to "Table B.310.15(B)(2)(1) through Table B.310.15(B)(2)(10)" and insert a new second sentence "Table B.310.15(B)(2)(11) provides the Adjustment Factors for more than three current-carrying conductors in a raceway or cable with load diversity.

Change "Figure B.310.3, Figure B.310.4, and Figure B.310.5" to "Figure B.310.15(B)(2)(3), Figure B.310.15(B)(2)(4), and Figure B.310.15(B)(2)(5)".

Change "Figure B.310.2 through Figure B.310.5" to "Figure B.310.15(B)(2)(2) through Figure B.310.15(B)(2)(5)".

Change title designation of Table B.310.1 to Table B.310.15(B)(2)(1).

Change title designation of Table B.310.3 to Table B.310.15(B)(2)(3).

Change title designation of Table B.310.5 to Table B.310.15(B)(2)(5) and change Figure B.310.2 to Figure B.310.15(B)(2)(2) in the title and in the 6 column headings.

Change title designation of Table B.310.6 to Table B.310.15(B)(2)(6) and change Figure B.310.2 to Figure B.310.15(B)(2)(2) in the title and in the 6 column headings.

Change title designation of Table B.310.7 to Table B.310.15(B)(2)(7) and change Figure B.310.2 to Figure B.310.15(B)(2)(2) in the title and in the 6 column headings.

Change title designation of Table B.310.8 to Table B.310.15(B)(2)(8) and change Figure B.310.2 to Figure B.310.15(B)(2)(2) in the title and in the 4 column headings.

Change title designation of Table B.310.9 to Table B.310.15(B)(2)(9) and change Figure B.310.2 to Figure B.310.15(B)(2)(2) in the title and in the 4 column headings.

Change title designation of Table B.310.10 to Table B.310.15(B)(2)(10) and change Figure B.310.2 to Figure B.310.15(B)(2)(2) in the title and in the 4 column headings.

Change title designation of Table B.310.11 to Table B.310.15(B)(2)(11) and in the FPN definition of terms, change "Table B.310.1; Table B.310.6; and Table B.310.7" to "Table B.310.15(B)(2)(1); Table B.310.15(B)(2)(6); and Table B.310.15(B)(2)(7)" and change "Table B.310.11" to "Table B.310.15(B)(2)(11)" in two places.

Change title designation of Figure B.310.1 to Figure B.310.15(B)(2)(1).

Change title designation of Figure B.310.2 to Figure B.310.15(B)(2)(2) and change "Table B.310.5 Through Table B.310.10" to "Table B.310.15(B)(2)(5) Through Table B.310.15(B)(2)(10)".

Change title designation of FPN Figure B.310.3 to FPN Figure B.310.15(B)(2)(3).

Change title designation of FPN Figure B.310.4 to FPN Figure B.310.15(B)(2)(4).

Change title designation of FPN Figure B.310.5 to FPN Figure B.310.15(B)(2)(5).

Substantiation: This revision will bring the Code into compliance with 2.3.1 of the NEC Style Manual which states "Tables and figures shall be referenced in the text and shall be designated by the number of the *NEC* rule in which they are referenced.

The new second sentence in B.310.15(B)(2) provides the text reference for Table B.310.15(B)(2)(11) since there is no other reference to that table in the Annex B text.

Proposals are also being submitted to correlate all the references to these Tables throughout the Code.

Panel Meeting Action: Accept

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-203 Log #275 NEC-P06 **Final Action: Accept**
(B.310.15(B)(3))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "figured" to "calculated" in the second paragraph.

Substantiation: The term "calculated" more accurately describes the operation.

This is one of a series of proposals to provide consistent terminology throughout the code.

Panel Meeting Action: Accept

Panel Statement: This revision is an editorial change. No technical changes have been made.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-204 Log #1636 NEC-P06 **Final Action: Accept**
(B.310.15(B)(3))

Submitter: James M. Daly, Upper Saddle River, NJ

Recommendation: Change "Figure B.310.1" to "Figure B.310.15(B)(2)(1)".

Substantiation: This revision will correlate with the proposal to revise the table designations of Tables B.310.1 through 310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).

Panel Meeting Action: Accept

Panel Statement: This revision is an editorial change. No technical changes have been made.

Number Eligible to Vote: 11

Ballot Results: Affirmative: 11

6-205 Log #1637 NEC-P06 **Final Action: Accept**
(B.310.15(B)(5))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the section title, change “Tables B.310.6 and B.310.7” to “Tables B.310.15(B)(2)(6) and B.310.15(B)(2)(7)”.

In (a):

Change “Figure B.310.2” to “Figure B.310.15(B)(2)(2)”.

Change “Table B.310.6 and Table B.310.7” to “Table B.310.15(B)(2)(6) and Table B.310.15(B)(2)(7)”.

In (b):

Change “Figure B.310.2” to “Figure B.310.15(B)(2)(2)”.

Change “Table B.310.6 and Table B.310.7” to “Table B.310.15(B)(2)(6) and Table B.310.15(B)(2)(7)”.

Substantiation: This revision will correlate with the proposal to revise the table designations of Tables B.310.1 through 310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-206 Log #1638 NEC-P06 **Final Action: Accept**
(B.310.15(B)(6))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Figure B.310.2” to “Figure B.310.15(B)(2)(2)” in three places.
Substantiation: This revision will correlate with the proposal to revise the table designations of Tables B.310.1 through 310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

6-207 Log #1639 NEC-P06 **Final Action: Accept**
(B.310.15(B)(7))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Change “Figure B.310.1” to “Figure B.310.15(B)(2)(1)” in the title and in three places in the text.

In the third paragraph, change “Table B.310.5” to “Table 310.15(B)(2)(5)”.

Substantiation: This revision will correlate with the proposal to revise the table designation of Tables B.310.1 through B.310.11 as Tables B.310.15(B)(2)(1) through B.310.15(B)(2)(11) and the figure designations of Figures B.310.1 through B.310.5 as Figures B.310.15(B)(2)(1) through B.310.15(B)(2)(5).
Panel Meeting Action: Accept
Panel Statement: This revision is an editorial change. No technical changes have been made.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

Annex C — Conduit and Tubing Fill Tables for Conductors And Fixture Wires of the Same Size

8-282 Log #2554a NEC-P08 **Final Action: Reject**
(Annex C)

Submitter: John Stuckwisch, Barth Electric / Rep. IEJATC Local 481 IBEW
Recommendation: #10 THW must have its area increased in Table 5 or Annex C. #10 THW must have its conductor fills increased.

A companion proposal has been submitted to Code-Making Panel 6 for Table 5.

Substantiation: So that the Table and the Annex agree with one another.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-283 Log #2950b NEC-P08 **Final Action: Reject**
(Annex C)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text to read as follows:

<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>

Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.
Panel Meeting Action: Reject
Panel Statement: CMP-8 concludes the text does not belong in Annex C.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-284 Log #3912a NEC-P08 **Final Action: Reject**
(Annex C)

Submitter: Edward Walton, Draka Cableteq, USA
Recommendation: Annex C tables for conduit fill for types RHH*, RHW*, RHW-2* without outer covering are incorrect and should be revised. The correct diameters for these cables are shown in the table below:

A copy of this proposal has also been sent to CMP-6 for action related to Table 5.

See Chapter 9 Table 5 on page 1183

Substantiation: See proposal for NFPA 70, Chapter 9, Table 5 “Dimensions of Insulated Conductors and Fixture Wires”. In this table, conductor types RHH*, RHW*, RHW-2* (*without outer jacket) have been placed in the same type class as TW, THW, THHW, THW-2 and this is never the case. This error leads to an understatement of the diameters of “R” type conductors in sizes 6 AWG and larger which could lead to under sizing conduit for these conductors.

I assume that Annex C tables are generated by a computer program that could be revised with the correct diameters. Willing to help with corrective effort.

Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects. The submitter did not provide the appropriate tables for the number of conductors in raceways for Annex C.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

8-285 Log #258 NEC-P08 **Final Action: Reject**
(Tables C.1 through C.12)

Submitter: Stephen Pirolli, Florida Electrical Apprenticeship & Training, Inc.
Recommendation: Correction to Annex C: Tables C.1, C.2, C.3, C.4, C.5, C.6, C.7, C.8, C.9, C.10, C.11, C.12.
Substantiation: In Annex C, Tables C.1 through C.12, TW #14 to #8 AWG is grouped by itself. This is a mistake. With TW #14 AWG to #8 AWG, this group should include TW, THHW, THW and THW-2. I have provided a marked-up copy of the suggested changes.

Note: Supporting material is available for review at NFPA Headquarters.

Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects. The submitter’s proposal was incomplete. The submitter correctly submitted Table C1 and C2 revisions; however the remaining tables need to be submitted.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 8-286 was not used)

CHAPTER 9

RHH*, RHW*, RHW-2* DIAMETERS FOR 2008 NFPA70

CORRECTED TABLE 5 DIMENSIONS OF INSULATED CONDUCTORS AND FIXTURE WIRES

TYPE	SIZE	COND DIA	COMPOSITE INSULATION "WITHOUT OUTER COVERING" INNER	OUTER	PROPER APPROXIMATE DIAMETER		**CURRENT LISTED DIAMETER**	**% ERROR**	PROPER APPROXIMATE AREA	
	AWG/kcmil	in.	in.	in.	in.	mm			in.	mm
'RHH*, RHW*, RHW-2*	14	0.073	0.030	0.015	0.163	4.140	0.163	0.0%	0.0209	13.46
	12	0.092	0.030	0.015	0.182	4.623	0.182	0.0%	0.0260	16.78
	10	0.116	0.030	0.015	0.206	5.233	0.206	0.0%	0.0333	21.50
	8	0.146	0.045	0.015	0.266	6.757	0.266	0.0%	0.0556	35.84
	6	0.184	0.045	0.030	0.334	8.484	**0.304**	**-9.0%**	0.0876	56.51
	4	0.232	0.045	0.030	0.382	9.703	**0.352**	**-7.9%**	0.1146	73.92
	3	0.260	0.045	0.030	0.410	10.414	**0.380**	**-7.3%**	0.1320	85.15
	2	0.292	0.045	0.030	0.442	11.227	**0.412**	**-6.8%**	0.1534	98.96
	1	0.332	0.055	0.045	0.532	13.513	**0.492**	**-7.5%**	0.2223	143.37
	1/0	0.372	0.055	0.045	0.572	14.529	**0.532**	**-7.0%**	0.2570	165.74
	2/0	0.418	0.055	0.045	0.618	15.698	**0.578**	**-6.5%**	0.3000	193.47
	3/0	0.470	0.055	0.045	0.670	17.019	**0.630**	**-6.0%**	0.3526	227.40
	4/0	0.528	0.055	0.045	0.728	18.492	**0.688**	**-5.5%**	0.4162	268.47
	250	0.575	0.065	0.065	0.835	21.210	**0.765**	**-8.4%**	0.5476	353.19
	300	0.630	0.065	0.065	0.890	22.607	**0.820**	**-7.9%**	0.6221	401.25
	350	0.681	0.065	0.065	0.941	23.902	**0.871**	**-7.4%**	0.6955	448.55
	400	0.728	0.065	0.065	0.988	25.096	**0.918**	**-7.1%**	0.7667	494.48
	500	0.813	0.065	0.065	1.073	27.255	**1.003**	**-6.5%**	0.9043	583.22
	600	0.893	0.080	0.065	1.183	30.049	**1.113**	**-5.9%**	1.0992	708.93
	700	0.964	0.080	0.065	1.254	31.853	**1.184**	**-5.6%**	1.2351	796.58
	750	0.998	0.080	0.065	1.288	32.716	**1.218**	**-5.4%**	1.3029	840.36
	800	1.030	0.080	0.065	1.320	33.529	**1.250**	**-5.3%**	1.3685	882.64
	900	1.094	0.080	0.065	1.384	35.155	**1.314**	**-5.1%**	1.5044	970.30
	1000	1.152	0.080	0.065	1.442	36.628	**1.372**	**-4.9%**	1.6331	1053.33
	1250	1.289	0.100	0.095	1.679	42.648	**1.539**	**-8.3%**	2.2141	1428.03
	1500	1.412	0.100	0.095	1.802	45.773	**1.662**	**-7.8%**	2.5504	1644.92
	1750	1.526	0.100	0.095	1.916	48.668	**1.776**	**-7.3%**	2.8832	1859.63
	2000	1.632	0.100	0.095	2.022	51.361	**1.882**	**-6.9%**	3.2111	2071.08

Annex D — Examples

11-158 Log #2069a NEC-P11 **Final Action: Reject**
(Annex D)

Submitter: John Skalecki, Cavendish, VT
Recommendation: Square feet is denoted throughout the code as (ft^2). 20 ft^2 does not equal 20 square feet. It equals 400 sq ft as mathematical notation goes.
This proposal has also been submitted to Code-Making Panels 2, 12, and 19.
Substantiation: It is very confusing to read square feet as feet squared. I propose all (ft^2) notations be replaced with (sq. ft.). Example: 20 sq ft = 4 ft x 5 ft. 20 ft^2 = 20 ft x 20 ft. Another example: 210.52(E)(3) Ex. 3 1.86 m^2 = 20 ft^2, 1.86 m^2 = 20 sq ft.
Panel Meeting Action: Reject
Panel Statement: The term is correct as written.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

12-184 Log #2069b NEC-P12 **Final Action: Reject**
(Annex D)

Submitter: John Skalecki, Cavendish, VT
Recommendation: Square feet is denoted throughout the code as (ft^2). 20 ft^2 does not equal 20 square feet. It equals 400 sq ft as mathematical notation goes.
This proposal has also been submitted to Code-Making Panels 2, 11, and 19.
Substantiation: It is very confusing to read square feet as feet squared. I propose all (ft^2) notations be replaced with (sq. ft.). Example: 20 sq ft = 4 ft x 5 ft. 20 ft^2 = 20 ft x 20 ft. Another example: 210.52(E)(3) Ex. 3 1.86 m^2 = 20 ft^2, 1.86 m^2 = 20 sq ft.
Panel Meeting Action: Reject
Panel Statement: The proposed revision would be in conflict with the 2003 NEC Style Manual for units of measure.
The submitter is incorrectly attributing the superscript to the numbers when it applies only to the units. For example, 20 ft^2 does not mean 20^2 ft^2. Therefore, 20 ft^2 or 20 sq ft equals 20 square feet and 20 ft squared or 20 ft sq = 400 square feet.
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

19-308 Log #2069c NEC-P19 **Final Action: Reject**
(Annex D)

Submitter: John Skalecki, Cavendish, VT
Recommendation: Square feet is denoted throughout the code as (ft^2). 20 ft^2 does not equal 20 square feet. It equals 400 sq ft as mathematical notation goes.
This proposal has also been submitted to Code-Making Panels 2, 11, and 12.
Substantiation: It is very confusing to read square feet as feet squared. I propose all (ft^2) notations be replaced with (sq. ft.). Example: 20 sq ft = 4 ft x 5 ft. 20 ft^2 = 20 ft x 20 ft. Another example: 210.52(E)(3) Ex. 3 1.86 m^2 = 20 ft^2, 1.86 m^2 = 20 sq ft.
Panel Meeting Action: Reject
Panel Statement: The existing language is consistent with other examples in Annex D. The proposed language does not improve clarity and usability of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

2-371 Log #2069 NEC-P02 **Final Action: Reject**
(Annex D)

Submitter: John Skalecki, Cavendish, VT
Recommendation: Square feet is denoted throughout the code as (ft^2). 20 ft^2 does not equal 20 square feet. It equals 400 sq ft as mathematical notation goes.
This proposal has also been submitted to Code-Making Panels 11, 12, and 19.
Substantiation: It is very confusing to read square feet as feet squared. I propose all (ft^2) notations be replaced with (sq. ft.). Example: 20 sq ft = 4 ft x 5 ft. 20 ft^2 = 20 ft x 20 ft. Another example: 210.52(E)(3) Ex. 3 1.86 m^2 = 20 ft^2, 1.86 m^2 = 20 sq ft.
Panel Meeting Action: Reject
Panel Statement: The panel notes that ft^2 is a proper notation for square feet.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

11-159 Log #2950d NEC-P11 **Final Action: Reject**
(Annex D)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text to read as follows:
<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>
Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.
Panel Meeting Action: Reject
Panel Statement: The title of the annexes is not within the purview of this panel. In addition, no specific location(s) for the additions has been indicated.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

19-309 Log #2950e NEC-P19 **Final Action: Reject**
(Annex D)

Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text to read as follows:
<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>
Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.
Panel Meeting Action: Reject
Panel Statement: CMP-19 does not have purview over formatting of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

2-372 Log #2950c NEC-P02 **Final Action: Accept in Principle**
(Annex A through H)

TCC Action: The Technical Correlating Committee notes that this is an NFPA staff function that will be handled by the NFPA editorial staff.
Submitter: Mark T. Rochon, Peabody, MA
Recommendation: Add new text to read as follows:
<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>
Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-373 Log #3413 NEC-P02 **Final Action: Reject**
(Example D.1(a))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
Annex D1a
Selected text to read "Sections 230.42(B) and 230.79 require service-entrance conductors and disconnecting means rated not less than 100 amperes." (The remaining text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-298.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-374 Log #402 NEC-P02 **Final Action: Accept**
(Example D.1(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
In General Lighting Load, change "3 VA per ft^2" to "3 VA/ft^2".
Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-375 Log #3800 NEC-P02 **Final Action: Reject**
(Example D.1(b))

Submitter: David Filipiak, Sky Electric, Inc.
Recommendation: Delete Example D1(b) in its entirety and replace with the following:
Example D1(b) One-Family Dwelling
Assume same conditions as Example No. D1(a), plus addition of one 6-A, 230-V, room air-conditioning unit and one 12-A, 115-V, room air-conditioning unit,* one 8-A, 115-V, rated waste disposer, and one 10-A 120-V, rated dishwasher. See Article 430 for general motors and Article 440, Part VII, for air-conditioning equipment. Motors have nameplate ratings of 115V and 230V for use on 120-V and 240-V nominal voltage systems.
*(For feeder neutral, use larger of the two appliances for unbalance.)

Let Calculated load from D1(a) 18,600VA
One 6-A, 230V room air conditioner 1,440VA* (see 440.62(A)
One 12-A, 115-V room air conditioner 1,440VA
One 8-A, 115-V rated waste disposer 960VA
One 10-A, 120-V rated dishwasher 1,200VA (see 430.22)
*25 percent of largest room air conditioner, 1440 ×.25 360VA
*25 percent of largest motor, 1200VA ×.25 300VA
Net Calculated load for 120/240-V, 3 wire
single phase service or feeder 24,300VA/240V=101.25 A

Service or feeder rating would be 110 A.

Calculation for Neutral for Feeder and Service

Net calculated load for neutral from D1(a) 14,550VA
One 12-A, 115-V room air conditioner 1,440VA* (see 440.62(A))
One 8-A, 115-V rated waste disposer 960VA* (see 430.22)
One 10-A, 120V dishwasher 1,200VA
*25 percent of largest motor, 960VA ×.25 240VA
*25 percent of largest room air conditioner 360VA
Net calculated load for Neutral 18,750VA / 240V = 78.1A

Neutral conductor rating would be 78 A.

Substantiation: In Parts I, II, and III of Article 220 all of the calculations are discussed in Volt-Amperes or KVA.
The new calculated load in Example D1(a) in Annex D is shown in VA.
For consistency and clarification, example D1(b) in Annex D, which is a continuation of example D1(a) should also be calculated in Volt-Amperes
Panel Meeting Action: Reject
Panel Statement: The purpose of the example is to show an unbalanced load, which is why line currents are used.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-376 Log #403 NEC-P02 **Final Action: Accept**
(Example D.1(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "Total amperes per line" to "Total amperes".
Substantiation: "Per line" was deleted since only two of the three columns refer to a "Line".
This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-377 Log #1626 NEC-P02 **Final Action: Reject**
(Example D.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the very last sentence, change "Table 310.16" to "Table 310.15(B)(1)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: If CMP-6 revises the table designations then the proposal can be accepted at the comment stage.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-378 Log #404 NEC-P02 **Final Action: Accept**
(Example D.2(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "Feeder Neutral Load, per 220.61" to "Feeder Neutral Load in accordance with 220.61".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-379 Log #405 NEC-P02 **Final Action: Accept**
(Example D.2(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Change "Feeder Neutral Load, per 220.61" to "Feeder Neutral Load in accordance with 220.61".
Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-380 Log #406 NEC-P02 **Final Action: Accept**
(Example D.3)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:
Under Continuous Loads, change "3000 ft^2 at 3 VA per ft^2" to "3000 ft^2 at 3 VA/ft^2" and "30 ft at 200 VA per ft" to "30 ft at 200 VA/ft".
In the very last line in the Example, revise as follows: "Service or feeder conductor is 1/0 Cu in accordance with ~~per~~ 215.3 and Table 310.16 (with 75°C terminations)."
Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-381 Log #3416 NEC-P02 **Final Action: Reject**
(Example D.3)

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
Annex D3
Selected text at the end of the example to read "Service-entrance or feeder conductor is 1/0 Cu per 215.3 and Table 310.16 (with 75°C terminations)." (The remaining text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.
Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.
The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.
It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.
By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.
Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-298.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-382 Log #1627 NEC-P02 **Final Action: Reject**
(Example D.3(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In Ungrounded Feeder Conductors, change "Table 310.16" to "Table 310.15(B)(1)" in six places.
In the last paragraph under Feeder Neutral Conductor, change "Table 310.16" to "Table 310.15(B)(1)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: If CMP-6 revises the table designations then the proposal can be accepted at the comment stage.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-383 Log #4695 NEC-P02 **Final Action: Reject**
(Annex D, Example D.3(a))

Submitter: Frederic P. Hartwell, Hartwell Electrical Services, Inc.
Recommendation: Change the final neutral size to 4 AWG or even 3 AWG as required; rewrite the explanatory text to show a further increase in sizing proportionally based on the increase in size of the ungrounded conductors provoked by the requirements to overcome derating due to mutual conductor heating and ambient temperature.
Substantiation: This proposal is a simple placeholder that will afford public review and thereby preserve the ability to write specific text in the comment period, should CMP 5 rule that an increase in conductor size above the very minimum size established by ampacity requirements is an increase in size within the meaning of 250.122(B). This submitter is doing everything in his power to resist that interpretation, and has submitted a clarifying proposal to that end. The submitter fervently hopes this proposal will be rejected and stay rejected. However, should CMP 5 go the wrong way, the text in this example will require correlation, and by this submittal, it will not be necessary to wait for the next code cycle to do so.
Panel Meeting Action: Reject
Panel Statement: Should CMP-5 change 250.122 to require a recalculation of the neutral size, this proposal can be revisited at the comment phase.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-384 Log #1628 NEC-P02 **Final Action: Reject**
(Example D.4(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: In the very last line, change "Table 310.16 through 310.21" to "Table 310.15(B)(1) through Table 310.15(B)(6)".
Substantiation: This revision will correlate with the proposal to revise the table designation of Tables 310.16 through 310.21 as Tables 310.15(B)(1) through 310.15(B)(6) to comply with 2.3.1 of the NEC Style Manual.
Panel Meeting Action: Reject
Panel Statement: If CMP-6 revises the table designations then the proposal can be accepted at the comment stage.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-385 Log #3421 NEC-P02 **Final Action: Reject**
(Example D.4(a))

TCC Action: The Technical Correlating Committee directs the Chair of Code-Making Panel 4 to establish a Task Group to correlate the action on this proposal with the actions taken by Code-Making Panel 4.
Submitter: Timothy M. Croushore, Allegheny Power / Rep. Edison Electric Institute/Electric Light and Power NEC Task Force
Recommendation: Revise text to read as follows:
Example D4(a)
Selected text in the example to read "**Minimum Size Main Feeders (or Service-Entrance Conductors) Required (Less House load) (For 40 Dwelling Units – 20 with Ranges)**" (The remaining text to be unchanged.)
Substantiation: Separate Proposals have been submitted to change the definitions of Service Cable, Service Conductors, and Service Equipment. This Proposal is intended to provide the Panel with information about the proposed changes and to provide a means to update corresponding affected text using the defined terms. The following is a listing of the proposed changes to the definitions and the technical substantiation for those changes:
Service-Entrance Cable. Service-entrance conductors made up in the form of a cable.
Service-Entrance Conductors. The conductors from the service point to the service disconnecting means.

Service Equipment. The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service-entrance conductors to a building or other structure, or and otherwise designated area, and intended to constitute the main cutoff and control of the supply.

The aspect of Service and what constitutes Service, and related issues, has been the subject of comments and revisions for the last several code cycles. That issue has also been debated by Panel 1 vis-à-vis the NEC Section 90.2(B)(5) over the last several cycles and it was finally clarified in the 2005 NEC. The primary concept that has been carried forth is that only utilities supply service. That has also been carried forth via the definitions of "service drops" and "service laterals". Those, too, are utility installed extensions of the services. What comes after the "point of delivery" or "the point of connection" are "service-entrance conductors," either underground or overhead.

It is recognized, however, that the definitions of "service entrance conductors" (either overhead and/or underground) need to have the concept of "service point" added to ensure further clarity of the issue. As the TCC noted in its comments in the ROP for the 2008 NEC, the concept of "Service Drop" and "Service Lateral" are "by current definitions and code requirements, not limited to the 'utility company side of the service point'." These revised definitions (and corresponding changes to related NEC Sections that use these terms as well as "Service Drop" and "Service Lateral") will clarify the application of NEC requirements.

By changing these definitions (and the corresponding Sections where the affected terms are used), these terms will be updated to correlate with existing definitions related to services and service entrances and capture the stated intent and understanding in the NEC.

Panel Meeting Action: Reject
Panel Statement: See panel statement on Proposal 2-298.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-386 Log #407 NEC-P02 **Final Action: Accept**
(Example D.4(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Under **Calculated Load for Each Dwelling Unit**, replace "per" with "/" so the first line reads: "General Lighting: 840 ft^2 at 3 VA/ft^2 = 2520 VA".

Under **Minimum Number of Branch Circuits Required for Each Dwelling Unit**, in Range Circuit, change "per" to "in accordance with".

Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-387 Log #408 NEC-P02 **Final Action: Accept**
(Example D.4(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Under **Calculated Load for Each Dwelling Unit**, replace "per" with "/" so the line reads: "840 ft^2 at 3 VA/ft^2".

Under **Minimum Number of Branch Circuits Required for Each Dwelling Unit**, in the fifth line, change "per" to "in accordance with".

Substantiation: This revision will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-388 Log #409 NEC-P02 **Final Action: Accept**
(Example D.5(a))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Under **Minimum Number of Branch Circuits Required for Each Dwelling Unit**, in Range Circuit, revise as follows "…and one 10 AWG conductor in accordance with ~~per~~ 210.19(A)(3)".

Under **Minimum Size Feeders Required from Service Equipment to Meter Bank (For 20 Dwelling Units — 10 with Ranges)**, change "Per phase demand" to "Demand on each phase".

Under **Minimum Size Main Feeder (Less House Load) (For 40 Dwelling Units — 20 with Ranges)**, change "Per phase demand" to "Demand on each phase".

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

2-389 Log #410 NEC-P02 **Final Action: Accept**
(Example D.5(b))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Under **Minimum Number of Branch Circuits Required for Each Dwelling Unit**, in Range Circuit, revise as follows "…and one 10 AWG conductor in accordance with ~~per~~ 210.19(A)(3)".

Under **Minimum Size Feeder Required for Each Dwelling Unit**, in the fourth line, change "120 V per leg" to "120 V/leg".

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

11-159a Log #1397 NEC-P11 **Final Action: Reject**
(Example D.8)

Submitter: Jon Reuter, Minneapolis, MN
Recommendation: Add feeder conductor calculations at the end of the "Conductor Ampacity" section as follows:

For the 25-hp motor,
34 A x 1.25 = 42.5 A
For the 30-horsepower motors,
40 A x 1.25 = 50 A
65 A x 1.25 = 81.25 A
For the feeder *[see 430.24]*,
(40 A x 1.25) + 40 A + 34 A = 124 A

Substantiation: Example D8 does not include the calculations for sizing feeder conductors. Although the appropriate article and section (430.24) is referenced at the top of the example, it is never applied in the example.
Panel Meeting Action: Reject
Panel Statement: It is unclear as to what the submitter is requesting based on his proposed calculations.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

12-185 Log #411 NEC-P12 **Final Action: Accept**
(Example D.9(a), (e), and (f))

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Change "Per" to "In accordance with" in (a), (e), and (f).

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Accept
Number Eligible to Vote: 11
Ballot Results: Affirmative: 11

11-160 Log #412 NEC-P11 **Final Action: Reject**
(Example D.10(b), (c), and (d))

TCC Action: It was the action of the Technical Correlating Committee that this proposal be referred to Code-Making Panel 12 for Action.

The action will be considered by Code-Making Panel 12 as a public comment.

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: Revise text to read as follows:

Change "Per" to "In accordance with" in (b), (c), and (d).

Substantiation: This revision will comply with the recommendations in the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard.
Panel Meeting Action: Reject
Panel Statement: The panel does not have jurisdiction over this example. It resides with Panel 12.
Number Eligible to Vote: 15
Ballot Results: Affirmative: 15

19-310 Log #413 NEC-P19 **Final Action: Reject**
(Example D.11)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: The following text should be revised as shown:
"Lighting (70 ft × 10 ft × 3 VA/ft[2] ~~VA per ft2~~)"
"4260 VA ÷ 240 V = 17.75 ~~A per leg~~ amperes"
"Amperes ~~per Leg~~"; "~~Leg~~ Line A" and "~~Leg~~ Line B"
"Total amperes ~~per leg~~"
"Based on the higher current calculated for either line ~~leg~~, a minimum 50 ampere ~~50-A~~ supply cord would be required."
Substantiation: These revisions will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard. Ampere is required to be spelled out when accompanied by a number value. The change from "leg" to "line" provides consistency with other Annex D Examples. "Phase" might be more appropriate.
Panel Meeting Action: Reject
Panel Statement: The existing language is consistent with other examples in Annex D. The proposed language does not improve clarity and usability of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

19-311 Log #414 NEC-P19 **Final Action: Reject**
(Example D.12)

Submitter: James M. Daly, Upper Saddle River, NJ
Recommendation: The following text should be revised as shown:
"Lighting (40 ft × 10 ft × 3 VA/ft[2] ~~VA per ft2~~)"
"3945 VA ÷ 240 V = 16.44 ~~A per leg~~ amperes"
"Amperes ~~per Leg~~"; "~~Leg~~ Line A" and "~~Leg~~ Line B"
"~~Totals~~ Total amperes"
"Based on the higher current calculated for either line ~~leg~~, a minimum 50 ampere ~~50-A~~ supply cord would be required."
Substantiation: These revisions will comply with the NEC Style Manual and the Manual of Style for NFPA Technical Committee Documents and provide consistency throughout the Code. "Per" is not an appropriate term for a standard. Ampere is required to be spelled out when accompanied by a number value. The change from "leg" to "line" provides consistency with other Annex D Examples. "Phase" might be more appropriate.
Panel Meeting Action: Reject
Panel Statement: The existing language is consistent with other examples in Annex D. The proposed language does not improve clarity and usability of the code.
Number Eligible to Vote: 8
Ballot Results: Affirmative: 8

8-287 Log #4299 NEC-P08 **Final Action: Accept in Principle**
(Example D.13-(New))

Submitter: Robert Crain, Cablofil
Recommendation: Add sample calculations for cable tray fill to a new or existing Annex.

EXAMPLE CALCULATIONS FOR SIZING CABLE TRAY CONTAINING POWER CABLES

1. Multi-Conductor Cables 4/0 & Larger
USE: NEC 392.9(A)(1)
Cable tray must have an inside width equal to or greater than the sum of the diameters (Sd) of the cables, which must be installed in a single layer.

Example: Cable tray width is obtained as follows:

Cable size being used	**(OD)** Cable outside Diameters (inches)	**(N)** Number of Cables	**Sd = (OD) x (N)** (Sum of the Cable Diameters in Inches)
3-conductor Type MC Cable – 4/0 AWG	1.57	12	18.84

The sum of the diameters (Sd) of all cables = 18.84 inches, therefore a ***cable tray*** with an inside width of at least ***18.84 inches*** is required.

Note: Cable outside diameter is a nominal diameter from catalog data.

EXAMPLE CALCULATIONS FOR SIZING CABLE TRAY CONTAINING POWER CABLES

2. Multi-Conductor Cables smaller than 4/0
USE: *NEC 392.9(A)(2)*
The sum of the cross-sectional areas of all the cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in ***Table 392.9 Column 1***

Table 392.9 Column 1

Inside width of cable Tray (inches)	Allowable cable area (square inches)
6	7.0
9	10.5
12	14.0
18	21.0
24	28.0
30	35.0
36	42.0

Example: Cable tray width is obtained as follows:

Cable size being used	**(A)** Cable cross-sectional area (square inches)	**(N)** Number of Cables	Multiply **(A)** x **(N)** (which is a total cable cross-sectional area in square inches
4-conductor Type TC Cable - #1 AWG	1.1350	9	12.15

The total cable cross-sectional area is 12.15 square inches. Using the Table above, the next higher allowable cable area must be used, which is 14.0 square inches. The table specifies that the cable tray inside width for an allowable cable area of 14.0 square inches is 12 inches.

Note: Cable cross-sectional area is a nominal area from catalog data.

EXAMPLE CALCULATIONS FOR SIZING CABLE TRAY CONTAINING POWER CABLES

3. Single Conductor Cables 1/0-4/0

USE: *NEC 392.10(A)(4)*

Cable tray must have an inside width equal to or greater than the sum of the diameters (Sd) of the cables. The cables must be evenly distributed across the cable tray.

Example: Cable tray width is obtained as follows:

Single conductor Cable size being used	**(OD)** Cable outside Diameters (inches)	**(N)** Number of Cables	**Sd = (OD) x (N)** (Sum of the Cable Diameters in Inches)
THHN – 4/0 AWG	0.642	18	11.556

The sum of diameters (Sd) of all cables = 11.56 inches, therefore a ***cable tray*** with an inside width of at least ***11.56 inches*** is required.

Note: Cable outside diameter from Chapter 9, Table 5.

EXAMPLE CALCULATIONS FOR SIZING CABLE TRAY CONTAINING POWER CABLES

4. Single Conductor Cables 250 – 900 kcmil

USE: NEC 392.10(A)(2)

The sum of the cross-sectional areas of all the cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in Table 392.10(A) Column 1

Table 392.10 Column 1

Inside width of cable tray (inches)	Allowable cable area (square inches)
6	6.5
9	9.5
12	13.0
18	19.5
24	26.0
30	32.5
36	39.0

Example: Cable tray width is obtained as follows:

Cable size being used	**(A)** Cable cross-sectional area (square inches)	**(N)** Number of Cables	Multiply **(A)** x **(N)** (which is a total cable cross-sectional area in square inches
THHN- 500kcmil	0.707	9	6.36

The total cable cross-sectional area is 6.36 square inches. Using the Table above, the next higher allowable cable area must be used, which is 6.5 square inches. The table specifies that the cable tray inside width for an allowable cable area of 6.5 square inches is ***6 inches***.

Note: Single conductor cable cross-sectional area from Chapter 9, Table 5.

Substantiation: The rules and charts provided in Article 392 for determining the required cable tray size are complex. Cable tray manufacturers receive many technical support inquiries regarding how to figure cable tray size. Locating sample calculations in an Annex would assist users of the Code in sizing cable tray.

A table in an Annex of the Code would be a useful tool, and additionally these sample calculations will provide the detail necessary to understand the application of alternate cable types and sizes.

Panel Meeting Action: Accept in Principle

Add a new title to the proposal to state:

Example D.13 Cable Tray Calculations (see Article 392).

Panel Statement: The panel supports the proposal but requires a title per the NEC Style Manual.

Number Eligible to Vote: 12

Ballot Results: Affirmative: 12

(**Note: Sequence 8-288 was not used)**

Annex E — Types of Construction

7-163 Log #2950f NEC-P07 **Final Action: Accept in Principle**
(Annex E)

Submitter: Mark T. Rochon, Peabody, MA

Recommendation: Add new text to read as follows:

<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>

Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.

Panel Meeting Action: Accept in Principle

Panel Statement: The panel recommends that the text be added to the NEC Table of Contents.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Annex F — Availability and Reliability for Critical Operations Power Systems; and Development and Implementation of Functional Performance Tests (FPTs) for Critical Operations Power Systems

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13-304 Log #3943 NEC-P13 **Final Action: Reject**
(Annex F)

Submitter: James Kelley, Sargent & Lundy

Recommendation: Revise text to read as follows:

Testing Implementation for FPTs. The final step in the successful commissioning plan is testing and proper execution of system-integrated tests.

(1) Systems Ready to Operate. The FPTs can be implemented as various systems become operative (i.e., test for the generator system) or when the entire system is installed. However, the final "pull the plug" test is performed only after all systems are completely installed. If the electrical contractor (or subcontractor) implements the FPTs, a witness must initial each step of the test. The electrical contractor cannot employ the witness directly or indirectly.

(2) Perform Tests ~~(FPTs)~~. If the system fails the test, the problem must be resolved and the equipment or system retested or the testing requirements re-analyzed until successful tests are witnessed. Once the system or equipment passes testing, it is verified by designated commissioning official.

Substantiation: "System-integrated tests" should be defined.

The acronym FPT is incorrect for "Perform Tests"; therefore, stricken provided the intent was to discuss the act of performing tests.

Panel Meeting Action: Reject

Panel Statement: The intent of the annex provisions are clear as written in the current text.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-305 Log #3945 NEC-P13 **Final Action: Accept in Part**
(Annex F)

Submitter: James Kelley, Sargent & Lundy

Recommendation: Revise text to read as follows:

(1) Submit Functional Performance Tests (FPTs). System/component tests or <u>functional performance tests</u> (FPTs) are developed from submitted drawings, <u>systems operating documents</u> (SODS) and <u>systems operation and maintenance manuals</u> (SOMMs), including large component testing (i.e., transformers, cable, generators, UPS), and how components operate as part of the total system. The commissioning authority develops the test and cannot be the installation contractor (or subcontractor).

As the equipment/components/systems are installed, quality assurance procedures are administered to verify that components are installed in accordance with minimum manufacturers' recommendations, safety codes, and acceptable installation practices. Quality assurance discrepancies are then identified and added to a "commissioning action list" that must be rectified as ~~past~~ <u>part</u> of the commissioning program. These items would usually be discussed during commissioning meetings. Discrepancies are usually identified initially by visual inspection.

Substantiation: According to the 2003 National Electrical Code Style Manual amended January 15, 2003, 3.2.3, all acronyms and any abbreviations that are not in common use shall be spelled out with the abbreviation [or acronym] following in parenthesis for the first use of the term in the body of each article.

Though the acronym FPT, familiar to the commissioning community, is spelled out ahead of its use in the title of the article, the comment is for the body of the article.

The acronym SOD is not in common use. A search for the meaning of this acronym yielded a term used in government or military language. One case where this was found spelled out was in the Army Corp of Engineers Technical Manual 5-694 meaning "systems operating document".

The acronym SOMM is not in common use. A search for the meaning of this acronym yielded a term used in government or military language. One case where this was found spelled out was in the Army Corp of Engineers document ER 25-345-1 meaning "Systems Operation and Maintenance (O&M) Manual".

Editorial correction of spelling that resulted in the word "past" instead of "part".

Panel Meeting Action: Accept in Part

The panel accepts the recommendation other than to use the term "functional performance tests" in the text of the provision.

Panel Statement: The use of only the acronym in the text is appropriate as it is explained in the title.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

13-306 Log #2950g NEC-P13 **Final Action: Accept in Principle**
(Annex F)

Submitter: Mark T. Rochon, Peabody, MA

Recommendation: Add new text to read as follows:

<u>Annex: Informational Purposes Only.</u>
<u>Annex A Product Safety.</u>
<u>Annex B Application Information for Ampacity Calculation.</u>
<u>Annex C Conduit and Tubing Fill Tables for Conductors and Luminaire Wires of the Same Size.</u>
<u>Annex D Examples.</u>
<u>Annex E Type of Construction.</u>
<u>Annex F About Critical Operations Power System.</u>
<u>Annex G Supervisory Control and Data Acquisition.</u>
<u>Annex H Administration and Enforcement.</u>

Substantiation: A description of the Annexes would be very helpful in searching for the informational headings making the code easier to use.

Panel Meeting Action: Accept in Principle

The panel recommends that the titles of Annexes A through H be added to the table of contents.

Panel Statement: The panel understands that the table of contents is a staff editorial function. The panel concurs with the recommendation that the annex titles are useful information that can be added to the list of annexes in the table of contents.

Number Eligible to Vote: 14

Ballot Results: Affirmative: 14

Annex H — Administration and Enforcement

1-276a Log #173 NEC-P01 **Final Action: Reject**
(Annex H)

Submitter: Felix Giannini, Lexco, Inc.
Recommendation: Changes to Article 90.4: FROM:
Insert into Annex H Administration 80.2 Definitions:
Governing Authority. A duly elected legislative body empowered to enact legislation in behalf of the Local, State, Federal or National government to which it has been elected.
Substantiation: I believe that a definition should be included in Annex G Administration 80.2, too, so as to make the term clear and perhaps legally effective, this should be addressed in any and all other codes that use that term as well as similar terms.
Panel Meeting Action: Reject
Panel Statement: The proposed definition would preclude those governing authorities who are appointed.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

1-277 Log #3983 NEC-P01 **Final Action: Reject**
(H80.13)

Submitter: Michael A. Anthony, University of Michigan Business Operations
Recommendation: ADD TEXT AS SHOWN BELOW:
80.13 Authority.
Where used in this article, the term *authority having jurisdiction* shall include the chief electrical inspector, **fire marshal, public safety official,** or other individuals designated by the governing body. This Code shall be administered and enforced by the authority having jurisdiction designated by the governing authority as follows.
Substantiation: THIS CHANGE BROADENS THE AUTHORITY TO OTHER OFFICIALS, WITH OTHER TITLES AND/OR FUNCTIONS, WHO MAY HAVE A KEY ROLE IN ADMINISTRATION AND ENFORCEMENT. THIS CHANGE MAY ASSIST ADOPTING AGENCIES IN THE DETERMINATION OF AUTHORITY IN USING NEW ARTICLE 708 – CRITICAL OPERATIONS POWER SYSTEMS.
Panel Meeting Action: Reject
Panel Statement: The chief electrical inspector is defined in 80.2. Generally, the authority having jurisdiction for administering the NEC should be the chief electrical inspectors.
This section, however, currently allows for “other individuals designated by the governing body” Other individuals could be the fire marshal or public safety official. The additional text is unnecessary.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 11 Negative: 1
Explanation of Negative:
ANTHONY, M.: This section of the code needs to reflect a changed workplace in which the widely understood title and responsibility of the Chief Electrical Inspector has been integrated into the work of a Public Safety Official or Fire Marshal. We should not assume that the individual charged with administering the NEC is an inspector or even an electrician; so much has risk management spread out responsibility.

1-278 Log #2328 NEC-P01 **Final Action: Reject**
(H80.15(B)(4)f.)

Submitter: Michael L. Last, Na’alehu, HI
Recommendation: Revise text as follows:
f. A member of an ~~the labor~~ organization that represents the primary electrical workforce.
Substantiation: The submitter is well aware that Annex H (as are all the other annexes: A thru G), is (are) included for informational purposes only; and not a part of NFPA 70. Unlike any of the other annexes (A thru G), the preface to Annex H has additional wording relative to adoption by the local jurisdiction. If the local jurisdiction adopts Annex H (without modification), the wording is such that an unfair benefit could be afforded to a labor organization- through its adoption. As a member of the Electrical Board, the individual identified in paragraph f. could assist in the formulation of rules and regulations that, while beneficial to members of labor organizations, has a negative impact on other equally (or more) qualified individuals who do not affiliate themselves with a labor organization. An example of such a regulation could be one which stipulates a required completion of a course of study administered by a labor union. The proposed revision will give equal representation to both those who align themselves with labor (union) organizations, and those who do not. there are organizations, while not considered labor entities, perform similar functions to unions. The members of said non- labor groups share the same work ethics as do their brothers in the unions. The wording currently in place could offer an unfair advantage to a select group of workers. Especially when the majority of the workforce is not represented by a labor organization.
Panel Meeting Action: Reject
Panel Statement: List item (f)of 80.15(B)(4) is one of eight additional membership choices necessary to ensure that the electrical board reflects the balanced representation required in 80.15(B)(1).
Number Eligible to Vote: 12
Ballot Results: Affirmative: 10 Negative: 2
Explanation of Negative:
ANTHONY, M.: We agree with the submitter’s substantiation that the more general term to describe the primary electrical workforce is more fair to the majority of the workforce that is not represented by a labor organization. As an example, here is how the composition of an electrical administrative board is described in one state
The Electrical Administrative board was established by Act XXX of 19XX and consists of:

- State Fire Marshal
- A representative of an insurance bureau
- A representative of an electrical energy supply agency
- An electrical contractor
- A master electrician serving as a supervisor
- An electrical Journeyman
- A chief electrical inspector of a municipality
- A representative of distributors of electrical apparatus and supplies
- A representative of manufacturers primarily and actively engaged in
- similar products used as a part of or in connection with, an electrical installation.
- A representative of the general public

This state gets a balance of interests in its work without use of a word that connotes membership in a labor organization.
HITTINGER, D.: This proposal should have been accepted. Deleting the term “labor” would allow a member of any organization representing the primary electrical workforce to be able to serve on an electrical board.

Annex I

8-289 Log #3708 NEC-P08 **Final Action: Reject**
(Annex I (New))

Submitter: Vince Baclawski, National Electrical Manufacturers Association (NEMA)
Recommendation: Add table for cable tray fill to a new Annex.

See Tables 1-7 starting on page 1192

Substantiation: The tables for sizing cable tray based on the type and number of conductors is very confusing and difficult to understand. The rules are hard to apply correctly even for an experienced user. Tables showing the number of conductors in each size tray, similar to Annex C in NFPA 70 is much simpler and straightforward. The number one request of cable tray manufacturers’ technical support is for information concerning the correct sizing of cable tray based on a fixed number of cables. Many cable tray manufacturers have developed charts or spreadsheets to try and assist the contractor with sizing tray and some do not always give the correct answers. Inspectors also have difficulty determining the correct number of cables for an installed cable tray. The tables proposed to be added to new Annex are designed to reduce errors and provide the contractor the ease of use similar in design and style to those currently located in Annex C.
The information used to generate the tables is contained within the 2008 NFPA 70. The formulas used are based on the cable types, ampacities and sizes as required in NEC section 392.9 and 392.11. The tables are based on single conductor diameters currently located in NFPA 70, Chapter 9 Table 8. Multi-conductor cable diameters are based on worst case diameters reviewed from each all North American Copper/Aluminum multiconductor cable manufacturers. The inside width and fill depth of cable tray is restricted by NEMA VE1 as referenced in NEC 392.1. The proposed cable tray tables have the most common combination of cable types and conductors. It will serve as guideline for the typical cable tray installation and will allow the less common installation to continue to rely on the formulas in the existing code.
Panel Meeting Action: Reject
Panel Statement: The panel found errors in the table; technical information is not correct.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

(Note: Sequence 8-290 was not used)

Number of Type MC Cables allowed in Cable Tray (3C Multi-conductor MC Cable Non-Jacketed Assembly)

Table New 1 *(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)*

		Ventilated Tray Width												
Conductor Insulation Type	**Conductor Size (AWG/ kcmil)**	**50 2”**	**100 4”**	**150 6”**	**200 8”**	**300 12”**	**400 16”**	**450 18”**	**500 20”**	**600 24”**	**750 30”**	**900 36”**		**Dia used**
THHN														
	14	13	27	41	55	82	110	124	138	165	206	248		0.46
	12	10	20	31	41	62	83	93	104	124	160	192		0.53
	10	7	15	23	31	47	62	70	78	94	119	149		0.61
	8	6	12	18	25	37	50	56	63	75	96	116		0.68
	6	4	8	13	17	26	34	39	43	52	66	79		0.82
	4	2	5	8	11	17	23	26	29	35	45	55		0.99
	3	2	5	7	10	15	21	23	26	31	40	48		1.05
	2	2	4	6	9	13	18	20	22	27	34	41		1.13
	1	2	4	6	8	12	16	18	20	24	30	36		1.2
	1/0	1	3	5	7	11	14	16	18	22	28	34		1.25
	2/0	1	3	4	6	9	13	14	16	19	24	29		1.34
	3/0	1	2	3	5	7	10	11	13	15	20	24		1.49
	4/0	1	2	3	5	7	10	11	12	15	19	22		1.57
	250	1	2	3	4	6	9	10	11	13	17	20		1.74
	300	1	2	3	4	6	8	9	10	12	16	19		1.86
	350	1	2	3	4	6	8	9	10	12	15	18		1.96
	400	0	1	2	3	5	7	8	9	11	14	17		2.11
	500	0	1	2	3	5	7	7	8	10	13	16		2.24
	600	0	1	2	3	4	6	7	8	9	12	15		2.38
	700	0	1	2	3	4	6	7	7	9	11	14		2.52
	750	0	1	2	2	4	5	6	7	8	11	13		2.67
	800	0	1	2	2	4	5	6	6	8	10	12		2.85
	900	0	1	1	2	3	5	5	6	7	10	12		2.99
	1000	0	1	1	2	3	4	5	6	7	9	11		3.25
	Both Aluminum and copper Worst case diameter used													
	Ampacity per 310.16 310.18													

Table NEW -2

Number of Type MC Cables allowed per code (4C Multi-Conductor MC Cable Non-Jacketed Assembly)

(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)

Ventilated Tray Width

Conductor Insulation Type	**Conductor Size (AWG/ kcmil)**	**50 2”**	**100 4”**	**150 6”**	**200 8”**	**300 12”**	**400 16”**	**450 18”**	**500 20”**	**600 24”**	**750 30”**	**900 36”**		**Dia Used**
THHN														
	14	13	27	40	54	81	108	122	135	162	202	243		
	12	10	21	31	42	63	84	94	105	126	157	189		
	10	7	15	23	31	47	62	70	78	94	117	141		
	8	6	12	19	25	38	50	57	63	76	101	114		
	6	4	8	13	17	26	34	39	43	52	65	78		
	4	3	6	9	12	18	24	27	30	36	45	54		
	3	2	5	7	10	15	21	23	26	31	38	46		
	2	2	4	6	9	13	18	20	22	27	33	40		
	1	2	4	6	8	12	16	18	20	24	30	36		
	1/0	1	3	5	7	11	15	16	18	22	27	33		
	2/0	1	3	4	6	9	12	14	16	19	23	28		
	3/0	1	2	4	5	7	10	11	13	15	19	22		
	4/0	1	2	3	5	7	10	11	12	15	18	22		
	250	1	2	3	4	6	9	10	11	13	16	19		
	300	1	2	3	4	6	8	9	10	12	15	18		
	350	1	2	3	4	6	8	9	10	12	15	18		
	400	0	1	2	3	5	7	8	9	11	13	14		
	500	0	1	2	3	5	7	7	8	10	12	15		
	600	0	1	2	3	5	5	7	8	10	12	15		
	700	0	1	2	3	5	6	7	7	8	10	14		
	750	0	1	2	2	4	5	6	6	8	11	13		
	800	0	1	2	2	4	5	6	7	8	10	12		
	900	0	1	2	2	4	5	6	6	8	10	12		
	1000	0	1	1	1	3	4	5	5	7	9	11		

Both Aluminum and copper, Largest commercial cable diameter used
Ampacity per 310.16 310.18

Table New 3 **Number of Type TC Cables allowed per code (3C Multi-conductor TC cable Assembly)**

(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)

		Ventilated Tray Width											
Conductor Insulation Type	**Conductor Size (AWG/ kcmil)**	**50 2”**	**100 4”**	**150 6”**	**200 8”**	**300 12”**	**400 16”**	**450 18”**	**500 20”**	**600 24”**	**750 30”**	**900 36”**	**Dia used**
THHN													
	14	13	27	40	54	81	108	122	135	162	202	243	
	12	10	21	31	42	63	84	94	105	126	157	189	
	10	7	15	23	31	47	62	70	78	94	117	141	
	8	6	12	19	25	38	50	57	63	76	101	114	
	6	4	8	13	17	26	34	39	43	52	65	78	
	4	3	6	9	12	18	24	27	30	36	45	54	
	3	2	5	7	10	15	21	23	26	31	38	46	
	2	2	4	6	9	13	18	20	22	27	33	40	
	1	2	4	6	8	12	16	18	20	24	30	36	
	1/0	1	3	5	7	11	15	16	18	22	27	33	
	2/0	1	3	4	6	9	12	14	16	19	23	28	
	3/0	1	2	4	5	7	10	11	13	15	19	22	
	4/0	1	2	3	5	7	10	11	12	15	18	22	
	250	1	2	3	4	6	9	10	11	13	16	19	
	300	1	2	3	4	6	8	9	10	12	15	18	
	350	1	2	3	4	6	8	9	10	12	15	18	
	400	0	1	2	3	5	7	8	9	11	13	14	
	500	0	1	2	3	5	7	7	8	10	12	15	
	600	0	1	2	3	5	5	7	8	10	12	15	
	700	0	1	2	3	5	6	7	7	8	10	14	
	750	0	1	2	2	4	5	6	6	8	11	13	
	800	0	1	2	2	4	5	6	7	8	10	12	
	900	0	1	2	2	4	5	6	6	8	10	12	
	1000	0	1	1	1	3	4	5	5	7	9	11	

Both Aluminum and copper, Largest commercial cable diameter used

Ampacity per 310.16 310.18

Table New 4	Number of Type TC Cables allowed per code (4C Multi-conductor TC cable Assembly)													
	(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)													
					Ventilated Tray Width									
Conductor Insulation Type	**Conductor Size (AWG/ kcmil)**	**50 2”**	**100 4”**	**150 6”**	**200 8”**	**300 12”**	**400 16”**	**450 18”**	**500 20”**	**600 24”**	**750 30”**	**900 36”**		**Dia used**
THHN														
	14	11	23	35	47	71	95	107	119	143	182	219		0.49
	12	9	18	27	36	55	73	82	91	110	140	168		0.56
	10	6	13	20	27	41	54	61	68	82	104	125		0.65
	8	5	10	16	21	32	43	49	54	65	83	99		0.73
	6	4	8	13	17	26	34	39	43	52	66	79		0.82
	4	2	5	7	10	15	20	22	25	30	38	46		1.08
	3	2	4	6	8	13	17	19	22	26	33	40		1.15
	2	1	3	5	7	11	15	17	19	22	29	34		1.24
	1	1	3	4	6	9	12	14	16	19	24	29		1.35
	1/0	1	3	4	6	9	12	14	15	18	24	28		1.36
	2/0	1	2	3	5	7	10	11	13	15	20	24		1.49
	3/0	1	2	3	4	6	8	10	11	13	17	20		1.61
	4/0	1	2	3	4	6	9	10	11	13	17	20		1.75
	250	1	2	3	4	6	8	9	10	12	15	18		1.91
	300	0	0	0	0	0	0	0	0	0	0	0		
	350	0	1	2	3	5	7	8	9	10	13	16		2.16
	400	0	0	0	0	0	0	0	0	0	0	0		
	500	0	1	2	3	4	6	7	7	9	12	14		2.48
	600	0	0	0	0	0	0	0	0	0	0	0		
	700	0	0	0	0	0	0	0	0	0	0	0		
	750	0	1	1	2	3	5	5	6	7	10	12		2.96
	800	0	0	0	0	0	0	0	0	0	0	0		
	900	0	0	0	0	0	0	0	0	0	0	0		
	1000	0	0	0	0	0	0	0	0	0	0	0		
	Both Aluminum and copper, Largest commercial cable diameter used													
	Ampacity per 310.16 310.18													

Number of Single Conductor Cables allowed in Cable Tray

Table New 5

(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)

		Ventilated Tray Width												
Conductor Insulation Type	**Conductor Size (AWG/ kcmil)**	**50 2”**	**100 4”**	**150 6”**	**200 8”**	**300 12”**	**400 16”**	**450 18”**	**500 20”**	**600 24”**	**750 30”**	**900 36”**		**Dia used**
THHN														
	1/0	4	8	12	16	24	32	36	40	48	61	74		0.486
	2/0	3	7	11	14	22	29	33	37	44	56	67		0.532
	3/0	3	6	10	13	20	26	30	33	40	51	61		0.584
	4/0	3	6	9	12	18	24	27	30	36	46	56		0.642
	250	5	10	16	21	32	42	48	53	64	81	98		0.711
	300	4	9	13	18	27	37	41	46	55	70	84		0.766
	350	4	8	12	16	24	32	36	40	48	61	74		0.817
	400	3	7	10	14	21	29	32	36	43	55	66		0.864
	500	3	6	9	12	18	24	27	30	36	45	55		0.949
	600	2	4	7	9	14	19	22	24	29	37	44		1.051
	700	2	4	6	8	12	17	19	21	25	32	39		1.122
	750	2	4	6	8	12	16	18	20	24	30	37		1.156
	800	1	3	5	7	11	15	17	19	23	29	35		1.188
	900	1	3	5	6	10	13	15	17	20	26	31		1.252
	1000	1	3	4	6	9	12	13	15	18	22	27		1.31

Conductor diameter based on Chapter 9, Table 8

Ampacity per 310.16 310.18

Table New 6

Number of Single Conductor Cables allowed in Cable Tray

(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)

Conductor Insulation Type	Conductor Size (AWG/ kcmil)	50 2”	100 4”	150 6”	200 8”	300 12”	400 16”	450 18”	500 20”	600 24”	750 30”	900 36”	Dia used
						Ventilated Tray Width							
XHHW													
	1/0	4	8	12	16	24	32	36	40	49	62	74	0.482
	2/0	3	7	11	14	22	29	33	37	44	56	68	0.528
	3/0	3	6	10	13	20	27	30	33	40	51	62	0.58
	4/0	3	6	9	12	18	24	27	30	37	47	56	0.638
	250	5	10	16	21	32	43	49	54	65	83	98	0.705
	300	4	9	14	18	28	37	42	47	56	71	85	0.76
	350	4	8	12	16	24	33	37	41	49	62	75	0.811
	400	3	7	11	14	22	29	33	36	44	56	67	0.858
	500	3	6	9	12	18	24	27	30	36	46	55	0.943
	600	2	4	7	9	14	19	22	24	29	37	44	1.053
	700	2	4	6	8	12	17	19	21	25	32	39	1.124
	750	2	4	6	8	12	16	18	20	24	30	37	1.158
	800	1	3	5	7	11	15	17	19	23	29	35	1.19
	900	1	3	5	6	10	13	15	17	20	26	31	1.254
	1000	1	3	4	6	9	12	13	15	18	22	27	1.312

Conductor diameter based on Chapter 9, Table 8

Ampacity per 310.16 310.18

Table New 7	Number of Single Conductor Cables allowed in Cable Tray												
	(Based on fill per 392.9 , Table 392.9, Column 1, ampacity per 392.11)												
					Ventilated Tray Width								
Conductor Insulation Type	**Conductor Size (AWG/ kcmil)**	**50 2”**	**100 4”**	**150 6”**	**200 8”**	**300 12”**	**400 16”**	**450 18”**	**500 20”**	**600 24”**	**750 30”**	**900 36”**	**Dia used**
RHW													
	1/0	3	7	11	14	22	29	33	37	44	56	67	0.532
	2/0	3	6	10	13	20	27	30	34	40	51	62	0.578
	3/0	3	6	9	12	18	24	28	31	37	47	57	0.63
	4/0	2	5	8	11	17	22	25	28	34	43	52	0.688
	250	4	9	13	18	27	37	41	46	55	70	84	0.765
	300	4	8	12	16	24	32	36	40	48	61	73	0.82
	350	3	7	10	14	21	28	32	35	42	54	65	0.871
	400	3	6	9	12	19	25	28	32	38	49	58	0.918
	500	2	5	8	10	16	21	24	26	32	41	49	1.003
	600	2	4	6	8	13	17	19	21	26	33	40	1.113
	700	1	3	5	7	11	15	17	19	23	29	35	1.184
	750	1	3	5	7	10	14	16	18	21	27	33	1.218
	800	1	3	5	6	10	13	15	17	20	26	31	1.25
	900	1	3	4	6	9	12	14	15	18	23	28	1.314
	1000	1	2	4	5	8	11	12	14	17	21	26	1.372
	Conductor diameter based on Chapter 9, Table 8												
	Ampacity per 310.16 310.18												

16-351 Log #4830a NEC-P16 **Final Action: Reject**
(Annex I (New))

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Add new Annex I as follows:
Annex I
Annex I is not a part of the requirements of this NFPA document. It is included for informational purposes only and does not form a mandatory part of the requirements of this Code.
This informational annex provides a list of referenced documents referred to by Fine Print Notes within other sections of this Code. It is recognized that this list is current at the time of publication but that new documents or modifications to existing documents can occur at any time while this edition of the Code is in effect.
(1) NFPA 251-2006, Standard Methods of Tests of Fire Resistance of Building Construction and Materials - one method of determining fire rating
(2) UL 60950-1-2003, Standard for Safety of Information Technology Equipment - for one way to determine applicable requirements for listing of information technology (computer) equipment
(3) NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces - for one method of defining low smoke-producing cable as a maximum peak optical density of 0.5 and a maximum average optical density of 0.15.
(4) ANSI/UL 1666- 2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts - for one method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor
(5) UL
1685-2000, Standard for Safety for Vertical-Tray Fire- Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables - for one method of defining “resistant to the spread of fire” by using the “UL Flame Exposure, Vertical Tray Flame Test”
(6) CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables - for another method of defining “resistant to the spread of fire”
(7) ANSI/UL 1581-2001, Reference Standard for Electrical Wires, Cables and Flexible Cords - for one method of determining that cable is resistant to flame spread by use of the VW-1 (vertical wire) flame test.
(8) UL 2196-2002, Standard for Tests of Fire Resistive Cables - for one method of defining circuit integrity by establishing a minimum 2-hour fire resistance rating
(9) UL 2024, Standard for Optical Fiber Cable Raceway - for one method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor by using the Test for Flame Propagation (Riser)
(10) NFPA 72®-2007, National Fire Alarm Code® - for further information on the installation and monitoring for integrity requirements for fire alarm systems
(11) ANSI/UL 1666-2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts - for one method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor
This proposal has also been sent to Code-Making Panel 3.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: The FPNs are more user-friendly in current locations.
Number Eligible to Vote: 16
Ballot Results: Affirmative: 16

3-340 Log #4830 NEC-P03 **Final Action: Reject**
(Annex I (New))

Submitter: T. David Mills, T. David Mills Associates
Recommendation: Add new Annex I as follows:
Annex I
Annex I is not a part of the requirements of this NFPA document. It is included for informational purposes only and does not form a mandatory part of the requirements of this Code.
This informational annex provides a list of referenced documents referred to by Fine Print Notes within other sections of this Code. It is recognized that this list is current at the time of publication but that new documents or modifications to existing documents can occur at any time while this edition of the Code is in effect.
(1) NFPA 251-2006, Standard Methods of Tests of Fire Resistance of Building Construction and Materials - one method of determining fire rating
(2) UL 60950-1-2003, Standard for Safety of Information Technology Equipment - for one way to determine applicable requirements for listing of information technology (computer) equipment
(3) NFPA 262-2007, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces - for one method of defining low smoke-producing cable as a maximum peak optical density of 0.5 and a maximum average optical density of 0.15.
(4) ANSI/UL 1666- 2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cable Installed Vertically in Shafts - for one method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor
(5) UL
1685-2000, Standard for Safety for Vertical-Tray Fire- Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables - for one method of defining “resistant to the spread of fire” by using the “UL Flame Exposure, Vertical Tray Flame Test”
(6) CSA C22.2 No. 0.3-M-2001, Test Methods for Electrical Wires and Cables - for another method of defining “resistant to the spread of fire”
(7) ANSI/UL 1581-2001, Reference Standard for Electrical Wires, Cables and Flexible Cords - for one method of determining that cable is resistant to flame spread by use of the VW-1 (vertical wire) flame test.
(8) UL 2196-2002, Standard for Tests of Fire Resistive Cables - for one method of defining circuit integrity by establishing a minimum 2-hour fire resistance rating
(9) UL 2024, Standard for Optical Fiber Cable Raceway - for one method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor by using the Test for Flame Propagation (Riser)
(10) NFPA 72®-2007, National Fire Alarm Code® - for further information on the installation and monitoring for integrity requirements for fire alarm systems
(11) ANSI/UL 1666-2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts - for one method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor
This proposal has also been sent to Code-Making Panel 16.
Substantiation: The number of fine print notes (FPNs) solely to reference other documents has grown significantly and many are repeated verbatim in several different sections of the Code. This situation can be alleviated by forming an informative annex that can be referenced by multiple FPNs without duplicating paragraphs of words. The Code would be easier to read and printing costs could be reduced as well.
I plan to recommend a revision to the NEC Manual of Style section 4.2 allowing the creation of just such an annex.
Panel Meeting Action: Reject
Panel Statement: See the panel statement on Proposal 3-72.
Number Eligible to Vote: 14
Ballot Results: Affirmative: 13 Negative: 1
Explanation of Negative:
SANDERS, M.: See my Explanation of Negative for Proposal 3-72.

Annex K

1-276b Log #468 NEC-P01 **Final Action: Reject**
(Annex K (New))

Submitter: Joseph A. Tedesco, Tedesco Electrical Code Consultants, Inc.
Recommendation: Add new text from NFPA 70E Annex K to read as follows:
This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.
XX.1 General Categories.
There are three general categories of electrical hazards: electrical shock, arc-flash, and arc-blast.
XX.2 Electric Shock.
Approximately 30,000 nonfatal electrical shock accidents occur each year. The National Safety Council estimates that about 1000 fatalities each year are due to electrocution, more than half of them while servicing energized systems of less than 600 volts. Electrocution is the fourth leading cause of industrial fatalities, after traffic, homicide, and construction accidents. The current required to light a 71/2 watt, 120 volt lamp, if passed across the chest, is enough to cause a fatality. The most damaging paths through the body are through the lungs, heart, and brain.
XX.3 Arc-Flash.
When an electric current passes through air between ungrounded conductors or between ungrounded conductors and grounded conductors, the temperatures can reach 35,000F. Exposure to these extreme temperatures both burns the skin directly and causes ignition of clothing, which adds to the burn injury. The majority of hospital admissions due to electrical accidents are from arc-flash burns, not from shocks. Each year more than 2,000 people are admitted to burn centers with severe arc-flash burns. Arc-flashes can and do kill at distances of 10 ft.
XX.4 Arc-Blast.
The tremendous temperatures of the arc cause the explosive expansion of both the surrounding air and the metal in the arc path. For example, copper expands by a factor of 67,000 times when it turns from a solid to a vapor. The danger associated with this expansion is one of high pressures, sound, and shrapnel. The high pressures can easily exceed hundreds or even thousands of pounds per square foot, knocking workers off ladders, rupturing eardrums, and collapsing lungs. The sounds associated with these pressures can exceed 160 dB. Finally, material and molten metal is expelled away from the arc at speeds exceeding 700 miles per hour, fast enough for shrapnel to completely penetrate the human body.
Substantiation: NFPA 70E is not adopted by many, and parts of it should be in an Annex in the NEC.
Panel Meeting Action: Reject
Panel Statement: The proposal does not comply with 4.3.3(d) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12

Annex L

8-291 Log #492 NEC-P08 **Final Action: Reject**
(Annex L-(New))

Submitter: Joe Tedesco, Tedesco Electrical Code Consultants, Inc.
Recommendation: Add new text as follows:
Annex L: Removal of abandoned wiring & equipment
Substantiation: Remove abandoned wiring to source of supply.
Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.
Disconnect and remove abandoned panelboards and distribution equipment.
Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
Panel Meeting Action: Reject
Panel Statement: The proposal does not recommend specific code text as is required by 4.3.3(c) of the NFPA Regulations Governing Committee Projects.
Number Eligible to Vote: 12
Ballot Results: Affirmative: 12